DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Part 1

[TD 10024]

RIN 1545–BR17

Section 45Y Clean Electricity Production Credit and Section 48E Clean Electricity Investment Credit

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Final regulations.

SUMMARY: This document sets forth final regulations regarding the clean electricity production credit and the clean electricity investment credit established by the Inflation Reduction Act of 2022. These final regulations provide rules for determining greenhouse gas emissions rates resulting from the production of electricity; petitioning for provisional emissions rates; and determining eligibility for these credits in various circumstances. The final regulations affect all taxpayers that claim the clean electricity production credit with respect to a qualified facility or the clean electricity investment credit with respect to a qualified facility or energy storage technology, as applicable, that is placed in service after 2024.

DATES:

Effective date: These regulations are effective on January 15, 2025.

Applicability dates: For dates of applicability, see §§ 1.45Y–1(e), 1.45Y–2(d), 1.45Y–3(d) 1.45Y–4(e), 1.45Y–5(j), 1.48E–1(e), 1.48E–2(h), 1.48E–3(f), 1.48E–4(j), and 1.48E–5(l).

FOR FURTHER INFORMATION CONTACT: Maksim Berger, John M. Deininger, Martha M. Garcia, Boris Kukso, Nathaniel Kupferman, and Alexander Scott at (202) 317–6853 (not a toll-free number).

SUPPLEMENTARY INFORMATION:

Authority

This Treasury decision amends the Income Tax Regulations (26 CFR part 1) to implement the statutory provisions of sections 45Y and 48E of the Internal Revenue Code (Code). The regulations contained in this Treasury decision are issued by the Secretary of the Treasury or her delegate (Secretary) pursuant to the authority granted under sections 45Y(f), 48E(i) and 7805(a) of the Code (final regulations).

Section 45Y(f) provides an express delegation of authority to the Secretary to prescribe rules to implement section 45Y, ''including calculation of greenhouse gas emissions rates for qualified facilities and determination of clean electricity production credits under section 45Y.'' Section 48E(i) provides an express delegation of authority to prescribe rules ''regarding implementation of [section 48E].''

Finally, section 7805(a) authorizes the Secretary ''to prescribe all needful rules and regulations for the enforcement of [the Code], including all rules and regulations as may be necessary by reason of any alteration of law in relation to internal revenue.''

Background

On August 30, 2023, the Treasury Department and the IRS published a notice of proposed rulemaking and a notice of public hearing (REG–100908–23) in the **Federal Register** (88 FR 60018), *corrected in* 88 FR 73807 (Oct. 27, 2023), and 89 FR 25550 (April 11, 2024), providing guidance on the Prevailing Wage and Apprenticeship (PWA) requirements under sections 30C, 45, 45L, 45Q, 45U, 45V, 45Y, 45Z, 48, 48C, 48E, and 179D (PWA proposed regulations).

On November 22, 2023, the Treasury Department and the IRS published a notice of proposed rulemaking and a notice of public hearing (REG–132569–17) in the **Federal Register** (88 FR 82188), *corrected in* 89 FR 2182 (January 12, 2024), proposing rules that would provide guidance under section 48 (section 48 proposed regulations). On February 22, 2024, the Treasury Department and the IRS published a second correction to the proposed regulations in the **Federal Register** (89 FR 13293) that re-opened the comment period through March 25, 2024. Among other matters, the section 48 proposed regulations withdrew and reproposed § 1.48–13 of the PWA proposed regulations addressing the PWA requirements under section 48, the rules under section 48(a)(9)(B)(i) related to an energy project with a maximum net output of less than one megawatt of electrical (as measured in alternating current) or thermal energy (One Megawatt Exception), and the recapture rules under section 48(a)(10)(C) related to the prevailing wage requirements. Although the section 48 proposed regulations withdrew certain portions of the PWA proposed regulations, the section 48 proposed regulations incorporated the preamble to the PWA proposed regulations for generally applicable rules.

On June 3, 2024, a notice of proposed rulemaking (REG–119283–23) relating to the clean electricity production credit determined under section 45Y (section 45Y credit) and the clean electricity investment credit determined under section 48E (section 48E credit) was published in the **Federal Register** (89 FR 47792) proposing amendments to 26 CFR part 1 (proposed regulations). *See* the Background and Explanation of Provisions sections of the preamble to the proposed regulations, which is incorporated in this preamble to the extent consistent with the following Summary of Comments and Explanation of Revisions. Additionally, the Treasury Department and the IRS requested comments on the proposed definition of a qualified facility with a maximum net output of less than one megawatt (as measured in alternating current) for purposes of the One Megawatt Exception under section 45Y(a)(2)(B)(i). The proposed regulations incorporated the preamble to the PWA proposed regulations for generally applicable rules.

On June 25, 2024, the Treasury Department and the IRS published final regulations (T.D. 9998) in the **Federal Register** (89 FR 53184) adopting the PWA proposed regulations (PWA final regulations) with certain modifications and revisions in response to public comments on the PWA proposed regulations. Comments received on generally applicable rules in response to the PWA proposed regulations, including rules that merely referenced section 48 or 48E, are addressed in the PWA final regulations. The preamble to the PWA final regulations explained that comments received regarding the specific PWA requirements related to the One Megawatt Exception under sections 45Y, 48, and 48E, and the recapture rules in section 48(a)(10)(C), whether received in response to the PWA proposed regulations or the section 48 proposed regulations, would be addressed in future guidance. Because proposed § 1.48E–3 of the PWA proposed regulations generally incorporated the rules of proposed § 1.48–13, the PWA final regulations did not include final regulations under section 48E. Proposed § 1.48E–3 of the PWA proposed regulations and the provisions relating to section 48E of the proposed regulations would be addressed in future guidance.

On December 12, 2024, the Treasury Department and the IRS published final regulations (T.D. 10015) in the **Federal Register** (89 FR 100598) adopting the section 48 proposed regulations, including the rules for the PWA requirements in § 1.48–13 (section 48 final regulations). The Treasury Department and the IRS addressed the comments related to the PWA requirements with respect to section 48 including the One Megawatt Exception

under section 48(a)(9)(B)(i), the recapture rules under section 48(a)(10)(C), and the definition of an energy project in the section 48 final regulations.

As described in the Summary of Comments and Explanation of Revisions, this Treasury decision adopts the proposed regulations with certain modifications after full consideration of all comments received, including comments pertaining to the One Megawatt Exception under section 45Y(a)(2)(B)(i) and to issues related to the PWA requirements under section 48E and proposed § 1.48E–3.

Summary of Comments and Explanation of Revisions

I. Overview

The Treasury Department and the IRS received over 1,800 written comments timely submitted by the August 2, 2024, comment submission deadline, in response to the proposed regulations, which are available for public inspection at *https://www.regulations.gov* or upon request. A public hearing was held in person on August 12, 2024, and telephonically on August 13, 2024, at which 36 speakers provided testimony over the two days. After careful consideration of the comments and testimony, the proposed regulations are adopted with modifications as described in this Summary of Comments and Explanation of Revisions.

Comments summarizing the statute or the proposed regulations, recommending statutory revisions to sections 45Y and 48E or other statutes, or addressing issues that are outside the scope of this rulemaking (such as revising other Federal regulations and recommending changes to IRS forms) are generally not described in this Summary of Comments and Explanation of Revisions or adopted in these final regulations. In addition to modifications described in this Summary of Comments and Explanation of Revisions, the final regulations also include non-substantive grammatical or stylistic changes to the proposed regulations. Unless otherwise indicated in this Summary of Comments and Explanation of Revisions, provisions of the proposed regulations with respect to which no comments were received are adopted without substantive change.

The Treasury Department and the IRS consulted extensively with scientific and technical experts from across the Federal government, including personnel from the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Department of Agriculture (USDA), in developing and drafting these final regulations. The Treasury Department and the IRS had regular working group meetings with these experts from the time that sections 45Y and 48E were enacted by the Inflation Reduction Act (IRA) through the drafting and publication of the proposed and final regulations. These meetings included discussions on the full range of issues related to determining greenhouse gas emissions rates for the production of electricity, petitioning for provisional emissions rates, and determining eligibility for the section 45Y and 48E credits in various circumstances. These meetings also included comprehensive briefing and full consideration of the issues raised in the comments received on the proposed regulations and proposed § 1.48E–3 of the PWA proposed regulations. In addition, experts from the DOE, the EPA, and the USDA reviewed multiple drafts of the proposed and final regulations in their entirety. The conclusions reached in these final regulations and explained in this Summary of Comments and Explanation of Revisions were deeply informed by these working group meetings and the scientific and technical expertise that was shared in those meetings.

For purposes of this preamble, a provision of the proposed regulations, for example, § 1.45Y–1 of the proposed regulations, is referred to as ''proposed § 1.45Y–1.''

II. Rules Specific to Section 45Y

Proposed § 1.45Y–1 provided an overview of proposed §§ 1.45Y–1 through 1.45Y–5 and definitions of terms for purposes of proposed §§ 1.45Y–1 through 1.45Y–5, including the terms ''combined heat and power system (CHP) property,'' ''metering device,'' ''related person,'' ''unrelated person,'' and ''qualified facility.''

A. Metering Device

Proposed § 1.45Y–1(a)(5)(i) through (iii) defined, for purposes of section 45Y(a)(1)(A)(ii)(II), the term ''metering device;'' provided standards for maintaining and operating a metering device for purposes of section 45Y(a)(1)(A)(ii)(II) and proposed § 1.45Y–1(a)(5), including by providing that a metering device should meet certain standards and be properly calibrated, and provided rules related to monitoring and locating the metering device. Proposed § 1.45Y–1(a)(5)(iv) provided examples illustrating the rules provided by proposed § 1.45Y–1(a)(5).

Commenters provided feedback on the definition of ''metering device.'' Two commenters noted that the proposed regulations defined a ''metering device'' related to ''energy revenue metering,'' and asserted that metering devices typically measure energy production, not revenue. The commenters recommended revising the term ''energy revenue metering'' to ''energy production metering'' in the final regulations.

The Treasury Department and the IRS have determined that, because energy revenue metering encompasses energy production measurement as part of its function, the commenters' concern is addressed by the proposed regulations. Therefore, these final regulations adopt the definition of metering device as proposed.

Another commenter requested that the final regulations provide clarifications regarding third-party metering requirements. The commenter requested that the Treasury Department and the IRS clarify whether operation of the metering device by a third party could be fully remote, or if the meter owner must be granted access to the site. The commenter further requested that the final regulations clarify whether the meter can be located prior to energy delivery to storage, or whether it must be located at the point of interconnection. Finally, the commenter requested clarification regarding whether the section 45Y credit amount is determined at the point of sale or where the electricity is metered.

Section 45Y(a)(1)(A) provides, in part, that the amount of the credit is the kilowatt hours of electricity produced by the taxpayer at a qualified facility and in the case of a qualified facility which is equipped with a metering device which is owned and operated by an unrelated person, sold, consumed or stored by the taxpayer during the taxable year. Proposed § 1.45Y–1(a)(5)(ii) required a metering device to meet the requirements of the American National Standards Institute C12.1–2022 standard, or subsequent revisions, be revenue grade with a +/− 0.5% accuracy, and be properly calibrated and maintained in proper working order according to the instructions of its manufacturer. If a metering device satisfies the requirements in § 1.45Y–1(a)(5)(ii), the statutory language of section 45Y(a)(1)(A) would not prevent operation by a third party to be fully remote. As to whether the metering device can be located prior to energy delivery to storage or whether it must be located at the point of interconnection, the location of the meter should not matter provided the meter meets the requirements in § 1.45Y–1(a)(5)(ii). Accordingly, the final regulations adopt

proposed § 1.45Y–1(a)(5) without change, and do not impose a specific location requirement for such metering device based on the lack of such a requirement in the statutory language.

B. Related and Unrelated Persons

Proposed § 1.45Y–1(a)(7) provided a definition of the term ''related person'' and special rules for the treatment of corporations that are members of a consolidated group (as defined in § 1.1502–1(h)).

Proposed § 1.45Y–1(a)(11) provided a definition of the term ''unrelated person;'' rules for the sales of electricity to individual consumers; and an example illustrating the application of these rules.

A commenter requested clarification regarding the sale to an unrelated person requirement. The commenter pointed to Notice 2008–60, 2008–30 I.R.B. 178, which provides guidance on the section 45 credit by clarifying that the requirement of a sale to an unrelated person will be treated as satisfied if the producer of electricity sells electricity to a related person for resale by the related person to a person that is not related to the producer. The commenter requested that the Treasury Department and the IRS likewise confirm that under section 45Y, a sale to a related person for the purposes of resale to an unrelated person will also be treated as a sale to an unrelated person if there is no metering device owned and operated by a third party.

The Treasury Department and the IRS disagree that the rule in Notice 2008–60 that is applicable to the section 45 credit, under which the sale of electricity to a related party with a subsequent sale to an unrelated party is treated as a sale to an unrelated party, should apply to the section 45Y credit. Section 45 does not include a provision similar to section 45Y(a)(1)(A)(ii), which provides that either (I) a taxpayer must sell the electricity to an unrelated party, or (II) the taxpayer's qualified facility must be equipped with a metering device owned and operated by an unrelated person, and the electricity must be sold, consumed or stored by the taxpayer during the taxable year. The inclusion of section 45Y(a)(1)(A)(ii) demonstrates that Congress intended to allow the section 45Y credit for related party sales only if the taxpayer produces electricity at a qualified facility that has a metering device owned and operated by an unrelated person. Congress did not carve out an exception for related party sales for purposes of resale to unrelated persons and the final regulations cannot create one. To allow taxpayers to apply the concepts provided in Notice 2008–60 to the section 45Y credit for sales to unrelated parties would undermine the metering obligation in section 45Y(a)(1)(A)(ii)(II). Accordingly, the Treasury Department and the IRS cannot adopt the commenter's recommendation and the rule will be adopted as proposed.

C. Credit Phase Out

Proposed § 1.45Y–1(c) provided rules for calculating the amount of the credit under section 45Y(a) and the applicable phase-out percentages; defined the term ''applicable year'' and provided rules for determining the applicable year, including rules regarding the use of certain datasets in determining the applicable year. The definition of ''applicable year'' also applies for purposes of the section 48E credit phase-out rules. In the preamble to the proposed regulations, the Treasury Department and the IRS requested comments on which datasets are most appropriate to determine the applicable year and why.

Commenters generally agreed with the Treasury Department and the IRS that the Energy Information Administration's (EIA) Electric Power Annual and Monthly Energy Review, the EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks (GHGI), the EPA Greenhouse Gas Reporting Program (GHGRP), and the Emissions and Generation Resource Integrated Database (eGrid) are suitable datasets to determine the applicable year and recommended the final rules adopt one or more of these dataset(s) as providing the timeliest assessment of emissions to minimize potential confusion. One commenter suggested using a single annually published government data source, and recommended the EIA Monthly Energy Review that delineates electricity sector greenhouse gas (GHG) emissions for 2022 and the following years.

Review of the comments confirmed that the EIA Electric Power Annual and the EPA GHGI are well-established data sources that are representative of the annual GHG emissions from the production of electricity in the United States. Moreover, the requirement in § 1.45Y–1(c)(4) that both the EIA Electric Power Annual and the EPA GHGI must be assessed separately increases certainty that emissions from the power sector meet the required levels.

Another commenter requested that the Treasury Department and the IRS consider whether a single year drop in GHG emissions of less than the applicable year threshold followed by GHG emissions increases in subsequent years should trigger the phase-out of the credits.

Section 45Y(d)(3) describes the term ''applicable year'' as the later of 2032, or the calendar year in which the Secretary determines that the annual GHG emissions from the production of electricity in the United States are equal to or less than 25 percent of the annual GHG emissions from the production of electricity in the United States for calendar year 2022. Section 45Y(d)(2) provides that the section 45Y credit phases out over a four-year period subsequent to the applicable year. The statutory language describes the applicable year as a single year, and the credit phase-out begins subsequent to the applicable year. Based on the statutory language, the phase-out period is a continual period. Therefore, the statutory language does not grant the Treasury Department and the IRS authority to reverse a determination that GHG emissions were at a sufficient level to meet the definition of the applicable year. For this reason, the comment is not adopted.

D. Qualified Facility

The proposed regulations adopted the statutory definition of a ''qualified facility.'' Section 45Y(b)(1)(A) provides, in part, that a qualified facility is a facility for which the GHG emissions rate is not greater than zero. The GHG emissions rate is further defined in section 45Y(b)(2). Section 45Y(b)(1)(B) provides that a facility is only treated as a qualified facility during the 10-year period beginning on the date the facility was originally placed in service.

A commenter asked for clarification regarding changes to a facility that impact its GHG emissions rate from electricity generation and whether such changes impact a qualified facility's credit eligibility. The commenter requested confirmation that a facility that initially operates with greater than zero GHG emissions but later operates with not greater than zero GHG emissions can still be considered a qualified facility under section 45Y. The commenter suggested clarifying that in the case of such a facility, the 10-year credit period begins when the facility first becomes a ''qualified facility'' operating at commercial scale with not greater than zero GHG emissions. The commenter asserted that providing a different interpretation would disincentivize facilities that are built with the capacity to produce power with greater than zero GHG emissions from undertaking such investment.

The Treasury Department and the IRS note that section 45Y(b)(1)(B) treats a facility as a qualified facility only

during the 10-year period beginning on the date the facility was originally placed in service. Generally, a qualified facility is considered placed in service in the earlier of (i) the taxable year in which, under the taxpayer's deprecation practice, the period for depreciation with the respect to such property begins; or (ii) the taxable year in which the qualified facility is placed in a condition or state of readiness and availability to produce electricity, whether in a trade or business or in the production of income. Accordingly, a facility that initially operates with greater than zero GHG emissions may later be treated as a qualified facility if it meets the requirements under section 45Y(b) in a taxable year, but only during the 10-year period beginning on the date the facility was originally placed in service. For example, taxpayer places in service a facility in year 1 that has GHG emission that are greater than zero. In year 6, the facility has GHG emissions that are not greater than zero and is a qualified facility under section 45Y. If the facility continues to have not greater than zero GHG emissions, the facility continues to be a qualified facility under section 45Y and taxpayer may claim the section 45Y credit until year 10 (years 6 through 10), provided the facility continues to have not greater than zero GHG emissions for each of the remaining years. The Treasury Department and the IRS cannot adopt the commenter's recommendation and the rule will be adopted as proposed.

A commenter asserted that a facility qualifying for a section 45Y credit should not cease to be a qualified facility if, for a limited time or in a limited amount, it has a GHG emissions rate above zero (for example, as a result of a temporary change in fuel or feedstock). The commenter referenced Notice 2008–60, which it described as allowing the use of minimal fossil fuels for flame startup and stabilization in an open-loop biomass facility that qualifies under section 45. The commenter stated that zero-carbon fuels are not always available. The commenter emphasized that the proposed regulations under section 48E, in contrast to those under section 45Y, provide flexibility for purposes of recapture for those facilities that produce 10 grams of CO_2e per kWh. As a result, the commenter requested that the final regulations allow a facility to claim the section 45Y credit for the days or months of the year during which the facility produces electricity with a GHG emissions rate of zero. The commenter asserted that flexibility is needed for de minimis emissions or periods during the tax year.

Section 45Y(b)(1)(A) defines a qualified facility as having a GHG emissions rate from the production of electricity of not greater than zero. The statute does not provide a de minimis exception and the final regulations cannot create one. Accordingly, a facility cannot qualify for the section 45Y credit in a taxable year during the 10-year credit period after such facility is originally placed in service if such facility has a GHG emissions rate from the production of electricity of greater than zero, even if for a limited time or in a limited amount. However, the Treasury Department and the IRS note that a facility's failure to qualify for the section 45Y credit in one or more taxable years does not prevent such facility from qualifying for the section 45Y credit in any other taxable years during the 10-year credit period after such facility is originally placed in service. The statute allows a facility a 10-year credit period from the date the facility is originally placed in service, and a facility can be considered a qualified facility for any taxable year during such 10-year credit period in which it satisfies the requirements of the section 45Y credit.

E. Combined Heat and Power (CHP) Property

Proposed § 1.45Y–1(a)(2) defined ''combined heat and power (CHP) property.'' Proposed § 1.45Y–1(d) set forth the credit eligibility requirements for CHP property; provided rules for determining the energy efficiency percentage of CHP property and for calculating electricity produced by CHP property; and defined the term ''heat rate'' and provided rules for its calculation.

Section 45Y(g)(2) generally provides special rules for the calculation of the credit with respect to CHP property. Section 45Y(g)(2)(A)(i) states that ''the kilowatt hours of electricity produced by a taxpayer at a qualified facility shall include any production in the form of useful thermal energy by any combined heat and power system property within such facility.'' Section 45Y(g)(2)(A)(i) requires the thermal energy output from a CHP property to be included in determining the energy that qualifies for the credit in contrast to a non-CHP facility, for which only the electricity generation should be credited. For example, if a CHP property produces 1 kWh of electricity output and 1 kWh of thermal output, then the taxpayer that owns the CHP property may compute a credit based on production of 2 kWh of electricity.

Section 45Y(g)(2)(B) provides that the term ''combined heat and power property'' has the same meaning given such term by section 48(c)(3) (without regard to subparagraphs (A)(iv), (B), and (D) thereof). Section 48(c)(3)(C)(i) and proposed § 1.45Y–1(d)(2) define the energy efficiency percentage for purposes of a CHP property as a fraction—(I) the numerator of which is the total useful electrical, thermal, and mechanical power produced by the system at normal operating rates, and expected to be consumed in its normal application, and (II) the denominator of which is the lower heating value of the fuel sources for the system. Section 45Y(g)(2)(C)(ii) provides that the term ''heat rate'' means the amount of energy used by the qualified facility to generate 1 kilowatt hour of electricity, expressed as British thermal units per net kilowatt hour generated. Proposed § 1.45Y–1(d)(3)(ii) addressed how to determine the ''heat rate'' for a qualified facility that includes CHP property that uses combustion. In the preamble to the proposed regulations, the Treasury Department and the IRS requested comments regarding the application of the energy efficiency percentage requirements to CHP property for which there is no combustion and whether the statutory definition of ''heat rate'' for this property should be further clarified in the final regulations.

One commenter addressed the application of the energy efficiency percentage requirements to CHP property involving nuclear power and recommended the final regulations adopt the EIA's definition of ''heat content'' as a substitute for the lower heating value used to calculate the energy efficiency of a CHP property. The commenter emphasized that the lower heating value usually applies to combustion fuels, not fuels such as uranium that are non-combustible, and for non-combustion fuels the lower heating value should be the same as the heat content. Another commenter made a similar request that the final regulations permit the use of a nuclear reactor's maximum licensed thermal output to serve as the functional equivalent of the lower heating value of fuel sources, in recognition that nuclear fission does not involve combustion.

A separate commenter requested the final regulations establish a methodology for taxpayers to determine the energy efficiency percentage for CHP property using non-combustible fuel sources for which there is no lower heating value. With respect to the definition of heat rate, the commenter asserted that the methodology in proposed § 1.45Y–1(d)(3)(ii)(B) to calculate heat rate does not take into account that there is no lower heating

value for CHP property using non-combustible fuel sources. The commenter further questioned the accuracy of the formula for converting from BTU to kWh to calculate electricity produced by CHP property because the formula relies upon a definition of heat rate that does not account for CHP property using non-combustion fuel sources. The commenter recommended providing a conversion formula in the final regulations for CHP property using non-combustion fuel sources.

The Treasury Department and the IRS recognize there is a gap in the current guidance regarding how to calculate the energy efficiency percentage and heat rate for fuels without lower heating values as referenced in section 48(c)(3)(C)(i)(II) and the proposed methodology in proposed § 1.45Y–1(d)(3)(ii)(B). The lower heating value is intended to provide a measure for the energy released when a fuel is combusted under certain conditions. Fuels that are not combusted will not have a lower heating value, but the amount of energy such fuels could release under certain conditions can still be measured.

The Treasury Department and the IRS agree with commenters that the final regulations should permit the use of a nuclear reactor's thermal output to serve as the functional equivalent of the lower heating value of fuel sources, in recognition that nuclear fission does not involve combustion. The final regulations are amended accordingly. With respect to other technologies, the Treasury Department and the IRS will continue to consult with experts in order to develop additional approaches that are either generally applicable or appropriate for other particular technologies. The final regulations are therefore also amended to reflect this continuing consideration and to provide flexibility to prescribe these additional approaches in guidance published in the Internal Revenue Bulletin. Section 1.45Y–1(d)(2) and (d)(3)(ii)(B) of the final regulations are revised accordingly.

In addition, for organizational purposes, the definition under proposed § 1.45Y–1(a)(2) of a unit of a qualified facility for purposes of CHP property, has been moved within the definition of a unit of a qualified facility under § 1.45Y–2(b)(2)(i).

F. 80/20 Rule

The 80/20 Rule is designed to broaden the availability of investment and production tax credits by providing a new original placed in service date for a qualified facility that includes some components of property previously placed in service, rather than requiring the qualified facility to be composed entirely of new components of property. In the context of section 45Y, the 80/20 Rule applies at the qualified facility level to the components of property within the unit of qualified facility. Proposed § 1.45Y–4(d)(1) provided that for purposes of section 45Y(b)(1)(B), a facility may qualify as originally placed in service even if it contains some used components of property within the unit of qualified facility, provided the fair market value of the used components of the unit of qualified facility is not more than 20 percent of the total value of the unit of qualified facility (that is, the cost of the new components of property plus the fair market value of the used components of property within the unit of qualified facility).

Although this section focuses on the 80/20 Rule in the section 45Y context, section III.E. of this Summary of Comments and Explanation of Revisions describes some comments received on both sections 45Y and 48E. This includes discussion of the interaction between the rule for addition of a new unit or an addition of capacity (Incremental Production Rule) and the 80/20 Rule. As described in that section, the Treasury Department and the IRS agree that the statutory provisions allowing for new units and additions of capacity provided in sections 45Y(b)(1)(C) and 48E(b)(3)(B)(i) are separate and distinct from the 80/20 Rule. If a retrofitted facility satisfies the 80/20 Rule, the final regulations provide that the facility will be treated as newly placed in service even if the taxpayer also satisfies the provisions regarding new units and additions of capacity. These final regulations provide an additional example, in § 1.45Y–4(c)(5)(v) that specifically addresses decommissioned and restarted facilities. In response to a comment, the Treasury Department and the IRS removed the reference to a decommissioned nuclear facility in Example 3 in § 1.45Y–4(c)(6)(iii) to avoid referring to decommissioned and restarted nuclear facilities in the additions of capacity rule and the 80/20 Rule. Additionally, § 1.45Y–4(d)(1) is clarified to confirm that a qualified facility that meets the requirements of section 45Y(b)(1)(A) may claim the full section 45Y credit rather than the credit resulting from the addition of a new unit or an addition of capacity.

While commenters generally supported the need for the 80/20 Rule for the section 45Y credit, commenters also asked for clarity regarding the application of the 80/20 Rule. A commenter requested clarification that a facility that previously qualified for a credit under section 45 or 48 and is later retrofitted may be eligible for a section 45Y or 48E credit if it satisfies the 80/20 Rule. The Treasury Department and the IRS agree that if a qualified facility under section 45 or an energy property under section 48 is later retrofitted in a manner that satisfies the 80/20 Rule, it will be considered a new qualified facility and may be eligible for a section 45Y or 48E credit so long as the qualified facility meets all requirements of section 45Y or 48E.

Another commenter generally stated that under Notice 2018–59, 2018–28 I.R.B. 196, the 80/20 Rule applies at the property level and not the project or system level. The commenter requested that the 80/20 Rule similarly only apply at the property level for the section 45Y credit. In response to this comment, the Treasury Department and the IRS confirm that for purposes of the section 45Y credit, the 80/20 Rule does not apply to a project or system but instead to a qualified facility. Proposed § 1.45Y–4(d)(1) set forth the 80/20 Rule for purposes of the section 45Y credit and applies the rule to a retrofitted qualified facility. The 80/20 Rule applies at the qualified facility level to the components of property within the unit of qualified facility. The final regulations retain this application of the 80/20 Rule to the section 45Y credit.

Another commenter requested clarification regarding how the 80/20 Rule is applied for purposes of section 45Y by comparing its application to section 48E. The commenter pointed out that proposed § 1.48E–4(c)(4) looked only to functionally interdependent components of property (and not integral property) to determine what is considered new components of the unit of qualified facility, while proposed § 1.45Y–4(d) did not. This commenter requested clarification regarding which components are included in the determination under the 80/20 Rule for purposes of the section 45Y credit. Similarly, another commenter recommended that the final regulations define a ''unit of qualified facility'' as the specific components necessary for the production of electricity and not the integral property essential to the completeness of that function. With respect to dam-based hydropower facilities, another commenter supported proposed § 1.45Y–4(d) permitting existing dam-based hydroelectric facilities to qualify for the 80/20 Rule. The commenter asked to confirm that the 80/20 Rule is applied on a turbine-by-turbine basis and not the whole facility, because individual turbines may be repowered separately. As noted

earlier, the 80/20 Rule applies at the qualified facility level to the components of property within the unit of qualified facility and therefore in the context of a hydropower facility the 80/20 Rule cannot be applied on a turbine-by-turbine basis.

The Treasury Department and the IRS decline to modify the proposed rule in response to these requests for specific applications to particular technologies. Proposed § 1.45Y–2(b)(2)(i) provided that for purposes of the section 45Y credit, the unit of qualified facility includes all functionally interdependent components of property (as defined in proposed § 1.45Y–2(b)(2)(ii)) owned by the taxpayer that are operated together and that can operate apart from other property to produce electricity.

Proposed §§ 1.45Y–4(d)(2) and 1.48E–4(c)(3) both provided that the cost of new components of the unit of qualified facility includes all costs properly included in the depreciable basis of the new components of property of the unit of qualified facility. Under both proposed §§ 1.45Y–2(b)(2) and 1.48E–2(b)(2), a unit of qualified facility only includes functionally interdependent components of property and not integral property. Thus, the Treasury Department and the IRS agree with the commenter that only functionally interdependent property is taken into account to determine whether a retrofitted qualified facility satisfies the 80/20 Rule for purposes of sections 45Y and 48E. Proposed § 1.48E–4(c)(4) provided a rule allowing costs for integral property to be included in determining the section 48E credit after it has been determined that the qualified facility has satisfied the 80/20 Rule. Because the section 45Y credit is a production tax credit calculated based on electricity produced and not the amount of investment in the qualified facility, there is no need for a rule similar to proposed § 1.48E–4(c)(4) in the final regulations under section 45Y.

III. Rules Specific to Section 48E

Proposed § 1.48E–1(b)(1) provided rules for determining the amount of the credit; defined the term ''applicable percentage;'' and explained how to determine the applicable percentage for a qualified facility. Proposed § 1.48E–1(c) provided the credit phase-out rules and proposed § 1.48E–1(c)(3) defined applicable year for purposes of the credit phase-out rules by reference to proposed § 1.45Y–1(c)(3). *See* section II.C. of this Summary of Comments and Explanation of Revisions for a discussion of those rules.

A. Organization of Proposed § 1.48E–2

Proposed § 1.48E–2(a) defined a qualified facility for purposes of section 48E. Proposed § 1.48E–2(b) described the property included in a qualified facility for purposes of section 48E, defined the terms ''unit of qualified facility'' as well as ''functionally interdependent'' and ''integral part'' (both as they apply to a qualified facility), and provided several examples to illustrate the rules. Proposed § 1.48E–2(c) provided rules for the coordination of the section 48E credit with certain other Federal income tax credits with respect to qualified facilities. Proposed § 1.48E–2(d) provided rules for determining the qualified investment with respect to a qualified facility. Proposed § 1.48E–2(e) defined the term ''qualified property.'' Proposed § 1.48E–2(f) defined certain terms related to requirements for qualified property, including ''tangible personal property,'' ''other tangible property,'' ''construction, reconstruction, or erection of qualified property,'' ''acquisition of qualified property,'' ''original use of qualified property,'' ''depreciation allowable,'' ''placed in service'' and ''claim.'' Proposed § 1.48E–2(g) provided rules for energy storage technology (EST).

The Treasury Department and the IRS determined that the organization of proposed § 1.48E–2, as it related to qualified facilities, did not adhere to the organization of section 48E. The final regulations reorganize § 1.48E–2 to more clearly follow the organization of section 48E. The Treasury Department and the IRS do not intend for the reorganization of § 1.48E–2 to create any substantive differences from the rules as they were provided in the proposed regulations.

As reorganized, § 1.48E–2(a) of these final regulations provides the rules for determining the qualified investment with respect to a qualified facility. Section 1.48E–2(b) defines the term ''qualified facility'' as it relates to section 48E, as well as the term ''placed in service.'' Section 1.48E–2(c) defines the term ''qualified property.'' Section 1.48E–2(d) provides the rules for property included in a qualified facility, including a description of ''unit of qualified facility'' and ''integral part,'' and provides examples illustrating these rules. Section 1.48E–2(e) provides definitions related to the requirements for qualified property. Section 1.48E–2(f) provides rules for the coordination of the section 48E credit with certain other Federal income tax credits with respect to qualified facilities and includes examples to illustrate those rules. Section 1.48E–2(g) provides rules relating to EST. Finally, the definition of the term ''claim'' for both a qualified facility and EST is moved to § 1.48E–1(a)(2) and is modified to also apply to the other Federal income tax credits described in section 48E(b)(3)(C).

B. Qualified Investment With Respect to a Qualified Facility and Qualified Property

Proposed § 1.48E–2(d) described a qualified investment with respect to any qualified facility. Proposed § 1.48E–2(e) defined ''qualified property'' for purposes of proposed § 1.48E–2(a).

A commenter requested that the final regulations clarify that the qualified property included in a qualified investment in a qualified hydropower facility includes all the components and property identified as qualified property in prior guidance under section 48, up through and including the substation at which the electrical voltage is stepped up to transmission voltage. Similarly, another commenter asked whether the scope of qualified property under section 48E(b)(2) includes all property identified as energy property under section 48(a)(3), unless explicitly excluded under section 48E.

The Treasury Department and the IRS recognize that some technologies may be creditable under both sections 48 and 48E. Although the rules for eligibility differ between the two sections, they share many overlapping concepts (for example, functional interdependence and integral property). For those facilities that generate electricity and for EST that are eligible for both the section 48 and 48E credits, the Treasury Department and the IRS expect similar property to be eligible. However, the application of these concepts to a specific facility or EST is ultimately a fact-specific determination.

That said, unlike section 48, these final regulations are technology neutral, and the rules are meant to apply to all qualified facilities. A definitive response to these comments would require the Treasury Department and the IRS to conduct a complete factual analysis of the property in question, which may include information beyond that which was provided by the commenters. Because more information is needed to make the determinations requested by the commenters, the requested clarifications are not addressed in these final regulations.

C. Energy Storage Technology Overview

1. In General

Proposed § 1.48E–2(g) provided rules defining a unit of EST. Section 48E(c)(2)

defines the term ''energy storage technology'' by reference to section 48(c)(6) (noting that the beginning of construction requirement in section 48(c)(6)(D) does not apply). A commenter suggested clarifying that EST may include either ''property . . . which receives, stores, and delivers energy for conversion,'' or ''thermal energy storage property,'' by reading the ''and'' between sections 48(c)(6)(A)(i) and (ii) as disjunctive. The Treasury Department and the IRS confirm that the term ''and'' between sections 48(c)(6)(A)(i) and (ii) is disjunctive for purposes of section 48E(c)(2) and property described in section 48(c)(6)(A)(i) or (ii) are included as EST.

2. Functionally Interdependent

Proposed § 1.48E–2(g)(2)(i) provided that, for purposes of the section 48E credit, a unit of EST includes all functionally interdependent components of property (as defined in proposed § 1.48E–2(g)(2)(ii)) owned by the taxpayer that are operated together and that can operate apart from other property to perform the intended function of the EST. Proposed § 1.48E–2(g)(2)(ii) provided that components are functionally interdependent if the placing in service of each of the components is dependent upon the placing in service of each of the other components to perform the intended function of the EST.

A commenter requested that the Treasury Department and the IRS explicitly clarify that the section 48E credit can be claimed with respect to EST that is co-located and used in conjunction with electricity generation equipment for which the section 45 or 45Y credits are claimed, without regard to whether the EST would be considered a functionally interdependent component or an integral part of the electricity generation equipment under other rules or whether the EST and electricity generation equipment are owned by the same or different taxpayers.

Section 48E(a) provides that the clean electricity investment credit is determined separately with respect to any qualified facility and any EST. This statutory text establishes an important categorical distinction between qualified facilities and ESTs. While integral property may be shared by a co-located qualified facility and an EST, a unit of qualified facility and a unit of EST cannot share components for purposes of section 48E. Further, the Treasury Department and the IRS confirm that an EST is eligible for the section 48E credit if it satisfies the requirements of section 48E, even if the EST is co-located with a qualified facility that has claimed the section 45 or 45Y credits. *See* section III.C.6. of this Summary of Comments and Explanation of Revisions for additional discussion of comments on co-located, or ''hybrid,'' projects that include an EST and qualified facility.

3. Qualified Investment With Respect to Energy Storage Technology

Proposed § 1.48E–2(g)(4) provided that the qualified investment with respect to any EST for a taxable year is the basis of any EST placed in service by the taxpayer during such taxable year. Commenters requested clarification that the entire cost basis of EST property that converts energy to electricity is eligible for the section 48E credit, even if some functionally interdependent property is used to produce heat. The commenters asserted that there is no statutory requirement that the energy stored be exclusively converted to electricity and that the Code is silent about any minimum percentage requirement of energy being converted to electricity.

Proposed § 1.48E–2(g)(6)(i) described electrical energy storage property as property (other than property primarily used in the transportation of goods or individuals and not for the production of electricity) that receives, stores, and delivers energy for conversion to electricity and has a nameplate capacity of not less than 5 kWh. This definition is adopted from section 48E(c)(2), which defines ''energy storage technology'' including electrical energy storage property by reference to section 48(c)(6). Because the purpose of an electrical energy storage property is to receive, store and deliver energy for conversion to electricity, not to produce thermal energy, components of property of an energy storage property used to produce thermal energy would be subject to the incremental cost rule discussed in section III.G. of this Summary of Comments and Explanation of Revisions.

4. Placed in Service

Proposed § 1.48E–2(g)(5)(i) provided rules for determining when an EST has been placed in service for purposes of the section 48E credit. Notwithstanding the general rules provided in proposed § 1.48E–2(g)(5)(i), an EST with respect to which an election is made under section 50(d)(5) of the Code and § 1.48–4 to treat the lessee as having purchased such EST is considered placed in service by the lessor in the taxable year in which possession is transferred to such lessee.

Commenters suggested expanding the definition of placed in service for EST because ''energy storage may charge and discharge prior to being ready for commercial operation.'' Specifically, a commenter suggested that EST property should be treated as placed in service when (i) such property has all licenses, permits, and approval required to store and dispatch power, (ii) pre-operational testing is complete, (iii) the taxpayer has title to the property, and (iv) the property is available to store and discharge power on a regular, commercial basis.

Instead of providing specific indicia of when an EST is treated as being placed in service, the rule in proposed § 1.48E–2(g)(5)(ii) provided general principles for a taxpayer to determine when an EST has been placed in service that are broadly applicable to all types of EST. These principles are based upon the placed in service rules provided by § 1.48–9(b)(5), which generally adopt the placed in service rules of § 1.46–3(d)(1). The general principles under § 1.46–3(d)(1) have applied to the section 48 credit since its enactment. These principles are well-understood, general standards for determining when property is placed in service, and they are widely relied upon by industry. The Treasury Department and the IRS view the general principles provided by the proposed rule as adequate for determining when EST is placed in service, and as sufficiently broad to address these commenters' concerns. Therefore, the final regulations adopt the placed in service rules as proposed.

5. Electrical Energy Storage Property

Proposed § 1.48E–2(g)(6)(i) described electrical energy storage property as property (other than property primarily used in the transportation of goods or individuals and not for the production of electricity) that receives, stores, and delivers energy for conversion to electricity and has a nameplate capacity of not less than 5 kWh. For example, subject to the exclusion for property primarily used in the transportation of goods or individuals, electrical energy storage property includes but is not limited to rechargeable electrochemical batteries of all types (such as lithium-ion, vanadium redox flow, sodium sulfur, and lead-acid); ultracapacitors; physical storage such as pumped storage hydropower, compressed air storage, and flywheels; as well as reversible fuel cells.

Commenters asked for clarification regarding what constitutes property ''primarily used'' in the transportation of goods or individuals. One commenter suggested that the final regulations

provide a bright line rule and clarify that property that receives, stores, and delivers energy for conversion to electricity and is intended to be used for less than 35 percent of its hours of use in a calendar year for transporting goods or individuals is not considered ''primarily used in the transportation of goods or individuals.'' In this commenter's view, property, including a school bus, that receives, stores, and delivers energy for conversion to electricity that is used less than 35 percent of its hours of use in a calendar year for transporting goods or individuals is not primarily used for transportation. However, the commenter clarified that if electric school buses paired with a bidirectional vehicle-to-grid (V2G) charger are permitted to qualify as EST, then the charger itself should not be considered part of the electrical energy storage property.

The final regulations mirror the language of section 48E(c)(2), which adopts the definition of EST provided in section 48(c)(6)(A), and excludes property primarily used in the transportation of individuals or goods. The Treasury Department and the IRS consider school buses as primarily used in transportation because the primary reason for a taxpayer to acquire school buses is to transport individuals, not store energy, notwithstanding the overall amount of time buses are used to actually transport individuals. A ''bright line'' test requested by the commenter is not feasible because any given situation and determination is fact dependent.

In addition, there are other IRA tax incentives intended to benefit some technologies for which these commenters seek section 48E credit eligibility. For instance, section 45W of the Code provides a tax credit for vehicles such as electric school buses. Furthermore, a notice of proposed rulemaking (REG–118269–23) published in the **Federal Register** (89 FR 76759) on September 19, 2024, regarding the section 30C alternative fuel vehicle refueling property credit (September 2024 proposed regulations) proposed a definition for property primarily used in the transportation of goods or individuals and not for the production of electricity for purposes of sections 48 and 48E. In particular, proposed § 1.48E–2 provided that energy storage property is primarily used in the transportation of goods or individuals and not for the production of electricity, and therefore is not EST eligible for the section 48E credit, if a credit is claimed under section 30C for such property. Comments regarding this proposed definition will be further addressed in the Treasury decision that finalizes the September 2024 proposed regulations. The Treasury Department and IRS note that energy storage property for which the section 30C credit is not claimed may be creditable as EST under sections 48 and 48E if that property meets the requirements of those tax credits.

6. Hybrid Systems (Qualified Facility + EST)

Several commenters addressed the treatment of qualified facilities, such as solar generation facilities, and EST that are co-located, or so-called ''hybrid'' projects. At least one commenter supported treating a qualified facility and EST as separate for purposes of the section 48E credit. The commenter emphasized that such an approach is critical for the long-term success of the section 45Y and 48E credits, and importantly, will align with the goal of the domestic content bonus credit amount to reshore clean energy supply chains.

Other commenters requested that taxpayers be able to elect a single section 48E credit for hybrid systems, consisting of a qualified facility and an EST, and sought clarification of whether property included in a unit of EST may be included in a unit of qualified facility. A commenter noted that for purposes of rooftop solar and storage hybrid systems, the EST and the solar energy property are dependent upon each being placed in service because both are essential to the completeness of the intended function of the hybrid system. Commenters asserted that including EST in the definition of ''integral part'' of a qualified facility and providing examples of dual eligibility for section 48 and 48E credits during the transition period would help maintain consistency and reduce administrative burdens. One commenter recommended modifying proposed § 1.48E–2(b) to clarify that EST may (but is not required to) be considered an integral part of a qualified facility. Commenters stated that such a clarification would align with current guidance for the domestic content bonus credit amount and the test for determining whether multiple energy properties will be considered an energy project under the section 48 proposed regulations. Another commenter stated that this approach would allow for increased technological flexibility for purposes of the section 48E credit and would allow residential solar energy developers to continue claiming a single credit for hybrid systems. A commenter claimed that adding EST as an integral part of a qualified facility would allow utility scale solar energy developers the option to claim separate credits for the EST and the qualified facility under the section 48E proposed regulations.

Another commenter suggested permitting a taxpayer developing a hybrid system and claiming the section 48E credit on both the qualified facility and EST to elect to treat them as a single energy project. Other commenters requested that the final regulations clarify that even if qualified facilities and EST are separate categories under section 48E, a taxpayer developing a hybrid system that incorporates both may file a single Form 3468, *Investment Credit,* and register only once for purposes of section 6418 of the Code relating to transfer elections for eligible credits (section 6418 credit transfer elections).

As noted earlier in section III.C.2. of this Summary of Comments and Explanation of Revisions, the statutory framework of section 48E does not support treating a qualified facility and EST as a single creditable property. Instead, the text of section 48E repeatedly treats a qualified facility and EST as separately creditable properties. Accordingly, there is no statutory basis to allow taxpayers an option to claim a single credit for hybrid systems that include both qualified facilities and EST. In addition, although beyond the scope of these final regulations, the Treasury Department and the IRS note that, because a hybrid system would be considered two separate eligible credit properties, a taxpayer would need to register them separately for purposes of making section 6418 credit transfer elections. *See* §§ 1.6418–1(d) and 1.6418–4.

Some commenters also requested that the final regulations provide an option to claim a single credit for a hybrid system rather than two credits, one for the EST and one for the qualified facility, in part, because those commenters currently enter into a single leasing agreement with customers for both a solar qualified facility and an EST. These commenters expressed concern about whether, under the proposed regulations, they would need to enter into separate contracts for the solar qualified facility and the EST. These commenters noted that if they are able to use a single contract, the contract will need to have separate term lengths for the solar qualified facility and the EST to satisfy the leasing rules for tax purposes. These commenters raised the issue that since a solar qualified facility and an EST generally have different useful lives the leasing rules could not cover both the solar qualified facility and the EST if they claimed separate credits.

The Treasury Department and the IRS are not aware of any case law or guidance related to leasing rules that would require a taxpayer to break up the scope of a lease into components before analyzing whether there is a true lease for tax purposes regardless of the useful life of different assets included in the lease. In order to claim section 48E credits for both the solar qualified facility and an EST that are part of a combined solar qualified facility and EST, a taxpayer must retain ownership of both at the time such property is placed in service. This is true regardless of whether there are separate credits or separate credit calculations required for a solar qualified facility and an EST. While the final regulations define a unit of property as a qualified facility or an EST for purposes of section 48E, the final regulations are not intended to apply more broadly to define what comprises a unit of property for any other purpose of the Code.

Another commenter requested that the section 48E credit be made available for pumped storage hydropower property, including if such property overlaps or shares property with a qualified hydropower facility that has claimed or will claim the credit under section 45 or 45Y, and that no allocation of costs is required with respect to such overlapping property.

The Treasury Department and the IRS confirm that an EST is eligible for a separate section 48E credit if it satisfies the requirements of section 48E and the section 48E regulations. A taxpayer that makes a qualified investment with respect to a qualified facility or an EST is eligible for the section 48E credit only to the extent of the taxpayer's eligible investment in the qualified facility or EST. As described in proposed § 1.48E–2(b)(3)(vi), multiple qualified facilities (whether owned by one or more taxpayers), including qualified facilities with respect to which a taxpayer has claimed a credit under section 48E, 45, or 45Y or another Federal income tax credit, may include shared property that may be considered part of a qualified investment for each qualified facility so long as the cost basis for the shared property is properly allocated to each qualified facility and the taxpayer only claims a section 48E credit with respect to the portion of the cost basis properly allocable to the qualified facility for which the taxpayer is claiming a section 48E credit. The proposed rule addresses the commenter's concerns and will be adopted as proposed.

7. Thermal Energy Storage Property

Proposed § 1.48E–2(g)(6)(ii) defined thermal energy storage property as property comprising a system that is directly connected to a heating, ventilation, or air conditioning (HVAC) system; removes heat from, or adds heat to, a storage medium for subsequent use; and provides energy for the heating or cooling of the interior of a residential or commercial building. Thermal energy storage property includes equipment and materials, and parts related to the functioning of such equipment, to store thermal energy for later use to heat or cool, or to provide hot water for use in heating a residential or commercial building. Thermal energy storage property does not include a swimming pool, CHP property, or a building or its structural components.

Several commenters requested additional examples of thermal energy storage property and asked whether specific property would be considered part of thermal energy storage. For example, a commenter recommended including an example of thermal energy storage property that includes phase change materials operating as a battery in place of a refrigeration cycle to reduce energy consumption in cold storage. Several commenters requested an example allowing for solar thermal systems to be treated as thermal energy storage property and noted that solar thermal systems are explicitly eligible under the section 48 credit. A commenter specifically contended that solar thermal systems that collect energy from the sun to heat a storage medium (for example, water) and then provide energy through an HVAC system for a residential or commercial building should be treated as thermal energy storage systems under section 48E.

Another commenter suggested clarifying that energy storage technology includes property capable of discharging both heat and electricity regardless of how the facility's heat is utilized as long as the facility has an electrical nameplate capacity of at least 5 kWh and the taxpayer claims a section 48E credit only on the parts of the facility that are essential to receiving, storing, and delivering energy for the conversion to electricity (that is, excluding components related to discharging heat). A different commenter suggested clarifying that thermal energy storage property includes property directly connected to a refrigeration system given that refrigeration systems are a subset of HVAC systems. Another commenter requested clarifying that otherwise-qualifying property that operates squarely within an HVAC ecosystem, or directly in connection with such a system, and that directly impacts the temperature of air being conditioned by an HVAC system, is ''directly connected'' to such system within the meaning of section 48E (and section 48); and non-structural, energy-saving, portable products that are incorporated into building elements specifically because of their energy-saving properties are not themselves ''a building or its structural components,'' and remain non-structural even if integrated into a ceiling.

Another commenter suggested providing examples of thermal energy storage property that include thermal ice or chilled water storage systems that use electricity to run a refrigeration cycle to produce ice or chilled water that is later connected to the HVAC system as an exchange medium for air conditioning the building, heat pump systems that store thermal energy in an underground tank or borehole field to be extracted for later use for heating and/or cooling, and electric furnaces that use electricity to heat bricks to high temperatures and later use this stored energy to heat a building through the HVAC system. Similarly, a commenter recommended several modifications to the examples of thermal energy storage in proposed § 1.48E–2(g)(6)(ii): (i) replace the reference to ''thermal ice storage systems'' with ''chilled water or ice storage systems,'' (ii) acknowledge that tanks could be above or below ground, and (iii) include ''electric boilers that use electricity to heat water and later use this stored energy to provide heat and/or domestic hot water to a building through the HVAC system.'' Several other commenters suggested clarifying whether the phrase ''directly connect to'' in proposed § 1.48E–2(g)(6)(ii) means that thermal storage systems that function as self-contained heating or cooling systems qualify as thermal energy storage property.

The Treasury Department and the IRS agree that the definition of thermal energy storage property requires clarification. Proposed § 1.48E–2(g)(6)(ii) defined thermal energy storage property, in part, as a system which ''removes heat from, or adds heat to, a storage medium for subsequent use.'' The Treasury Department and the IRS understand the phrase ''adds heat to'' as including equipment that is involved in adding, or transferring, already-existing heat from one medium to the storage medium, but not equipment involved in transforming other forms of energy into heat in the first instance. Equipment that just adds (or removes) heat includes technologies, like heat pumps, that draw heat from the ambient air or other stores of heat and adds that heat to a storage medium.

By contrast, equipment that transforms other forms of energy into heat in the first instance, for example through combustion or electric resistance, is not property that ''removes heat from, or adds heat to'' a storage medium and is therefore not an eligible component of a thermal energy storage property. For example, a conventional gas boiler with an integrated storage tank would not generally be thermal energy storage property, as it would generate new heat in the first instance through combustion and subsequently add that heat to the storage medium, rather than merely adding existing heat to the storage medium. While the gas boiler elements would not be part of such property, the integrated storage tank, may be thermal energy storage property if it otherwise meets the thermal energy storage property definition. Further, an air-to-water heat pump with a thermal storage tank, for example, would generally be thermal energy storage property provided it otherwise meets the definition of thermal energy storage. This could be the case even if the heat pump also serves a purpose in the connected HVAC system's real-time heating or cooling of a building. In that case, the thermal storage tank would be thermal energy storage property and the heat pump may also qualify as part of the thermal energy storage property to the extent the taxpayer's costs exceed the cost of an HVAC system without thermal storage capacity that would meet the same functional heating or cooling needs as the heat pump system with a storage medium, other than time shifting of heating or cooling. *See* section III.G. of the Summary of Comments and Explanation of Revisions for discussion of the Incremental Cost Rule.

Proposed § 1.48E–2(g)(6)(ii) included an example of electric furnaces that use electricity to heat bricks to high temperatures and later use this stored energy to heat a building through the HVAC system. The Treasury Department and the IRS acknowledge that this example needs to be refined to more precisely delineate the scope of eligible thermal energy storage property. Whereas the heated bricks and equipment that adds heat generated by the furnace to those bricks, or removes heat from the bricks, is eligible thermal energy storage property, the electric furnace equipment that transforms energy into the thermal energy via electrical resistance in the first instance is not. Section 1.48E–2(g)(6)(ii) of the final regulations provides that thermal energy storage property does not include property that transforms other forms of energy into heat in the first instance.

With respect to subsequent use, the Treasury Department and the IRS also agree that additional clarity is warranted. The statute requires that thermal energy storage property must be able to perform certain functions, not simply perform heat transfer. Any heat transfer may take some amount of time and heat does not immediately dissipate even if no effort is made to store it. While some commenters asserted that such heat transfer is subsequent use, the Treasury Department and the IRS disagree. A plain reading of the statute supports the conclusion that thermal energy storage property does not include property that simply engages in heat transfer. The thermal energy storage property must be able to *store* the thermal energy. The Treasury Department and the IRS find that a minimum time interval for subsequent use provides certainty for taxpayers and sound tax administration.

Accordingly, the final regulations clarify that property that ''removes heat from, or adds heat to, a storage medium for subsequent use'' is property that is designed with the particular purpose of substantially altering the time profile of when heat added to or removed from the thermal storage medium can be used to heat or cool the interior of a residential or commercial building. The final regulations also provide a safe harbor for thermal energy storage property. If the thermal energy storage property can store energy that is sufficient to provide heating or cooling of the interior of a residential or commercial building for a minimum of one hour, it is deemed to have the purpose of substantially altering the time profile of when heat added to or removed from the thermal storage medium can be used to heat or cool the interior of a residential or commercial building.

These final regulations also add that thermal energy storage property may store thermal energy in an artificial pit, an aqueous solution, or a solid-liquid phase change material, in addition to the underground tank or a borehole field already included in the proposed regulations, in order to be extracted for later use for heating and/or cooling. The final regulations clarify that sources of thermal energy that transform other forms of energy into heat, such as electric boilers, are not thermal energy storage property.

The Treasury Department and the IRS clarified the definition of thermal energy storage property and the examples in the final regulations to illustrate what constitutes thermal energy storage property. The final regulations provide revised examples of thermal energy storage property, and those examples are intended to be a non-exhaustive list. The Treasury Department and the IRS have also determined that the revised description of thermal energy storage property in § 1.48E–2(e)(6)(ii) provides taxpayers with a sufficient means to determine whether specific property qualifies as thermal energy storage property. To the extent that commenters asked whether additional systems, configurations, or technologies would qualify as thermal energy storage property, such a determination would require the Treasury Department and the IRS to conduct a complete factual analysis of the system, configuration, or technology, which may include information beyond that which was provided by the commenters. Because more information is needed to make any such determinations requested by the commenters, the final regulations do not provide such additional requested clarifications.

Several commenters recommended clarifying that thermal energy storage property includes property providing energy for the heating or cooling of the interior of an industrial building, or other types of buildings. A commenter asserted that a wide variety of buildings are served by thermal energy storage, such as city halls, libraries, and jails, and that the definition of thermal energy storage property should not be limited to residential or commercial settings. Commenters requested that property used to convey stored energy and deliver it to building spaces (such as pipes and pumps), used to distribute stored thermal energy for heating or cooling or to supply domestic hot water for consumption in a residential or commercial building, be included within the definition of thermal energy storage property. One commenter recommended defining thermal energy storage property to include equipment, including pipes and pumps, used to distribute stored thermal energy to and within buildings. The commenter noted that such a clarification would necessitate incorporation of a dual use rule consistent with § 1.48–14(b), because thermal energy storage may use pipes to distribute stored thermal energy to and within buildings that are also used by non-qualifying sources.

One commenter requested clarifying whether thermal energy storage property includes liquid desiccant storage systems that use electricity to store energy in liquid desiccants that remove latent heat from the air for use in a connected HVAC system. Another

commenter noted that most solar thermal systems are combination or hybrid systems that provide thermal storage in the form of water or another fluid for a variety of applications. Regarding such combination systems, other commenters recommended clarifying that thermal energy property includes water heating applications and providing an example of such applications.

Section 48E(c)(2) defines EST as having the same meaning as under section 48(c)(6), and section 48(c)(6) defines EST to include thermal energy storage property. The statutory definition of thermal energy storage property under section 48(c)(6)(C) provides that such property is directly connected to a HVAC, removes heat from, or adds heat to, a storage medium for subsequent use, and provides energy for the heating or cooling of the interior of a residential or commercial building. To maintain consistency with the statutory text, the final regulations maintain the wording regarding eligible building applications set forth in section 48(c)(6)(C)(i)(III). With respect to property used to distribute stored thermal energy, such as pipes and pumps, the final regulations provide a function-oriented method to evaluate whether property is a functionally interdependent or an integral part of thermal energy storage property. Beyond the examples included in the proposed regulations and additional examples added here, commenters have described a number of additional innovative technologies that might qualify as thermal energy storage property. However, application of the functional definition of thermal energy storage property provided at section 48E(c)(2) (by reference to section 48(c)(6)) would be necessary to determine if these technologies are, in fact, examples of qualifying thermal energy storage property. Moreover, the examples contained in proposed § 1.48E–2(g)(6)(ii) are a non-exhaustive list. Therefore, the final regulations do not adopt all the recommended additional examples.

Because section 48E(c)(2) provides that the term ''energy storage technology'' has the meaning given such term in section 48(c)(6), the final regulations incorporate modifications made to the section 48 proposed regulations by the section 48 final regulations to clarify the definition of EST, including with respect to thermal energy property.

8. Hydrogen Energy Storage Property

Proposed § 1.48E–2(g)(6)(iii) provided that hydrogen energy storage property is property (other than property primarily used in the transportation of goods or individuals and not for the production of electricity) that stores hydrogen and has a nameplate capacity of not less than 5 kWh, equivalent to 0.127 kg of hydrogen or 52.7 standard cubic feet (scf) of hydrogen. Proposed § 1.48E–2(g)(6)(iii) also provided that hydrogen energy storage property must store hydrogen that is solely used as energy and not for other purposes, such as for the production of end products (for example, fertilizer), and set forth examples of hydrogen energy storage property.

A commenter stated that property storing hydrogen should be at least 1 GWh in capacity (which is equivalent to 96,554 gallons of liquid hydrogen storage capacity or about 25.4 metric tons) in order to qualify as hydrogen energy storage property. The Treasury Department and the IRS note that section 48E(c)(2) defines ''energy storage technology'' as having the meaning given such term in section 48(c)(6) (without the application of the beginning of construction deadline). Section 48(c)(6) defines ''energy storage technology'' as, in part, having a nameplate capacity of not less than 5 kilowatt hours. Accordingly, the final regulations do not adopt the commenter's suggestion, as doing so would be inconsistent with the statute.

a. End Use Requirement

Numerous commenters disagreed with the requirement that hydrogen energy storage property must store hydrogen that is solely used as energy and not for other purposes, which the commenters referred to as the ''end use requirement.'' Commenters noted that the end use requirement is not statutorily prescribed and asserted that it would be difficult, if not impossible, to implement. Commenters asserted that a single industrial customer may have multiple uses for hydrogen, sometimes for energy and sometimes for other purposes such as stripping pollutants from flue gas streams, and that customers are not generally willing to restrict their use in order to indemnify the hydrogen energy storage property against investment credit recapture risk. Commenters also pointed out that hydrogen storage projects may sell to intermediaries in which case the end use of hydrogen is not necessarily known, and ensuring that the end use requirement is respected by export markets would be impossible. A commenter contended that the limited number of examples and use cases offered in the proposed regulations raise several questions for taxpayers and hydrogen storage developers.

Some commenters also maintained that the end use requirement would be inconsistent with the Biden Administration's U.S. National Clean Hydrogen Roadmap. One of these commenters stated that a major build-out of hydrogen storage facilities targeting exclusively power sector end use makes little sense from a strategic perspective. A commenter asserted that the definition of EST in section 48(c)(6)(A)(i), which includes ''hydrogen, which stores energy,'' simply recognizes that hydrogen is inherently a form of energy itself. A commenter also claimed that section 48(c) only sets out affirmative requirements for EST and that, therefore, hydrogen storage property that is not primarily used in the transportation of goods or individuals should qualify for the section 48E credit regardless of where the stored hydrogen ends up. Commenters further noted that some energy uses may be indirect (for example, via intermediary molecules), further complicating application of an end use requirement.

Commenters also asserted that an end use requirement would bifurcate and adversely affect the hydrogen market, and that additional uses for hydrogen, such as feedstock for industrial processes, could present significant decarbonization opportunities. A commenter asserted that disallowing the section 48E credit for hydrogen storage from serving applications such as steel production and iron refining would be a significant disservice to America and delay or prevent massive reductions in carbon emissions while hindering U.S. manufacturing of essential construction materials. Commenters noted that a hydrogen end use requirement would disadvantage large-scale hydrogen storage facilities relative to smaller ones.

Commenters expressed concern that hydrogen energy storage is being unfairly singled out for disadvantageous treatment as compared to other EST, noting that the proposed regulations do not place an end use restriction on electricity stored within and discharged from batteries or other storage technologies; noting that energy withdrawn from batteries may be used for any purpose without losing its eligibility status. Commenters contended that the end use requirement would unduly push potential customers towards using battery-focused solutions instead of letting batteries and hydrogen solutions compete on equal footing, or in cases in which no alternative exists, would continue to extend the use of

existing technologies, fuels, and processes.

Some commenters supported the principle of an energy-based end use requirement for hydrogen energy storage property. One commenter sought clarification that ''energy'' was not limited to electricity production. Another commenter supported the principle of an energy-based end use limitation by comparing the statutory text of section 48(c)(6) from three legislative bills, including the version ultimately enacted by Congress, but opposed the ''solely'' criteria and cited practical challenges including administrability. Commenters generally requested that if an end use requirement is maintained that it be clarified and altered, and safe harbors provided. For example, a commenter suggested providing a rebuttable presumption of meeting the end use requirement if a taxpayer can demonstrate that it stored hydrogen predominantly for energy use.

Commenters also suggested creating a safe harbor as long as the facility itself uses some of the stored hydrogen for energy or the facility is an open access facility. A commenter requested flexible rules for determining the end use of hydrogen, including permitting taxpayers to assign withdrawn hydrogen based on commercial sales arrangements, or, alternatively, being able to rely on a mass balance approach based on the inputs and outputs to the storage property during the year. Commenters also suggested that the end use requirement conclude with the end of the 5-year recapture period provided by section 50. Several commenters suggested inverting the end use requirement to only disqualify property used to store hydrogen that is solely used for non-energy end products, or to exempt common carrier infrastructure from the end use requirement. Another commenter recommended a rule under which a facility that uses ''qualified clean hydrogen'' as defined under section 45V of the Code is deemed to qualify under section 48E if such hydrogen is used to create electricity.

Several commenters recommended implementing a dual use safe harbor to permit a taxpayer to claim a reduced section 48E credit when a portion of stored hydrogen is used for a purpose other than energy. Commenters noted that a dual use safe harbor could apply if at least half of the hydrogen in hydrogen energy storage property is used for energy purposes. In contrast, other commenters were opposed to any dual use approach to the end use limitation and asserted that such an approach would be unworkable, requiring ''unknowable, unprovable, unmonitorable, unauditable facts.''

Commenters asked for clarification regarding what constitutes energy use of stored hydrogen and what documentation is needed to demonstrate such energy use. Several commenters were opposed to any recordkeeping requirements related to the end use of hydrogen and contended that such requirements would be unduly burdensome to taxpayers given the fungibility of hydrogen. Another commenter noted that there are currently no recordkeeping or documentation precedents available for a taxpayer to efficiently demonstrate the final end use of hydrogen stored in such taxpayer's hydrogen energy storage property. The commenter asserted that, as there is no available documentation pathway for tracking hydrogen molecules through to their end use, it would be both impractical and prohibitively costly for a taxpayer to develop and implement such recordkeeping practices.

After consideration of the comments received, the Treasury Department and the IRS agree that section 48(c)(6)(A)(i) does not require that hydrogen energy storage property store hydrogen that will be used for the production of energy. The Treasury Department and the IRS recognize commenters' concerns regarding the administrative challenges the end use requirement could present for taxpayers and agree that it should be removed. The final regulations therefore do not adopt the requirement that hydrogen energy storage property store hydrogen that is solely used as energy and not for other purposes such as for the production of end products like fertilizer.

b. Hydrogen Storage Media

Many commenters provided feedback regarding the qualifying types of hydrogen storage media. Specifically, a commenter requested expanding the definition of hydrogen energy storage to include storage of ammonia and electrolytic hydrogen derivative e-fuels. A commenter also requested that the Treasury Department and the IRS recognize and clarify that, unlike electricity, hydrogen is a chemical building block for other molecules that are capable of more efficiently carrying hydrogen. According to the commenter, this means that hydrogen can be stored as a physical material medium such as a metal hydride. The commenter also requested confirmation that the examples of hydrogen storage mediums provided in the preamble to the proposed regulations are non-exhaustive and that the type of storage medium is intentionally unlimited.

The Treasury Department and the IRS decline to adopt comments requesting that the final regulations provide that chemical storage (that is, equipment used to store hydrogen carriers (such as ammonia and methanol)) is hydrogen energy storage property. Section 48E(c)(2) provides that the term ''energy storage technology'' has the meaning given to such term in section 48(c)(6). Section 48(c)(6)(A)(i) defines ''energy storage technology'' as property (other than property primarily used in the transportation of goods or individuals and not for the production of electricity) which receives, stores, and delivers energy for conversion to electricity (or, in the case of hydrogen, which stores energy), and has a nameplate capacity of not less than 5 kilowatt hours. Section 48(c)(6)(A) references hydrogen, but not compounds containing hydrogen.

c. Hydrogen Storage Components and Equipment

Several commenters requested clarifications regarding the components included in the definition of hydrogen energy storage. Commenters generally requested that the final regulations expand the list of integral and functionally interdependent equipment to be more inclusive of existing and future hydrogen energy storage property technologies. One commenter noted that while the functional interdependence test provided by the proposed regulations is helpful, specifying further what components are considered part of hydrogen energy storage is paramount. The commenter requested additional examples that address specific components including equipment needed to functionally store hydrogen, equipment used to change the phase of matter, equipment used to liquify hydrogen prior to storage, equipment used to convert stored hydrogen to ammonia to be used as a carrier of that stored hydrogen, equipment used to store electrolytic hydrogen derivative e-fuels, and any related and necessary pipelines. Similarly, commenters requested that additional components and equipment be specifically identified as eligible parts of hydrogen energy storage property, including hydrogen liquefaction and related equipment and other equipment required to operate underground hydrogen storage property.

A commenter requested that the final regulations demarcate between equipment used for hydrogen production, conditioning, transportation, and storage. The commenter emphasized that a clear demarcation is necessary to prevent

gaming the system if storage property would qualify for the section 48E credit under section 48(c)(6) and the production equipment will, in many or most cases, be associated with the production tax credit under section 45V. The commenter suggested that the proper demarcation between hydrogen production and conditioning, transportation, or storage equipment is the point at which any post-production conditioning to remove impurities or to put the hydrogen into a saleable form is completed. The commenter stated that, in distinguishing hydrogen production equipment from storage equipment, the associated conditioning equipment should include all equipment necessary to treat, process, compress, pump, or perform other physical action on hydrogen prior to its storage or delivery. The commenter noted that equipment used to convert hydrogen into ammonia, methanol, or another hydrogen carrier also should be associated with post-production processing of hydrogen and not eligible for the section 48E credit. Similarly, the commenter asserted that equipment, such as compressors, used to liquify hydrogen (liquefaction) to put it into a deliverable and salable form should not qualify as hydrogen energy storage property, including the equipment necessary for liquefaction, conversion to ammonia, methanol, or other hydrogen carrier, and dissociation or cracking equipment necessary to convert a hydrogen carrier back into hydrogen. The commenter emphasized that if compressors are used in direct connection with storage devices, rather than to change the form of the hydrogen (for example, from gas to liquid), compressors are integral to the storage equipment and should qualify for the section 48E credit. Another commenter stated that the definition of hydrogen storage property should be limited to tanks and caverns of scale, and the associated equipment necessary to fill or discharge hydrogen from those tanks or caverns.

Commenters also requested further guidance on the eligibility of pipelines as hydrogen energy storage property noting that there are specific cases in which hydrogen pipelines that are directly connected to an energy storage facility can operate as hydrogen storage, by providing additional volumes that can adjust pressure in direct coordination with the storage facility compression system. One commenter requested clarification of the term ''primarily'' in the phrase ''other than property primarily used in the transportation of goods or individuals'' as applied to pipelines that can be used to store hydrogen. Another commenter suggested clarifying the scope of hydrogen storage property with respect to transportation, customer delivery, and use.

One commenter that opposed the inclusion of pipelines, rail cars, and truck trailers in the definition of hydrogen storage property, noted that if hydrogen has been stored in qualified storage property, such as tanks or underground storage salt caverns, the energy storage property should end at the valve where the stored hydrogen is delivered into a pipeline system. Additional commenters recommended limiting the treatment of hydrogen pipelines as integral or interdependent to hydrogen storage property. Commenters pointed to Federal Energy Regulatory Commission (FERC) rulings and applicable case law, such as *Hawaiian Independent Refinery, Inc.* v. *U.S.,* 697 F.2d 1063 (Fed. Cir. 1983), which delineate the circumstances under which pipeline systems would be considered part of the storage facility. One commenter recommended only including pipelines directly linked to storage facilities and further recommended that the final regulations more precisely define the boundary between storage and transportation infrastructure. This commenter's proposed guideline would define the boundary between storage and transportation infrastructure by only considering specific interconnected pipeline segments as part of the storage system: point-to-point lines starting from the storage facility and ending at the first intersection point with explicit compression equipment. Commenters also requested a safe harbor for interconnecting pipelines whereby the pipelines would be deemed integral or interdependent to a hydrogen storage facility if (i) the complex is conceived and designed concurrently, and all offsite interconnecting pipeline components are placed into service within twenty four months of the date on which the first such component is placed into service, and (ii) the offsite interconnecting components are within 100 miles of the storage facility or within the same State as the storage facility.

Commenters proposed the inclusion of additional examples that would provide additional specific eligible components and provide capitalization rules; establish eligibility of pipelines connecting storage facilities if exclusive to use of those facilities; and establish eligibility of purification equipment intended to return the purity of hydrogen post-storage to its purity level upon entering storage.

A commenter suggested allowing tanks and associated equipment for the storage of ammonia when used as a hydrogen carrier to qualify for the section 48E credit but stated that equipment used to disassociate ammonia into hydrogen (referred to as cracking) is a separate function from hydrogen storage and should not be treated as hydrogen energy storage property.

The Treasury Department and the IRS agree that clarifying the definition of hydrogen energy storage property is warranted. Hydrogen liquefaction equipment may prepare hydrogen for storage in the hydrogen energy storage property, making such property an integral part of hydrogen energy storage property. The final regulations provide that property that is an integral part of hydrogen energy storage property includes, but is not limited to, hydrogen liquefaction equipment.

Section 48E(c)(2) generally defines ''energy storage technology'' as having the meaning given such term in section 48(c)(6). Section 48(c)(6)(A)(i) defines ''energy storage technology'' as excluding property primarily used in the transportation of goods or individuals and not for the production of electricity. In general, whether property is ''primarily'' used in the transportation of goods or individuals and not for the production of electricity, is dependent on the facts and circumstances. Pipelines, trailers, and railcars are property primarily used in the transportation of goods or individuals and not for the production of electricity. Accordingly, such property generally would not be considered part of hydrogen energy storage property for purposes of section 48E.

The Treasury Department and the IRS recognize that there are specific cases in which hydrogen pipelines that are directly connected to an energy storage facility can operate as hydrogen storage. Hydrogen energy storage property may have hydrogen pipelines that are used as gathering and distribution lines to transport hydrogen within the hydrogen energy storage property, making such hydrogen pipelines an integral part of the hydrogen energy storage property. These gathering and distribution lines are not pipelines used to transport hydrogen outside of the hydrogen energy storage property. The final regulations clarify that property that is an integral part of hydrogen energy storage property includes, but is not limited to, gathering and distribution lines within a hydrogen energy storage property.

The Treasury Department and the IRS decline to provide additional examples of integral equipment and functionally interdependent equipment in the context of hydrogen energy storage property. The final regulations provide a function-oriented method to determine whether a technology is EST that is broad enough to encompass nascent technologies without rendering the regulations quickly obsolete. It is impossible to enumerate every technology that may be eligible for the section 48E credit given the ever-changing nature of the industry and pace of technological development. Although these regulations do not list all technologies that may qualify for the section 48E credit, the final regulations provide adequate guidance and examples to illustrate the application of the rules for taxpayers to analyze a particular technology. The Treasury Department and the IRS, therefore, do not adopt commenters' requests concerning specific technologies.

9. Modification of Energy Storage Technology

Proposed § 1.48E–2(g)(7) provided that with respect to electrical energy storage property and hydrogen energy storage property, modified as set forth in proposed § 1.48E–2(g)(7), such property will be treated as an electrical energy storage property (as described in proposed § 1.48E–2(g)(6)(i)) or a hydrogen energy storage property (as described in proposed § 1.48E–2(g)(6)(iii)), except that the basis of the existing electrical energy storage property or hydrogen energy storage property prior to such modification is not taken into account for purposes of proposed § 1.48E–2(g)(7) and section 48E.

Commenters noted that taxpayers often replace energy storage equipment to manage the natural degradation of storage assets over time and to prolong the useful life of these projects, even if such improvements do not meet a 5-kWh capacity threshold. One commenter therefore contended that references to nameplate capacity in section 48E are best read to disregard any degradation of the EST between when it is placed in service and when capacity is added. The same commenter contended that modifications to EST should be eligible for the section 48E credit if one of the 5kWh nameplate measurement tests under proposed § 1.48E–2(g)(7)(i) and (ii) are met, regardless of any degradation that has occurred to the EST's nameplate capacity since its original in-service date. The commenter requested clarifying that the nameplate capacity after a modification is the nameplate capacity of such property before the modification plus the capacity added by the modification. Another commenter suggested permitting a ''modification that leads to a demonstrated increase in capacity (measured and recorded immediately before such modifications) of not less than 5kWh,'' to be eligible for the section 48E credit.

Another commenter explained that nameplate capacity of EST is typically defined when initial interconnection is approved, meaning that taxpayers who wish to claim the estimated expenditures of storage augmentation under section 48E will need to modify the original interconnection agreement or oversize their assets before placing them into service. The commenter requested that the section 48E rules recognize the eligibility of storage augmentation beyond nameplate capacity and suggested that the estimated expenditures associated with augmentation of qualifying EST be fully eligible for the section 48E credit. Another commenter suggested clarifying that augmentation of EST over time is eligible for the section 48E credit, either by treating estimated future augmentation costs at the time the EST is originally placed in service as eligible, with recapture provisions if estimated costs are not realized, or by treating any costs related to augmentation that are incurred as part of the upfront investment to construct an energy storage site as eligible. The commenter described augmentation as the periodic upgrade to capacity over a project's lifetime by either adding new inverters and enclosures or recycling batteries to old enclosures and adding new batteries behind an existing inverter.

Section 48E(c)(2) defines EST by reference to section 48(c)(6). Proposed § 1.48E–2(g)(7)(i) and (ii) applied the rules for modification of EST described in section 48(c)(6)(A)(i). In defining EST, section 48(c)(6)(A)(i) uses the term ''nameplate capacity.'' Accordingly, the rules for modification of EST apply with respect to the nameplate capacity of EST, and do not take into account potential degradation of the EST prior to its modification. The final regulations clarify that for purposes of the modification rules, the increase in nameplate capacity is equal to the difference between nameplate capacity immediately after the modification and nameplate capacity immediately prior to the modification. To maintain consistency with the statute, the final regulations do not adopt commenters' suggestions to measure an increase in nameplate capacity in a different manner.

A commenter also suggested clarifying that a modification is taken into account whether the increase in capacity is within an existing enclosure, the existing enclosure is expanded, a new enclosure is added for the increased capacity, or a new enclosure is constructed to include both the existing capacity and the added capacity.

Section 48(a)(6)(B) defines modifications of EST without any reference to physical space limitations. Proposed § 1.48E–2(g)(7) also does not address limiting modifications of EST based on physical space. The Treasury Department and the IRS conclude that a modification of EST is not limited by the physical space occupied by the EST before or after the modification and adopt the proposed regulations without change.

D. Rules for Certain Lower-Output Qualified Facilities

Proposed § 1.48E–4(a)(1) provided rules for qualified facilities with a maximum net output of not greater than 5 megawatts to include qualified interconnection costs in the basis of an associated qualified facility. Proposed § 1.48E–4(a)(1) provided that the qualified investment for a qualified facility includes amounts paid or incurred by the taxpayer for qualified interconnection property in connection with the installation of a qualified facility that has a maximum net output of not greater than 5 MW (as measured in alternating current) (Five-Megawatt Limitation). Proposed § 1.48E–4(a)(1) also provided that the qualified interconnection property must provide for the transmission or distribution of the electricity produced by a qualified facility and must be properly chargeable to the capital account of the taxpayer as reduced by the rules in proposed § 1.48E–4(a)(6). Proposed § 1.48E–4(a)(2) defined the term ''qualified interconnection property.'' Proposed § 1.48E–4(a)(2) further provided that qualified interconnection property is not taken into account to determine if a qualified facility meets the requirements for the increase in credit rate for energy communities or domestic content because qualified interconnection property is not part of a qualified facility. Proposed § 1.48E–4(a)(3) described the Five-Megawatt Limitation as a measurement taken at the qualified facility level. Proposed § 1.48E–4(a)(3)(i) provided that the maximum net output of a qualified facility is measured only by the nameplate generating capacity of the unit of qualified facility, which does

not include the nameplate capacity of any integral property, at the time that the qualified facility is placed in service. Proposed § 1.48E–4(a)(3)(i) additionally provided that the nameplate generating capacity of the unit of qualified facility is measured independently from any other qualified facilities that share the same integral property. Proposed § 1.48E–4(a)(3)(ii) provided how the nameplate capacity at a qualified facility is measured. Proposed § 1.48E–4(a)(4) defined the term ''interconnection agreement'' and proposed § 1.48E–4(a)(5) defined the term ''utility.'' Proposed § 1.48E–4(a)(6) provided that expenses paid or incurred for qualified interconnection property and amounts otherwise chargeable to capital account with respect to such expenses must be reduced under rules similar to the rules contained in section 50(c). Proposed § 1.48E–4(a)(6) provided that the taxpayer must pay or incur the interconnection property costs, and therefore, any reimbursement, including by a utility, must be accounted for by reducing the taxpayers' expenditure to determine eligible costs. The preamble to proposed § 1.48E–4(a)(6) explained that a taxpayer that is reimbursed for these costs may not include such reimbursed costs in the amount paid or incurred by the taxpayer for qualified interconnection property. In the case of a utility reimbursing a taxpayer for costs the taxpayer pays or incurs for qualified interconnection property, the utility should provide the taxpayer with information regarding such costs by the date on which the project is placed in service.

The preamble to the proposed regulations explained that the Treasury Department and the IRS are aware of common situations in which a taxpayer could ultimately receive a payment, credit, or service from another entity, including a utility, related to the costs the taxpayer pays or incurs for qualified interconnection property. For example, one taxpayer may place in service a qualified facility and make payments to a utility with respect to qualified interconnection property involving the addition, modification, or upgrade to the utility's transmission system related to such qualified facility. Subsequently, a different taxpayer may, at a later date, place in service a qualified facility and make payments to the same utility related to the same additions, modifications, or upgrades to the utility's transmission system that were made in response to the first taxpayer's interconnection. The utility may pay, credit, or provide services to the first taxpayer in an amount related to the costs paid by the second taxpayer. The likely amount or timing of any such payment, credit, or service would be unknown at the time the first taxpayer interconnects to the utility's transmission system.

Additionally, in the preamble to the proposed regulations, the Treasury Department and the IRS requested comments on several issues related to reimbursements. The Treasury Department and the IRS requested comment on whether such payment, credit, or service received by the first taxpayer, as a result of subsequent payments made to a utility by other parties, should be treated as a reimbursement to the first taxpayer and impact the amount of the costs of qualified interconnection property that the first taxpayer may include in its basis for purposes of the section 48E credit. The Treasury Department and the IRS also requested comment on whether the costs paid by the second taxpayer should be treated as amounts paid or incurred for qualified interconnection property in connection with the installation of the second taxpayer's qualified facility. The Treasury Department and the IRS requested comment on industry practices relevant to the determination of costs paid or incurred for qualified interconnection property, including the accounting treatment of costs paid or incurred for qualified interconnection property. The Treasury Department and the IRS also requested comment on whether any clarifications are needed regarding the tax treatment of amounts paid or incurred for qualified interconnection property, including reimbursement of costs paid or incurred by a taxpayer for qualified interconnection costs.

In addition to updates discussed in Sections III.D.1 through 6, the final regulations clarify the definition of an interconnection agreement in § 1.48E–4(a)(4) by stating that in the case of the election provided under section 50(d)(5) (relating to certain leased property), the term includes an agreement regarding a qualified facility leased by such taxpayer.

1. Qualified Interconnection Property

Some commenters requested clarification on whether certain costs are considered amounts paid or incurred for qualified interconnection property. A commenter requested that the final regulations confirm that equipment required to modify and upgrade transmission or distribution systems beyond the point of interconnection would be considered qualified interconnection property.

Section 48E(b)(4) provides that the term ''qualified interconnection property'' has the meaning given such term in section 48(a)(8)(B). Section 48(a)(8)(B) defines, in relevant part, the term ''qualified interconnection property'' to mean, with respect to an energy project that is not a microgrid controller, any tangible property that is part of an addition, *modification, or upgrade* to a transmission or distribution system that is required at or beyond the point at which the energy project interconnects to such transmission or distribution system in order to accommodate such interconnection. Proposed § 1.48E–4(a)(2) adopted this definition. The Treasury Department and the IRS confirm that under this definition, tangible property required to modify and upgrade transmission or distribution systems beyond the point of interconnection would (provided the property satisfies the other requirements of section 48(a)(8)(B)) be considered qualified interconnection property and eligible for inclusion in basis for purposes of the section 48E credit.

Another commenter requested that the final regulations expand the definition of qualified interconnection property to include grid-enhancing property. A definitive response to this comment would require the Treasury Department and the IRS to conduct a complete factual analysis of the property in question, which would include information beyond that which was provided by the commenter. Because more information is needed to make the determinations requested by the commenter, the requested clarifications are not addressed in these final regulations.

A commenter requested that, in instances in which the taxpayer funds network upgrades and is then later reimbursed by the transmission owner, taxpayers not be required to account for any reimbursements of interconnection-related expenses paid in later years to the taxpayer. Another commenter requested that in such a scenario, the final regulations should disregard reimbursements to the extent that the reimbursement is includable in the taxpayer's gross income. The commenter also asserted that in circumstances in which the taxpayer receives a later payment from a customer utilizing the qualified interconnection property, the taxpayer be permitted to treat the payments as revenue, rather than reimbursement. One of the commenters also requested confirmation that taxpayers can include in their basis qualifying interconnection costs recovered through ''Transmission

Owner Initial Funding.'' According to the commenters, in certain regional markets, the transmission owner funds the costs of interconnection upgrades for which a taxpayer is responsible, and the taxpayer then reimburses the transmission owner over a certain period, typically 20 years. The commenters requested that a taxpayer with such an arrangement be allowed to include the full amount of interconnection costs that it will ultimately pay over that period in calculating their section 48E credit for the taxable year that the qualified facility is placed in service.

The Treasury Department and the IRS note that the statute limits qualified interconnection property to tangible property. In the case of a taxpayer that pays costs over 20 years, the commenters do not describe whether these amounts paid may include amounts that are not tangible property. To the extent commenters are asking generally about the inclusion of the full allocated cost of interconnection upgrades and, therefore, any amounts paid or incurred by the taxpayer for qualified interconnection property, the Treasury Department and the IRS recognize these payments could include a number of markups that the utility that builds and owns the relevant interconnection property might charge for that property (whether currently or over a later reimbursement period), such as the markup for a rate of return or other costs (for example, a tax gross-up). Whether specific costs are allowable would be a fact-specific inquiry related to, among other things, whether such costs are incurred with respect to eligible tangible property. Therefore, the final regulations do not adopt commenters' suggestion to provide that the full allocated cost of interconnection upgrades is always eligible, although in many cases it may be. However, the Treasury Department and the IRS clarify that it is not determinative whether such costs are charged upfront or over time.

The final regulations under § 1.48E–4(a)(2) also clarify that for purposes of determining the original use of interconnection property in the context of a sale-leaseback or lease transaction, the principles of section 50(d)(4) must be taken into account, as applicable, with such original use determined on the date of the sale-leaseback or lease.

2. Interaction With Other Bonus Credit Amounts

Commenters requested that the final regulations clarify the interaction between the rules for qualified interconnection costs and the computation of the domestic content bonus credit amount and the increased credit amount for energy projects located in an energy community since this clarification was provided in section 48.

Section 48E(b)(4) provides that the term ''qualified interconnection property'' has the meaning given such term in section 48(a)(8)(B). Section 48(a)(8)(B) defines qualified interconnection property as distinct from the definition of ''energy property'' provided in section 48(a)(3). Additionally, section 48(a)(8)(A) includes amounts paid or incurred for qualified interconnection property meeting certain requirements for purposes of determining the credit under section 48(a). Similarly, section 48E(b)(1) includes expenditures paid or incurred by the taxpayer for qualified interconnection property meeting certain requirements for purposes of determining a qualified investment under section 48E(a) and defines qualified interconnection property discretely from a qualified facility eligible under section 48E(a)(1). Given that qualified interconnection property is not part of a qualified facility, § 1.48E–4(a)(2) provides that qualified interconnection property is not taken into account to determine if a qualified facility meets the requirements for the increase in credit rate for energy communities or domestic content. Therefore, no further clarification is needed in the final regulations.

Additionally, because the credit under section 48E(a) is calculated by multiplying the applicable percentage—which includes any domestic content bonus credit amount—by the basis of the qualified facility—which includes amounts paid or incurred by the taxpayer for qualified interconnection property, qualified interconnection costs are taken into account in calculating the domestic content bonus credit amount and the increased credit amounts for energy projects located in an energy community and for certain facilities placed in service in connection with low-income communities.

3. Basis Reduction

For purposes of section 48E(b), the term ''qualified interconnection property'' has the meaning given such term in section 48(a)(8)(B). There are no additional references to section 48(a)(8) other than section 48(a)(8)(B). As a result, the basis reduction language in section 48(a)(8)(E), which provides that in the case of expenses paid or incurred for interconnection property, amounts otherwise chargeable to capital account with respect to such expenses are to be reduced under rules similar to the rules of section 50(c), is not explicitly incorporated. However, the Treasury Department and the IRS determined that the section 50(c) basis reduction rules apply because section 50(c) provides for basis adjustments to investment credit property generally. Section 50(c) has two basis adjustment rules that could apply to interconnection property, section 50(c)(1) or (3). Although interconnection property is not part of a qualified facility as provided in proposed § 1.48E–4(a)(2), qualified interconnection costs are included in the basis used to calculate the section 48E credit. Therefore, the Treasury Department and the IRS confirm the special rule in section 50(c)(3)(A), which provides for a basis reduction of 50 percent in the case of any section 48E credit, applies to qualified interconnection property that is properly chargeable to capital account of the taxpayer which is the amount included in the basis used to calculate the section 48E credit.

4. Reimbursements and Other Cost Reductions

The proposed regulations requested comment on several issues related to reimbursement. Generally, the proposed regulations requested feedback on treatment of reimbursements in common situations in which a taxpayer could ultimately receive a payment, credit, or service from another entity, including a utility, related to the costs the taxpayer pays or incurs for qualified interconnection property. The proposed regulations also requested comments on the outcome when a different taxpayer makes payments to a utility for the same additions, modifications, or upgrades of another taxpayer. Comments were also requested on industry practices and tax implications of reimbursements. In response to these requests, a commenter requested the final regulations clarify that a taxpayer is not required to reduce its section 48E credit on account of any reimbursement of interconnection costs in the absence of a fixed right (that is specific in amount and time) to receive the reimbursement at the time the taxpayer incurs the interconnection costs. This commenter recommended that the final regulations include rules that are administrable and provide only a single credit on qualified interconnection costs (for example, a case in which another possible section 48E claimant reimburses directly or indirectly a first claimant).

Other commenters requested clarification of the reimbursement rules under specific scenarios. One commenter suggested that for cases in

which the taxpayer funds network upgrades and is later reimbursed by the transmission owner, the final regulations should avoid accounting for any reimbursements of interconnection-related expenses paid in later years to the taxpayer.

Another commenter suggested that including reimbursed interconnection costs in the credit basis should be based on whether the amounts are includible in gross income. The commenter stated that in circumstances in which a utility reimburses a qualified facility owner under a set schedule, the final rule should disregard the utility's reimbursements to the extent that the reimbursement is includable in a taxpayer's gross income. The commenter added that if a subsequent interconnection customer's use of the qualified interconnection property results in a later payment or credit to the taxpayer, the payment or credit should be treated as revenue rather than reimbursement. The commenter also requested clarification that in circumstances in which a qualified facility owner pays for qualified interconnection property *without* reimbursement, the owner should be able to utilize the full cost of those facilities in determining its investment tax credit.

The Treasury Department and the IRS recognize that situations may arise in which the initial amount paid or incurred for qualified interconnection property is reduced after the taxable year in which the taxpayer claims the section 48E credit. The Treasury Department and the IRS also recognize that other complicated situations may arise in determining whether a taxpayer has paid or incurred qualified interconnection costs. The comments received confirmed that these questions are not unique to the reimbursement of qualified interconnection costs and may also arise in the context of other tax credits. Therefore, the determination of whether qualified interconnection costs have been paid or incurred by the taxpayer and whether such amounts are reduced by virtue of transactions with the utility or with a third party should be based on generally applicable Federal tax principles.

In consideration of the comments, the final regulations revise the rule under § 1.48E–4(a)(6) regarding reduction to amounts chargeable to capital account to reflect the application of Federal tax principles to such transactions in determining the amount a taxpayer paid or incurred for qualified interconnection costs. The final regulations at § 1.48E–4(a)(1) explain that if the costs borne by the taxpayer are reduced by utility or non-utility payments, Federal tax principles may require the taxpayer to reduce the amount treated as paid or incurred for qualified interconnection property to determine a section 48E credit. The final regulations at § 1.48E–4(a)(7) also include two additional examples related to reducing costs borne by the taxpayer.

5. Five-Megawatt Limitation

Some commenters provided feedback on the measurement rule for the Five-Megawatt Limitation provided at proposed § 1.48E–4(a)(3). Two commenters suggested that the Five-Megawatt Limitation be modified to clarify the relevant measurement is performed at the point of output (that is, 5 MW AC at the inverter) rather than nameplate generation capacity to better align with section 48E(b)(1)(B). As described by one of the commenters, the text of section 48E(b)(1)(B) does not contain the words ''nameplate'' or ''capacity'' and instead it specifically refers to the 5 MW limit by reference to ''output . . . measured in alternating current'' which, for solar photovoltaic systems can only be read to refer to post-inverter measurement. Another commenter recommended that the final regulations refer only to output measured in alternating current, without presuming that the direct current nameplate capacity is identical. Additionally, this commenter requested that the final regulations specifically clarify that qualified facilities be defined at the inverter level for the limited purpose of evaluating if they meet the Five-Megawatt Limitation, as this is the source of any alternating current output.

Measuring output with accuracy and consistency must be done using a defined standard. The Treasury Department and the IRS conclude that nameplate generating capacity is the best and most practical measure of the maximum net output of a unit of qualified facility. Nameplate generating capacity is an objective and identifiable standard that can be accurately measured with consistency. Therefore, the Treasury Department and the IRS do not adopt the comment suggesting changes to the use of nameplate capacity. The final regulations at § 1.48E–4(a)(3)(ii) retain the rule that the determination of whether a qualified facility has a maximum net output of not greater than 5 MW (as measured in alternating current) is based on the nameplate capacity of the unit of qualified facility.

Regarding measurement of the Five-Megawatt Limitation in alternating or direct current, the Treasury Department and the IRS understand the commenter's concerns and agree that the rule provided in the proposed regulations should be revised. Section 48E(b)(1)(B)(i)(I) refers to a maximum net output of not greater than five megawatts (as measured in alternating current). Proposed § 1.48E–4(a)(3)(ii) provided for nameplate capacity in alternating current, without addressing types of qualified facilities, such as solar facilities, that generate electricity in direct current. Nameplate capacity for these types of qualified facilities is measured before the facility's output is converted to alternating current by an inverter. Because an inverter would be considered property that is an integral part of the qualified facility and not part of the unit of qualified facility itself, measuring the nameplate capacity of a qualified facility that generates electricity in direct current would be difficult under the proposed regulations.

However, in response to comments, the final regulations provide a method of measuring nameplate capacity for a qualified facility that generates electricity in direct current. The final regulations at § 1.48E–4(a)(3)(iii) provide that, for qualified facilities that generate electricity in direct current, the taxpayer determines whether a qualified facility has a maximum net output of not greater than 5 MW (in alternating current) by using the lesser of: (i) the sum of the nameplate generating capacities within the unit of qualified facility in direct current, which is deemed the nameplate generating capacity of the unit of qualified facility in alternating current; or (ii) the nameplate capacity of the first component of the qualified facility that inverts the direct current electricity generated into alternating current. This rule provides flexibility for taxpayers while ensuring that the maximum net output (in alternating current) of a qualified facility can be determined in an administrable and reasonably accurate manner for qualified facilities that generate electricity in direct current.

A few commenters suggested providing additional examples to illustrate output rules for interconnection property. Another commenter recommended finalizing Example 1 in proposed § 1.48E–4(a)(7)(i) which specified that two section 48E facilities, each with a maximum output of 5 MW AC, can share—and treat as qualified interconnection property—a step-up transformer, which is integral to both properties.

In response to commenters that requested additional clarification of the Five-Megawatt Limitation, the final

regulations add an additional example under § 1.48E–4(a)(7) as well as provide clarifications to the existing examples. These clarifications illustrate the revised method of measuring nameplate capacity for a qualified facility that generates electricity in direct current. The clarifications also demonstrate the application of the Five-Megawatt Limitation in cases in which the nameplate capacity differs from the maximum output provided in the interconnection agreement. Specifically, the newly added example describes the application of the Five-Megawatt Limitation to separate interconnection agreements for a single qualified facility made up of units of a qualified facility owned by a single taxpayer. In that example, although the taxpayer has interconnection agreements with the utility that each allow for a maximum output of 10 MW (as measured in alternating current), the taxpayer may include the costs taxpayer paid or incurred for qualified interconnection property, subject to the terms of the interconnection agreement, to calculate the taxpayer's section 48E credits for each of the qualified facilities because each has a maximum net output of not greater than 5 MW (alternating current).

6. Energy Storage Technology

Two commenters suggested that the final regulations permit interconnection costs for stand-alone EST. Both commenters explained that although sections 48E(b) and (c) do not mention eligible interconnection costs in the context of stand-alone EST, the term ''qualified interconnection property'' is defined by reference to section 48(a)(8). Therefore, according to the commenters, this result is supported because the statutory text of that section expressly includes ''amounts paid or incurred by the taxpayer for qualified interconnection property . . . to provide for the transmission or distribution of the electricity produced or stored by such property.'' These commenters also added that this result would reconcile sections 48 and 48E and would advance the IRA's express policy of encouraging storage deployment.

Based on the explicit language of section 48E, the Treasury Department and the IRS disagree that including costs for qualified interconnection property for a standalone EST is supported by the statute. Section 48E(c)(1), which describes the qualified investment *with respect to EST,* does not refer to qualified interconnection property.

Section 48E(b)(1) generally provides, in part, that the qualified investment with respect to any qualified facility for any taxable year includes the amount of any expenditures which are both paid or incurred by the taxpayer for qualified interconnection property in connection with a qualified facility which has a maximum net output of not greater than 5 megawatts (as measured in alternating current), and placed in service during the taxable year of the taxpayer. The amount of any expenditures which are paid or incurred by the taxpayer for qualified interconnection property must also be properly chargeable to capital account of the taxpayer. Section 48E(b)(4) defines qualified interconnection property by reference to section 48(a)(8)(B). While commenters are correct that the reference to qualified interconnection property in section 48(a)(8)(A) also refers to ''electricity stored,'' the cross-reference applicable for qualified facilities is to section 48(a)(8)(B) (the definition of qualified interconnection property) and there is no similar cross-reference in section 48E to support including the costs of qualified interconnection property for an EST. The overt omission of a reference to qualified interconnection property in section 48E(c), which provides rules for determining qualified investment with respect to an EST is instructive. The clear exclusion of qualified interconnection property for EST under section 48E(c)(1), particularly when compared to its inclusion in section 48E(b)(1)(B)(i)(I), demonstrates Congressional intent. Therefore, the final regulations do not adopt commenters' recommendation that expenditures paid or incurred by the taxpayer for qualified interconnection property are includible in the section 48E credit for EST.

As discussed earlier, the Treasury Department and the IRS understand that some hybrid systems (such as those for a solar qualified facility and EST) operate under a single interconnection agreement.[1] In these situations, while expenditures paid or incurred by a taxpayer for qualified interconnection property are not includible in the section 48E credit for an EST, those expenditures paid or incurred for qualified interconnection property that are properly allocated to the qualified facility (for example, the solar qualified facility) may be included in the credit base for the qualified facility's qualified investment for the section 48E credit.

[1] In some configurations, the addition of EST to a qualified facility may have no or limited impact on the interconnection costs of that hybrid facility.

E. 80/20 Rule

As noted earlier, the 80/20 Rule is designed to broaden the availability of the investment credit by providing a new original placed in service date for a qualified facility that includes some components of property previously placed in service, rather than requiring the qualified facility to be composed entirely of new components of property. In the context of section 48E, the 80/20 Rule applies at the qualified facility level to the components of property within the unit of qualified facility or unit of EST.

Proposed § 1.48E–4(c)(1) provided that for purposes of section 48E(b)(3)(A)(ii), a facility may qualify as originally placed in service even if it contains some used components of property within the unit of qualified facility, provided that the fair market value of the used components of the unit of qualified facility is not more than 20 percent of the unit of qualified facility's total value (that is, the cost of the new components of property plus the value of the used components of property within the unit of qualified facility). In addition to providing a new placed in service date for a qualified facility that includes some components of property that have previously been placed in service, the 80/20 Rule also encourages investment in the retrofitting of existing facilities.

Although this section focuses on the 80/20 Rule in the section 48E context, section II.F. of this Summary of Comments and Explanation of Revisions describes comments received on both sections 45Y and 48E. As described in that section, the Treasury Department and the IRS confirm that if a qualified facility under section 45 or energy property or EST under section 48 is later retrofitted in a manner that satisfies the 80/20 Rule, it will be considered a new qualified facility or a new EST and may be eligible for a section 48E credit so long as the qualified facility or EST meets all requirements of section 48E. Additionally, the Treasury Department and the IRS confirm that section 48E does not refer to a project or system but in the case of section 48E to a qualified facility and an EST.

1. Relevance of Prior Section 48 Guidance

Prior guidance and regulations under section 48 are not binding for purposes of section 48E. However, several commenters stated that application of the 80/20 Rule as proposed violated longstanding precedent under section 48. These commenters stated that under section 48 as previously applied,

taxpayers would be allowed to claim the section 48E credit for capital improvements as well as additions or modifications to existing property without regard to the 80/20 Rule. Further, some commenters suggested that the 80/20 Rule as originally applied in the section 48 context was only relevant for addressing the ''original use requirement'' for property and was not intended to prevent additions of new property from qualifying for a credit. These commenters pointed to Example 2 in § 1.48–2(b)(7) and Examples 4 and 5 in § 1.48–2(c), to illustrate that, in the context of the section 48 credit, the 80/20 Rule was intended to address the ''original use requirement.'' Consistent with this view, several commenters asserted that the prohibition against claiming the section 48E credit for additions that do not meet the 80/20 Rule (Excluded Costs Rule) is inconsistent with the statute and regulations and should be removed.

One commenter, like many others that asserted that the application of the 80/20 Rule for purposes of section 48E is contrary to historical precedent, also focused on the negative economic impact. The commenter stated that the proposed regulations would negatively impact the economics of both existing and future development of clean energy projects and that existing project investments were based on reasonable reliance that future capital improvements would be eligible for the section 48E credit without regard to the 80/20 Rule. Similarly, another commenter stated it did not see a policy rationale for application of the 80/20 Rule in the manner provided in the proposed regulations, as it would lead to uneconomic decisions, such as favoring demolition and rebuilding instead of capital expenditures to modify an existing energy property and, like others, pointed to what they view as inconsistency with more than 60 years of prior investment tax credit (ITC) precedent.

The Treasury Department and the IRS understand the concerns raised by commenters. However, prior guidance and regulations based on section 48 are not binding for purposes of section 48E. Section 48E provides a credit only for a qualified investment with respect to a qualified facility or an EST and not for components of property within a qualified facility or an EST. For the reasons provided here, the Treasury Department and the IRS believe that the best interpretation of ''qualified investment with respect to a qualified facility or an EST'' is that if a taxpayer does not place in service a qualified facility or an EST, a taxpayer is not eligible for a credit. Therefore, the application of the 80/20 Rule to the section 48E credit in the proposed regulations benefits taxpayers by providing a path to access the section 48E credit when less than an entirely new qualified facility or EST is placed in service.

Section 48E contains several features that require the credit to be analyzed at the level of a qualified facility or an EST. The PWA requirements are applied to a qualified facility or an EST under section 48E(a)(2)(A) and (B). Likewise, determining whether the increased credit amounts for domestic content and energy communities also apply to a qualified facility or an EST. Finally, determining whether a taxpayer may include qualified interconnection property expenditures is tied to the maximum net output of a qualified facility. These determinations cannot be made with respect to individual components of property. This statutory construction clearly contemplates calculating the credit on the basis of an entire qualified facility or EST. Applying the 80/20 Rule for purposes of section 48E provides taxpayers with an opportunity for additions of property to an existing facility or an EST to be eligible for the section 48E credit if the rule is satisfied.

Other commenters pointed to what they describe as longstanding rules that otherwise ITC-eligible improvements made to existing energy property may qualify for the ITC. One commenter stated that the IRA did not change this rule in any way. According to this commenter, application of the 80/20 Rule has always uniquely been relevant for purposes of the production tax credit (PTC) and is simply not relevant for purposes of the ITC. The Treasury Department and the IRS affirm the role of the 80/20 Rule in the ITC context to allow for additions of new property to an existing facility or EST to be eligible for the section 48E credit if the rule is satisfied.

2. Excluded Costs

Several commenters asserted that section 48E allows a credit for adding components or making capital additions to a qualified facility. One commenter concluded that capital improvements should not be penalized under the 80/20 Rule. According to the commenter, owners of a qualified facility, such as a solar qualified facility, should be allowed to upgrade or replace components and claim new section 48E credits. The commenter pointed to two examples in the existing Treasury Regulations under section 48 that the commenter stated illustrate the proper interpretation of the original use requirement in § 1.48–2(b)(7) and the difference between a reconditioned or rebuilt unit of property previously placed in service and/or the use of ''some used parts,'' on the one hand, and the addition of new property or capital improvements, on the other.

Another commenter stated that the excluded costs described in proposed § 1.48E–4(c)(5) are unclear because a taxpayer is always adding new components to used components, and it should be reworded to clarify that it does not imply that the taxpayer must exclude the cost of new components when a taxpayer adds them to used components.

Some of these commenters requested that the 80/20 Rule and the Excluded Costs Rule provided at proposed § 1.48E–4(c)(5) not apply for section 48E purposes to additions of otherwise eligible new components of property added to an existing qualified facility on which a PTC was not claimed. As an example, the commenter asserted that the owner of a solar qualified facility should be able to make capital improvements to upgrade or replace existing solar modules or inverters and claim a new section 48E credit without regard to the 80/20 Rule on such capital improvements. This commenter stated that the 80/20 Rule should only apply when a new category of components is added to an existing qualified facility comprised of different categories of components (such as wind being added to solar), then that new category of component should be treated as a separate ''unit of qualified facility.'' The commenter stated that this result is also consistent with the IRA generally, which does not prevent a taxpayer from claiming both a PTC with respect to the output of a qualified facility and an ITC with respect to any associated EST. The commenter stated that this is also consistent with Notice 2018–59.

Another commenter explained that the 80/20 Rule has its origins under the section 48 credit and in the context of the section 48 regulations the phrase, ''some used parts,'' that has been the focus of the IRS's administrative practice for almost 60 years. According to the commenter, Rev. Rul. 68–111, 1968–1 C.B. 29, reflects the proper application of the 80/20 Rule albeit under a prior version of the section 48 credit. The commenter asserted that the Excluded Costs Rule in proposed § 1.48E–4(c)(5) distorts the 80/20 Rule by shifting the focus from the use of ''used parts'' at the time the unit of property is originally placed in service to ''new'' property and capital improvements that are added later.

The Treasury Department and the IRS note that the application of the 80/20 Rule clarifies that expenditures for components of property that are not a unit of qualified facility can only qualify if the 80/20 Rule is satisfied, and thus any new property and capital improvements added later that are not a unit of qualified facility are ineligible for a section 48E credit unless the 80/20 Rule is satisfied. In response to the commenters that asserted that section 48E allows a credit for a component of property rather than a qualified facility, the Treasury Department and the IRS disagree with commenters' interpretation of the statutory language. The Treasury Department and the IRS also emphasize that existing regulations under § 1.48–2 do not reflect the current version of section 48 and are not applicable to section 48E. Additionally, a taxpayer who makes a capital improvement to an existing facility should consider the application of the Incremental Production Rule provided in § 1.45Y–4(d). Similarly, a taxpayer that makes modifications to an EST should consider the application of the rule provided at § 1.48E–2(g)(7).

Another commenter suggested that the purpose of the 80/20 Rule is to allow a facility that was placed in service prior to January 1, 2025, to nevertheless satisfy the requirement in section 48E(b)(3)(A)(ii) that a qualified facility be placed in service after December 31, 2024, if a substantial portion of the facility is reconstructed after 2024.

The Treasury Department and the IRS disagree that the 80/20 Rule is tied to a particular year. The 80/20 Rule allows a taxpayer to treat an existing facility as originally placed in service at a later date by adding new components of property that represent at least 80 percent of the value of the unit of qualified facility. A retrofitted qualified facility or EST will be eligible for the section 48E credit if it meets the requirements of the 80/20 Rule before the section 48E credit phases out.

3. Recapture

A commenter stated that if the Treasury Department and the IRS retain the Excluded Costs Rule as written, the final regulations should further clarify that investment tax credit recapture rules will not apply to additions of property that do not satisfy the 80/20 Rule. Generally, recapture under section 48E is governed by section 50(a)(1)(A), which provides for recapture of the credit if property ceases to be investment credit property. Additions of property that do not satisfy the 80/20 Rule and that are thus subject to the Excluded Costs Rule are not included in the calculation of the section 48E credit. Accordingly, there is no credit to recapture with respect to such additions of property.

4. Original Use Requirement

Some commenters asserted that the original use requirement applies only to *acquired* property, and therefore, the 80/20 Rule is unnecessary for other types of property. These commenters pointed to section 48E(b)(2)(C), which provides, in part, that qualified property means property (i) the construction, reconstruction, or erection of which is completed by the taxpayer, or (ii) which is acquired by the taxpayer if the original use of such property commences with the taxpayer. This language was incorporated at proposed § 1.48E–2(f)(3) through (5). The commenters cited this language to support their view that the original use requirement applies only to acquired property. Therefore, according to the commenters, the ''original use'' requirement applies to property acquired by a taxpayer, but does not apply to property the construction, *reconstruction,* or erection of which is completed by the taxpayer. The commenters concluded that this statutory language supports the position that capital additions to an existing qualified facility or EST qualify for the section 48E credit.

The Treasury Department and the IRS disagree with the commenters' interpretation of the statutory language and corresponding language in the proposed regulations. The commenters are correct that section 48E(b)(2)(C)(ii) requires original use for acquired property, whereas section 48E(b)(2)(C)(i) does not mention original use with respect to property that is constructed, reconstructed, or erected by or for the taxpayer, however, that is because an original use requirement is unnecessary in the latter context. The taxpayer that is claiming a credit for property that it constructed, reconstructed, or erected by or for such taxpayer will necessarily be the original user of such property. Although some commenters suggested the 80/20 Rule has historically been applied in the section 48 context with respect to the original use requirement, the Treasury Department and the IRS emphasize that the 80/20 Rule was first applied to the section 48 credit through guidance issued in the Internal Revenue Bulletin providing beginning of construction guidance. The Treasury Department and the IRS reiterate that for section 48E purposes, the 80/20 Rule allows a taxpayer that retrofits an existing facility to treat such facility as a new qualified facility or EST.

5. EST

In the context of section 48E, the proposed regulations discussed the 80/20 Rule for purposes of retrofitting a qualified facility but did not specifically address the application of the 80/20 Rule to EST. Some commenters asked if the 80/20 Rule applied to EST. Commenters requested that the final regulations clarify that the 80/20 Rule also applies to EST, including battery energy storage systems and pumped storage hydropower. Another commenter stated that new component categories, like EST, added to existing facilities should be treated as separate units of qualifying facility and exempted from the 80/20 Rule.

In response to these comments, the Treasury Department and the IRS note that the 80/20 Rule applies to EST. The 80/20 Rule, as it is applied to EST, is a separate rule from the modification of EST provided by the section 48E(c)(2) reference incorporating section 48(c)(6)(B) (modifications of EST). The final regulations adopt the application of the 80/20 Rule for EST, and this Summary of Comments and Explanation of Revisions addresses EST in regard to the 80/20 Rule. With respect to the addition of EST to a site with an existing qualified facility, the Treasury Department and the IRS note that an EST is separate from a qualified facility as discussed in section III.C.2. of this Summary of Comments and Explanation of Revisions. As a result, merely adding an EST to a site with an existing qualified facility does not require application of the 80/20 Rule.

6. Specific Technologies

Some commenters asked for specific clarifications regarding the 80/20 Rule and particular technologies. A commenter suggested that in the case of a hydropower facility combined with a pumped storage hydropower facility, each powerhouse generating unit (turbine or pump turbine, generator and controls) should be considered a unit of qualified facility for purposes of the final regulations. Additionally, this commenter asserted, that, in the case of a wind facility, the functionally interdependent components of a unit of qualified facility should be the turbine, tower, and foundation pad. In both cases, the commenter requested that the 80/20 Rule apply to the functionally interdependent components of the unit of qualified facility.

For purposes of the section 45Y and section 48E credits, the unit of qualified facility includes all functionally interdependent components of property (as defined in proposed § 1.48E–

2(d)(2)(ii)) owned by the taxpayer that are operated together and that can operate apart from other property to produce electricity. The final regulations adopt these rules, which provide a function-oriented approach to determine if property is considered part of the qualified facility that generates electricity, to ensure that the final regulations are broad enough to encompass nascent technologies without rendering the regulations quickly obsolete. After consideration of the comments, an example of the application of the 80/20 Rule to a qualified hydropower production facility has been added to the final regulations under § 1.48E–4(c)(6)(v). Additionally, the Treasury Department and the IRS made revisions to Example 3 of § 1.48E–4(c)(6)(iii), similar to those made for § 1.45Y–4(d)(3)(iii), that removed the reference to a decommissioned nuclear facility to avoid referring to decommissioned and restarted nuclear facilities in the Incremental Production Rule and the 80/20 Rule.

Another commenter specifically asked that the 80/20 Rule be eliminated for certain types of facilities such as power generation, thermal generation, or CHP facilities upgraded to be carbon neutral. To support this request, the commenter noted that the 80/20 Rule discourages the use of existing infrastructure in CHP applications. While the Treasury Department and the IRS appreciate the concerns raised for particular technologies, as described in the preamble to the proposed regulations, a qualified facility generally does not include equipment that is an addition or modification to an existing qualified facility or EST. However, *see* § 1.48E–4(b) regarding the Incremental Production Rule.

7. Interaction Between the Incremental Production Rule and the 80/20 Rule

Some commenters were concerned about the interaction of the Incremental Production Rule and the 80/20 Rule and the provided at proposed §§ 1.45Y–4(c) and 1.48E–4(b). One commenter requested that the Treasury Department and the IRS make clear that the provision for retrofitted facilities is separate and distinct from the requirements for the Incremental Production Rule, and that if there is any overlap between the two, the 80/20 Rule should control. The commenter stated that a retrofitted facility that results in the addition of capacity should be treated as newly placed in service if it meets the 80/20 Rule (rather than requiring the retrofitted facility to follow the Incremental Production Rule).

Another commenter recommended clarifying when to apply one rule or the other in situations in which both the 80/20 and Incremental Production rules could apply. A commenter also asserted that the statutory text under sections 45Y(b)(1)(C) and 48E(b)(3)(B)(i), regarding the Incremental Production Rule, is without regard to the 80/20 Rule or the facility's original placed in service date, and that, therefore, Congress sought to incentivize investment in existing facilities without requiring taxpayers to meet the 80/20 Rule. Similarly, commenters recommended providing an example of a decommissioned facility without any reference to the 80/20 Rule, and to revise Example 3 in proposed § 1.45Y–4(d)(3)(iii), regarding the 80/20 Rule, to remove the reference to decommissioning.

The Treasury Department and the IRS agree that the Incremental Production Rule provided in sections 45Y(b)(1)(C) and 48E(b)(3)(B)(i) are separate and distinct from the 80/20 Rule. If a retrofitted facility satisfies the 80/20 Rule, the final regulations provide that the facility will be treated as newly placed in service even if the taxpayer also satisfies the Incremental Production Rule. Separately, these final regulations provide an additional example, in § 1.48E–4(b)(5), which specifically addresses decommissioned and restarted facilities. Additionally, § 1.48E–4(c)(1) is clarified to confirm that a qualified facility or EST may claim the full available credit rather than the credit resulting from an addition of capacity. Finally, Example 3 in § 1.45Y–4(d)(3)(iii) is modified to remove the reference to decommissioning.

Another commenter requested clarification that even if a facility placed in service before 2025 (pre-2025 facility) fails the 80/20 Rule, property that is added to the facility may still qualify for the section 48E credit under the Incremental Production Rule in section 48E(b)(3)(B)(i). Proposed § 1.48E–4(b)(1) provided, in part, that the term qualified facility includes either a new unit or an addition of capacity placed in service after December 31, 2024, in connection with a facility described in section 48E(b)(3)(A) (without regard to section 48E(b)(3)(A)(ii)), which was placed in service before January 1, 2025, but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit or addition of capacity. Thus, a pre-2025 facility that fails the 80/20 Rule may still qualify for the section 48E credit under the Incremental Production Rule. Additionally, the Treasury Department and the IRS confirm that this rule will apply to a pre-2025 facility regardless of whether it satisfies the 80/20 Rule.

8. Other Comments

While the majority of commenters that opposed the 80/20 Rule suggested eliminating it, particularly the Excluded Costs Rule, one commenter provided an additional recommendation. This commenter recommended that the proposed regulations be revised to permit taxpayers to elect either the 80/20 Rule or a rule based on the original cost of the qualified facility (Original Cost Rule). Under the Original Cost Rule as proposed by the commenter, a qualified facility would be treated as originally placed in service, even though it contains some used components of property, provided the cost of the new components of the unit of qualified facility is at least 50 percent of the original cost of the unit of qualified facility. Original cost would be defined as the unadjusted GAAP book basis at the time the qualified facility was originally placed in service. The commenter also explained that this new rule could be limited in its application and stated that outside of sections 45 and 48 an 80/20 Rule currently applies to determine eligibility for bonus depreciation under section 168(k)(7) and the carbon oxide sequestration credit under section 45Q of the Code. Therefore, the commenter requested that the final regulations adopt an optional Original Cost Rule limited to section 45Y and section 48E qualified facilities, which would limit the effect to the section 45Y and 48E credits and permit the 80/20 Rule adopted in other contexts to remain in place.

The Treasury Department and the IRS understand the commenter's desire for a less restrictive standard than what the proposed 80/20 Rule provides, but the Treasury Department and the IRS think the 80/20 Rule strikes the appropriate balance between allowing taxpayers flexibility and creating an incentive for new investment. Therefore, the final regulations do not adopt the commenter's proposal.

After consideration of all comments expressing opposition to the 80/20 Rule in the context of section 48E, the Treasury Department and the IRS decline to modify or abandon the 80/20 Rule as requested. Section 48E(b)(1) provides that the section 48E credit is available for the qualified investment with respect to any qualified facility for any taxable year that includes the basis of any qualified property placed in service by the taxpayer during such

taxable year which is part of a qualified facility. Section 48E(c)(1) provides that a credit for the qualified investment with respect to an EST for any taxable year is the basis of any EST placed in service by the taxpayer during such taxable year. The 80/20 Rule is designed to broaden the availability of the section 48E credit to provide a new original placed in service date for a qualified facility or EST that includes some components of a qualified facility or EST that have already been placed in service, rather than requiring the entire unit of qualified facility or EST to be composed of only new property. The 80/20 Rule also encourages retrofitting an existing qualified facility or EST provided there is sufficient new investment. As described earlier in this section on the 80/20 Rule, if a qualified facility under section 45 or energy property under section 48 is retrofitted in a manner that satisfies the 80/20 Rule, it will be considered a new qualified facility and may be eligible for the section 45Y or 48E credits if the qualified facility meets all of the sections 45Y and 48E requirements.

Section 48E(c)(2) incorporates the lone express rule for modification of existing energy property that is found in section 48(c)(6)(B). This special rule is limited to modifications of existing EST. The inclusion of this specific provision suggests that modifications of existing EST that do not meet the 80/20 Rule or the Incremental Production Rule are ineligible for the section 45Y or 48E credits. Adopting the 80/20 Rule for the section 48E credit is favorable to taxpayers and encourages substantial additional investment in existing qualified facilities and EST.

As discussed in section IV.G. of this Summary of Comments and Explanation of Revisions, the ownership rules provided that the section 45Y and 48E credits are available for an entire unit of qualified facility or unit of EST and not for individual components of property. The 80/20 Rule is consistent with the ownership rules because it ensures that a qualified facility or EST that is retrofitted to a sufficient extent is considered a new qualified facility or EST, whereas the addition of mere components is not eligible for the section 48E credit.

F. Qualified Progress Expenditures

Section 48E(d)(1) provides that rules similar to the rules of former section 46(c)(4) and (d) (as in effect on the day before the date of the enactment of the Revenue Reconciliation Act of 1990) apply for purposes of section 48E(a). Footnote 5 of the proposed regulations explained that the rules provided by § 1.46–5 related to qualified progress expenditures apply for purposes of section 48E(a).

Several commenters requested that the final regulations provide additional clarifications related to whether qualified progress expenditures are allowable for purposes of elective payment elections under section 6417 (section 6417 elective payment elections). Commenters requested clarifying the application of qualified progress expenditure payments to ''applicable entities,'' as defined in section 6417(d)(1), and confirming that progress expenditures permitted by section 48E are allowable for purposes of section 6417 elective payment elections. Commenters noted that, while section 6418(g)(4) provides an explicit statutory prohibition on using the section 6418 credit transfer election provisions for progress expenditures, a similar prohibition was not included for section 6417 elective payment elections and that, therefore, permitting applicable entities to use the section 48E credit for purposes of section 6417 elective payment elections is consistent with the statutory text of section 6417.

Given the statutory language under section 48E(d)(1), a taxpayer can make a qualified progress expenditure election, as provided in § 1.46–5, to increase its qualified investment with respect to a qualified facility or EST for the taxable year by any qualified expenditures made during such taxable year. Section 6417(b)(12) provides that the section 48E credit is an applicable credit for purposes of making an elective payment election. The statutory text of sections 48E(d)(1) and 6417(b)(12), when read in tandem, permit a taxpayer to make an elective payment election with respect to a section 48E credit determined pursuant to a qualified progress expenditure election. Therefore, the Treasury Department and the IRS confirm that for the section 48E credit, qualified progress expenditures are allowable for purposes of section 6417 elective payment elections but have determined that no change is necessary in the final regulations. The final regulations at § 1.48E–4(g) adopt language similar to footnote 5 from the proposed regulations, that the rules provided by § 1.46–5 related to qualified progress expenditures apply for purposes of section 48E(a).

G. Incremental Cost Rule

One commenter requested that the final regulations ''clarify the application of the 'incremental cost''' concept to section 48E. Incremental cost is the excess of the total cost of equipment over the amount that would have been expended for the equipment if the equipment were not used for a qualifying purpose. The regulations under former § 1.48–9(k) provided the incremental cost rule. The preamble to the Treasury Decision (TD 7765, 46 FR 7291) that implemented this rule noted that in many instances one item of property can be used in part for a qualifying energy purpose and in part for non-qualifying functions. The preamble to TD 7765 explained that the Treasury Department and the IRS approached this situation by considering whether to deny the credit, provide partial credit, or allow a full credit. The preamble stated that simply denying the credit entirely would discourage investments, but that, on the other hand, property which incidentally serves an energy function should not receive the subsidy of a full energy credit. For these reasons, the Treasury Department and the IRS viewed the incremental cost rule as the most fair approach.

The Treasury Department and the IRS have determined that a similar approach should be taken in these final regulations. Section 1.48E–4(h)(1) provides that for purposes of section 48E, if a component of qualified property of a qualified facility or a component of property of an EST is also used for a purpose other than the intended function of the qualified facility or EST, only the incremental cost of such component is included in the basis of the qualified facility or EST. This section also defines the term ''incremental cost'' to mean the excess of the total cost of a component over the amount that would have been expended for the component if that component were used for a non-qualifying purpose. Section 1.48E–4(h)(2) provides an example to illustrate this rule.

H. Application of Normalization Opt-Out

Proposed § 1.48E–4(g)(4) referred taxpayers to section 50(d)(2) for application of the normalization rules to the section 48E credit in the case of certain regulated companies, including rules regarding the election not to apply the normalization rules to EST (as defined in section 48(c)(6) of the Code). Several commenters requested that the final regulations clarify that the normalization opt-out election provided in section 50(d)(2) is available for the section 48E credit claimed with respect to an EST, without regard to the date on which construction of such EST begins. After consideration of the comments, the requested clarification has been adopted in § 1.48E–4(i)(4).

IV. Combined Qualified Facilities (Sections 45Y and 48E)

This section covers issues that impact both sections 45Y and 48E and includes the topics: beginning of construction, property included in a qualified facility, qualified facilities and specific technologies, coordination with other credits, integral part, shared integral property, ownership, the Incremental Production Rule, and the dual use rule.

Proposed § 1.45Y–2(a) defined a ''qualified facility'' to mean a facility owned by the taxpayer that is used for the generation of electricity, is placed in service after December 31, 2024, and has a GHG emissions rate of not greater than zero (as determined under rules provided in proposed § 1.45Y–5).

Proposed § 1.48E–2(a) defined a ''qualified facility'' to mean a facility that is used for the generation of electricity, is placed in service by the taxpayer after December 31, 2024, and has a GHG emissions rate of not greater than zero (as determined under rules provided in § 1.45Y–5).

A. Beginning of Construction

Notice 2022–61, 2022–52 I.R.B. 560, provides guidance regarding the prevailing wage and apprenticeship (PWA) requirements and provides guidance for determining the beginning of construction of a facility for the section 45Y and 48E credits. Section 5 of the Notice provides that, to determine when construction begins for purposes of sections 30C, 45V, 45Y, and 48E, principles similar to those under Notice 2013–29, 2013–20 I.R.B. 1085, regarding the Physical Work Test and Five Percent Safe Harbor apply, and taxpayers satisfying either test will be considered to have begun construction.

Section 5 of Notice 2022–61 also provides that principles similar to those provided in certain IRS Notices [2] regarding the Continuity Requirement for purposes of sections 30C, 45V, 45Y, and 48E apply. Section 5 further provides that whether a taxpayer meets the Continuity Requirement under either test is determined by the relevant facts and circumstances. Additionally, section 5 states that principles similar to those under section 3 of Notice 2016–31, 2013–44 I.R.B. 431, regarding the Continuity Safe Harbor also apply for purposes of sections 30C, 45V, 45Y, and 48E. Section 5 also provides that taxpayers may rely on the Continuity Safe Harbor provided the facility is placed in service no more than four calendar years after the calendar year during which construction began. For purposes of the section 45Y and 48E credits, Notice 2022–61 continues to apply.

A commenter requested that final regulations clarify that projects failing to qualify for the section 45 or 48 credits due to a failure to satisfy continuity requirements may still qualify for the section 45Y or 48E credits, assuming all other requirements for the section 45Y or 48E credit are satisfied. The commenter contended that a taxpayer may meet the January 1, 2025, beginning of construction requirement to qualify for the section 45 and 48 credits, but may not be able to satisfy continuity requirements under existing IRS guidance by placing the facility in service within four years after construction began. The Treasury Department and the IRS confirm that a facility that fails to satisfy the requirements (including beginning of construction requirements) for the section 45 or 48 credit, is not disqualified from claiming either section 45Y or 48E so long as the facility meets all requirements under those Code sections.

The commenter also noted that sections 45Y and 48E employ a ''start of construction'' metric for purposes of determining whether a qualified facility is eligible for the increase in credit rates for satisfying the domestic content or energy communities bonus, and for assessing the applicable credit phaseout amounts. The commenter recommended resolving what they characterized as uncertainty related to application of beginning of construction rules under existing IRS guidance to sections 45Y and 48E by adopting modified continuity safe harbor requirements for determining the beginning of construction. One such modified safe harbor would permit a taxpayer to apply whatever rules were applicable to the ''commence construction'' year that corresponds to the earliest year that would still meet a continuity safe harbor based on when the facility was ultimately placed in service.

The Treasury Department and the IRS have determined that the existing Internal Revenue Bulletin guidance (referred to as the IRS Notices) adequately addresses the beginning of construction rules applicable to sections 45Y and 48E. Additionally, modifications to the beginning of construction guidance provided by the IRS Notices for sections 45 and 48 are beyond the scope of these final regulations.

B. Property Included in Qualified Facility

Proposed § 1.45Y–2(b) provided a description of the property included in a qualified facility. Proposed § 1.45Y–2(b)(1) provided that a qualified facility includes a unit of qualified facility, defined in proposed § 1.45Y–2(b)(2)(i), and also includes qualified property owned by the taxpayer that is an integral part of a qualified facility, defined in proposed § 1.45Y–2(b)(3). Section 45Y is silent regarding the credit eligibility of components that are part of a qualified facility but located in different locations. Accordingly, proposed § 1.45Y–2(b)(1) clarified that any property that meets the requirements of a qualified facility described in proposed § 1.45Y–2(b) is part of a qualified facility, regardless of where such property is located.

Proposed § 1.48E–2(b) provided that a qualified facility includes a unit of qualified facility, defined in proposed § 1.48E–2(b)(2)(i), and also includes property owned by the taxpayer that is integral to the unit of qualified facility, which is defined in proposed § 1.48E–2(b)(3). For purposes of section 48E, a qualified facility does not include any electrical transmission equipment, such as transmission lines and towers, or any equipment beyond the electrical transmission stage, and generally does not include equipment that is an addition or modification to an existing qualified facility. However, the proposed regulations provided two specific exceptions to that rule: the Incremental Production Rule, and the 80/20 Rule.

A commenter stated that there are inconsistencies between the definitions of a ''property included in a qualified facility'' in proposed § 1.45Y–2(b)(1) and ''unit of qualified facility'' in proposed § 1.45Y–2(b)(2). The commenter stated that the first definition provides that the qualified facility equals the ''unit of qualified facility'' plus the ''integral property'', however, the second definition provides that a ''unit of qualified facility'' equates to ''functionally interdependent components of property.'' The commenter stated that proposed § 1.48E–2 had similar inconsistencies. The commenter suggested that the final regulations include an example to more clearly define a qualified facility. The commenter also referred to the coordination with other credits in

[2] Notice 2013–29, 2013–20 I.R.B. 1085; *clarified by* Notice 2013–60, 2013–44 I.R.B. 431; *clarified and modified by* Notice 2014–46, 2014–36 I.R.B. 520; *updated by* Notice 2015–25, 2015–13 I.R.B. 814; *clarified and modified by* Notice 2016–31, 2016–23 I.R.B. 1025; *updated, clarified, and modified by* Notice 2017–04, 2017–4 I.R.B. 541; Notice 2018–59, 2018–28 I.R.B. 196; *modified by* Notice 2019–43, 2019–31 I.R.B. 487; *modified by* Notice 2020–41, 2020–25 I.R.B. 954; *clarified and modified by* Notice 2021–5, 2021–3 I.R.B. 479; *clarified and modified by* Notice 2021–41, 2021–29 I.R.B. 17.

proposed § 1.45Y–2(c) and stated that a taxpayer must assume that what constitutes a ''qualified facility'' under section 45Y, namely, all functionally interdependent components of property as well as any integral property, is the same with respect to all other Federal income tax credits that reference a qualified facility, but that this definition needs to be made consistent across all the other Code sections.

The Treasury Department and the IRS do not agree that an ambiguity exists between the references to a qualified facility. For both sections 45Y and 48E, the unit of qualified facility is the narrower definition and includes only the functionally interdependent components of property. A qualified facility is this ''unit of qualified facility'' plus integral property. Multiple examples in the proposed regulations illustrate these concepts.

The Treasury Department and the IRS also do not agree that taxpayers must assume that the definition of a ''qualified facility'' under sections 45Y and 48E is the same in all other Federal income tax credits. Each Code section has its own unique definition of a facility that must be considered; addressing definitions in other Code sections is beyond the scope of these final regulations. In response to commenters' concerns, though, the final regulations add additional examples to illustrate the interaction of Federal income tax credits in §§ 1.45Y–2(c)(3) and 1.48E–2(f)(3). The final regulations at §§ 1.45Y–2(b)(3)(vii) and 1.48E–2(b)(3)(vii) also change the term ''qualified property'' in proposed § 1.45Y–2(b)(1) to ''property'' as ''qualified property'' is not a term used in section 45Y.

C. Qualified Facilities and Specific Technologies for Purposes of Sections 45Y and/or 48E

1. Biogas

Commenters stated that the energy feedstock production property comprising a feedstock processing and treatment system, when owned by the same taxpayer that owns the electric generation facility placed in service after December 31, 2024, is either a functionally interdependent component property operated together with the electric generation facility or an integral part of that facility. Commenters asserted that anaerobic digester and gas conditioning components are used directly in the intended function of the facility and that, without this feedstock treatment, the electricity production component would not be able to produce zero or negative GHG electricity. Accordingly, commenters requested that the final regulations recognize all components of an electricity production facility, including the anaerobic digester and gas conditioning equipment as part of a qualified facility. The final regulations do not adopt these comments because while the energy feedstock production property described is generally used to produce fuel that may be used by a qualified facility to generate electricity, it is not part of such qualified facility based on the definition of qualified facility for purposes of the section 45Y and 48E credits.

2. Solar

A commenter encouraged the Treasury Department and the IRS to explicitly define solar photovoltaic panels used to generate electricity for an automated shading system as a qualified facility. The commenter noted that the example in proposed § 1.45Y–5(c)(1)(iii) already describes the GHG emissions rate for qualified facilities that produce electricity using solar photovoltaic properties as not greater than zero and that proposed § 1.45Y–5(c)(2)(iv) also describes solar photovoltaic power as a type of non-C&G facility.

The Treasury Department and the IRS have determined that the example in proposed § 1.45Y–5(c)(1)(iii) and the list of non-C&G facilities in proposed § 1.45Y–5(c)(2)(iv) are sufficient to address commenter's request as the rules adequately provide that facilities using solar photovoltaic property to produce electricity are eligible for the section 45Y and 48E credits assuming the taxpayer satisfies the other statutory requirements. Accordingly, the final regulations adopt the proposed rule without change.

3. Nuclear

A commenter requested that the final regulations confirm that nuclear structures, components, and fuel are part of qualified property for purposes of section 48E. Similarly, another commenter requested confirmation that specific components, such as reactor cores, are included in the qualified investment in a qualified facility under section 48E. Another commenter suggested adding language to the definition of integral part with respect to buildings to specifically address a building used for nuclear fusion or fission. The commenter specifically requested the final regulations describe a structure or building that is integral to the intended function of a qualified facility because it is needed to comply with or maintain required radiological health and safety conditions as required by a qualified facility's regulator.

Section 48E(b)(1) generally provides that the section 48E credit is available for a taxpayer's qualified investment with respect to a qualified facility, which is the sum of the basis of any qualified property placed in service by the taxpayer during such taxable year that is part of such qualified facility and if applicable, qualified interconnection costs. Section 48E(b)(2)(A) provides, in relevant part, that qualified property is property which is tangible personal property or other tangible property (not including a building or its structural components), but only if such property is used as an integral part of the qualified facility. Therefore, tangible property, including structures (other than buildings or their structural components), components, and fuel, that meets the definition of qualified property may be included in the credit base of a qualified facility. As provided in § 1.48E–2(d)(3)(v), generally buildings are not integral parts of a qualified facility because they are not integral to the intended function of the qualified facility. Due to the exclusion of a building or its structural components, this would exclude, for example, buildings that house nuclear reactor control rooms.

However, as the proposed regulations acknowledged, not all structures are considered ''buildings'' for the purpose of excluding buildings and their structural components. Proposed § 1.48E–2(b)(3)(v)(A) and (B) provided that a structure is not considered a building if it is essentially an item of machinery or equipment, or if it houses components of property that are integral to the intended function of the qualified facility and if the use of the structure is so closely related to the use of the housed components of property therein that the structure clearly can be expected to be replaced if the components of property it initially houses are replaced. The Treasury Department and the IRS confirm that nuclear containment structures fall within the exception provided in proposed § 1.48E–2(b)(3)(v)(A) and (B), which has been adopted and moved to § 1.48E–2(d)(3)(v)(A) and (B) of the final regulations. Like hydropower dams, but unlike control room buildings, nuclear containment structures are integral to the intended function of the qualified facility. Moreover, given their complexity, technical requirements, Nuclear Regulatory Commission-mandated testing requirements, severe limits on the time workers and other personnel can spend inside the structure, and purpose, nuclear

containment structures are essentially pieces of specialized equipment. They ensure the fulfillment of several safety functions at a nuclear power plant, including: (i) confinement of radioactive substances in operational states and in accidental conditions; (ii) protection of the reactor against natural external events and human induced events; and (iii) radiation shielding in operational states and in accident conditions.

4. Hydropower

A commenter requested that the final regulations provide additional examples illustrating the scope of a ''qualified investment credit facility'' and ''qualified property'' with respect to hydropower. Another commenter asked that the final regulations confirm that components of project works as identified in FERC licenses (referred to by the commenter as physical structures of a project) are integral property to a hydropower facility and therefore eligible for the section 48E credit. Specifically, the commenter suggested adopting principles from the section 48 proposed regulations regarding qualified offshore wind facilities, whereby all FERC-licensed components of any kind, including remote islanded hydropower generation components, including the switchgear or substation housed in an onshore substation, are either functionally interdependent components of a unit of the qualified facility or integral parts of a qualified facility.

A definitive response to these comments would require the Treasury Department and the IRS to conduct a complete factual analysis of the hydropower property in question, which may include information beyond that which was provided by the commenters. Because more information is needed to make the determinations requested by the commenters, the final regulations do not provide these requested clarifications. However, further discussion of relevant components of hydropower facilities is provided in section IV.E. of this Summary of Comments and Explanation of Revisions.

5. Section 48 Energy Properties

A commenter suggested that, for purposes of the qualified investment calculation in section 48E(b), the final regulations should clarify that the term ''qualified property'' includes any energy property defined in section 48(a)(3), unless it is specifically excluded. The Treasury Department and the IRS reiterate that the determination of whether a qualified facility is eligible for the section 48E credit depends, in part, on the anticipated GHG emissions of the facility as determined under section 48E(b)(3)(B)(ii) and § 1.48E–5 of these regulations rather than the technology used. This is distinct from section 48(a)(3), which identified specific types of energy property that are eligible for the section 48 credit. *See* the discussion of qualified property for section 48E in section III.B. of this Summary of Comments and Explanation of Revisions. Accordingly, the Treasury Department and the IRS cannot adopt the commenter's recommendation and the rule will be adopted as proposed.

6. Facilities That Are Not Used for the Generation of Electricity

A commenter requested that the final regulations provide flexibility to ensure that the following thermal energy technologies would not be prohibited from qualifying for the section 45Y and 48E credits: alternative water thermal sourcing, heat recovery systems for ventilation air, simultaneous heat recovery, and air source heat pumps. Similarly, another commenter suggested that thermal production from non-waste energy recovery should be eligible for the section 45Y credit and provided sample regulatory language to that effect. Another commenter suggested that technologies such as air-source heat pumps and building efficiency retrofits should be eligible for the section 45Y and 48E credits. Other commenters stated that microgrid controllers, which are energy property under section 48, should be eligible for the section 48E credit.

Sections 45Y(b)(1)(A)(i) and 48E(b)(3)(A)(i) define a qualified facility as a facility which is used for the generation of electricity. A facility cannot be considered a qualified facility under either section 45Y or 48E if it does not meet this requirement. However, the Treasury Department and the IRS note that the section 48E credit applies to both qualified facilities and EST. Section III.C.1. of this Summary of Comments and Explanation of Revisions discusses the definition of EST for purposes of the section 48E credit.

Given the earlier-described comments, and a few comments on other topics that indirectly suggested that EST that are net consumers of electricity were nonetheless ''used for the generation of electricity,'' the Treasury Department and the IRS have determined that additional clarification of the phrase ''used for the generation of electricity'' is warranted. The final regulations at §§ 1.45Y–2(a)(1) and 1.48E–2(b)(1)(i) clarify that, for a facility to meet the requirements of sections 45Y(b)(1)(A)(i) and 48E(b)(3)(A)(i), the facility must be a net generator of electricity, taking into account any electricity consumed by the facility.

D. Coordination With Other Credits

Proposed §§ 1.45Y–2(c) and 1.48E–2(c) provided rules for coordination of the section 45Y and 48E credits with other Federal income tax credits, including those determined under sections 45, 45J, 45Q, 45U, 48, and 48A. Proposed § 1.45Y–1(c)(1) provided, in part, that a taxpayer that owns a qualified facility that is eligible for both a section 45Y credit and another Federal income tax credit is eligible for the section 45Y credit only if the other Federal income tax credit was not allowed with respect to the qualified facility.

A commenter suggested clarifying that the reference in proposed § 1.45Y–2(c)(1) to ''another Federal income tax credit'' does not extend beyond those credits specifically listed in section 45Y(c)(1). The commenter stated that, although the reference to ''another Federal income tax credit'' follows a specific reference to specific sections of the Code, the general reference is ambiguous and may inadvertently preclude claiming the section 45Y or 48E credits when a taxpayer claims a non-energy credit such as the credit for increasing research activities under section 41 of the Code or the advanced manufacturing production credit under section 45X of the Code.

A commenter requested modifying § 1.45Y–2(c)(1) to permit a taxpayer to claim the section 45Y credit with respect to a qualified facility that is co-located with another facility for which a credit determined under section 45V or 45Z of the Code is allowed. Another commenter requested that the final regulations clarify that the carbon capture portion of a bioenergy and carbon sequestration facility is a section 45Q facility separate from the electricity generating portion of a qualified facility under section 45Y.

A commenter asked whether the ''anti-abuse provision'' in the section 45V proposed regulations would bar a taxpayer from claiming the section 45V credit in addition to either the section 45Y or 48E credits. Similarly, commenters requested clarifying whether taxpayers claiming the section 48E credit in a taxable year would be unable to claim the section 45Q credit in any subsequent year. The commenters asserted that section 48E(b)(3)(C) only specifically prohibits a taxpayer from claiming a section 48E credit for a facility for which a section 45Q credit was claimed ''for the taxable year or any prior taxable year,'' but does

not directly state that a taxpayer cannot claim a section 45Q credit for that facility in a future taxable year.

Some commenters requested that the final regulations prevent taxpayers from claiming multiple Federal or State tax incentives based on the same investment in or for the production of clean energy. By contrast, another commenter requested confirmation that claiming the section 45Y and 48E credits would not impact a taxpayer's ability to qualify for other subsidies, grants, or loans from DOE's Loans Program Office.

In accordance with the statutory language under section 45Y(b)(1)(D), the Treasury Department and the IRS confirm that the phrases ''another Federal income tax credit'' and ''other Federal income tax credit'' in proposed § 1.45Y–2(c)(1) refer solely to the credits claimed under sections 45, 45J, 45Q, 45U, 48, 48A, and 48E. Similarly, in accordance with section 48E(b)(3)(C), the phrases ''another Federal income tax credit'' and ''other Federal income tax credit'' in proposed § 1.48E–2(c)(1) refer solely to those credits claimed under sections 45, 45J, 45Q, 45U, 45Y, 48, and 48A. Moreover, the provisions under sections 45Y(b)(1)(D) and 48E(b)(3)(C) do not impact the ability of a taxpayer to claim a credit for a qualified facility that is co-located with a facility for which a credit under any Code section is claimed. In general, a taxpayer may claim a section 45Y or 48E credit for a qualified facility that is co-located with another facility, irrespective of any credit that the co-located facility claimed.

The determination of what constitutes a qualified facility for purposes of section 45Q is addressed in regulations under section 45Q and thus is beyond the scope of these final regulations. However, as described earlier, a taxpayer may not claim the section 45Y credit and the section 45Q (or sections 45, 45J, 45U, 48, 48A, and 48E) credit with respect to the same qualified facility for the taxable year or any prior taxable year. Nor may a taxpayer claim the section 48E credit and the section 45Q (or sections 45, 45J, 45U, 45Y, 48, and 48A) credit with respect to the same qualified facility for the taxable year or any prior taxable year. An examination of the whether the regulations under section 45Q prohibit a taxpayer from claiming the section 45Q credit with respect to a qualified facility for which the taxpayer has claimed a section 45Y or section 48E credit in any prior taxable year is beyond the scope of these final regulations. Finally, an examination of the application of the anti-abuse provision in the section 45V proposed regulations, or an analysis of Federal or State tax incentives, including subsidies, grants, or loans from DOE's Loans Program Office, are also beyond the scope of these final regulations. The final regulations add examples to §§ 1.45Y–2(c)(3) and 1.48E–2(f)(3) to further illustrate the interaction of sections 45Y and 48E with other Federal income tax credits.

E. Integral Part

Proposed § 1.45Y–2(b)(3)(i) provided that for purposes of the section 45Y credit, a component of property owned by a taxpayer is an integral part of a qualified facility if it is used directly in the intended function of the qualified facility and is essential to the completeness of such function. Property that is an integral part of a qualified facility is part of the qualified facility. Proposed § 1.45Y–2(b)(3)(ii) through (v) applied this rule to different types of property.

Proposed § 1.48E–2(b)(3)(i) similarly provided that for purposes of the section 48E credit, a component of property owned by a taxpayer is an integral part of a qualified facility if it is used directly in the intended function of the qualified facility and is essential to the completeness of the intended function. Property that is an integral part of a qualified facility is part of the qualified facility. A taxpayer may not claim the section 48E credit for any property that is an integral part of a qualified facility that is not owned by the taxpayer. Proposed § 1.48E–2(b)(3)(ii) through (v) applied this rule to different types of property.

Proposed § 1.48E–2(g)(3) provided that for purposes of the section 48E credit, property owned by a taxpayer is an integral part of EST owned by the same taxpayer if it is used directly in the intended function of the EST and is essential to the completeness of such function. Property that is an integral part of an EST is part of an EST. A taxpayer may not claim the section 48E credit for any property that is an integral part of an EST that is not owned by the taxpayer.

A commenter supported the facility-by-facility approach that section 48E uses and sought confirmation that taxpayers can determine section 48E credits on this basis, rather than under the ''energy project'' definition used in section 48 by which multiple energy properties would be treated as one energy project if, at any point during their construction, they are owned by a single taxpayer and meet two or more of seven factors set forth the in section 48 proposed regulations.

Section 48 was amended by the IRA to, among other things, provide a definition of the term ''energy project'' and provide increased credit amounts for energy property if that property is part of an energy project that satisfies specified conditions. While sections 45Y and 48E provide for similar increased credit amounts, the sections 45Y and 48E apply the increased credit amounts at the level of a qualified facility rather than an energy project. As a result, taxpayers can only determine section 48E credits on the facility-by-facility approach described in the statute and the proposed regulations.

Commenters requested expanding the scope of power conditioning equipment that is considered an integral part of a qualified facility to include software that optimizes or automates the function of power conditioning equipment. Commenters also requested that the final regulations clarify that software performing similar functions to other integral parts of the qualified facility, such as energy management systems, battery management systems, data acquisition systems, and optimization software, are all considered ''power conditioning equipment.''

Section 48E(b)(2) defines qualified property, in part, as property that is tangible personal property, or other tangible property (not including a building or its structural components), but only if such property is used as an integral part of the qualified facility. Software is not tangible property and therefore cannot be integral property included in the qualified investment of a section 48E qualified facility. Because the statutory definition limits ''qualified property'' to tangible property, the final regulations modify the language in proposed § 1.48E–2(b)(3)(ii) to remove any reference to software. The same language regarding software that was included in proposed § 1.48E–2(b)(3)(ii) was also included in proposed § 1.45Y–2(b)(3)(ii). The Treasury Department and the IRS note that, while the inclusion or exclusion of software does not impact the calculation of the section 45Y credit, in order to provide uniform definitions that are consistent with the statutory structure governing both credits, the final regulations also remove the references to software in § 1.45Y–2(b)(3)(ii).

Commenters requested retaining the treatment of offshore wind power conditioning and transfer equipment as an integral part of an offshore wind facility if it is owned by the same taxpayer that owns the unit of qualified facility. In addition, commenters stated that the examples in proposed § 1.48E–2(b)(3)(ii) were useful in illustrating the

project components that are integral parts of an offshore wind facility. Commenters stated that full eligibility is critically important, as power conditioning and transfer equipment represents a significant portion (up to 40 percent) of the total cost of an offshore wind facility. The final regulations adopt the proposed rule without change.

A commenter expressed concern that special-purpose buildings or building-like structures that have long been considered integral property under section 48 may be inadvertently excluded under the section 48E final regulations. For example, the commenter noted that the IRS previously issued revenue rulings (Rev. Rul. 72–223, 1972–1 C.B. 17; Rev. Rul. 72–96, 1972–1 C.B. 67; Rev. Rul. 84–40, 1984–12 I.R.B. 4) holding that special-purpose property such as hydroelectric power plant structures, reservoirs to be used with steam turbine generating plants, and dams were eligible for the section 48 credit as other tangible property rather than being considered buildings or their structural components. The commenter noted that in only one of the revenue rulings was the property not considered a building based on the idea that replacement of the turbine and support have to be undertaken at the same time. Similarly, commenters requested verification that the definition of integral property includes canopies for solar carports, racking structures specific to commercial and industrial solar projects, rooftop specialized battery housing structures, enclosures for densely populated urban environments, and similar components. In contrast, a commenter recommended clarifying that containers for utility-scale battery energy storage systems, inverter housing, and transformer housing are specifically considered buildings or equivalents.

As an alternative, some commenters suggested modifying the rule for buildings to generally include structures but exclude buildings of particular concern to the IRS (for example, housing or offices for maintenance equipment or regular operations staff). A commenter requested that, similar to proposed § 1.48E–2(b)(3)(v), the final regulations include a permanent building or structure as an integral part of an EST to the extent it can be demonstrated that (i) the construction of such building or structure would not have occurred but for placing the EST in service and (ii) the design and cost of such structure is consistent with the requirements of the EST. According to the commenter, such a rule would treat the portion of the building or structure used to house the EST as an integral part of the EST, whether or not permanent in nature. The commenter noted that in harsh environments, the taxpayer must construct a permanent structure for housing the EST and the applicable HVAC equipment needed to regulate the temperature of the structure so that the EST will function properly. The commenter also explicitly requested that HVAC equipment needed to regulate the temperature of the structure so that the EST will function properly be considered an integral part of the EST. Another commenter requested modifying proposed § 1.48E–2(b)(3)(v) to allow for structures or buildings integral to the intended function of the qualified facility if such building or structure is required to comply with or maintain required health and safety conditions required by the qualified facility's regulator.

Another commenter requested confirmation that devices used to manage load served by EST, such as critical loads panels or load controllers, are integral parts of EST. The commenter noted that backup batteries need load management devices to function correctly during grid failures or for off-grid power.

The definition of qualified property in section 48E(b)(2)(A)(ii) includes tangible property that is used as an integral part of a qualified facility, but explicitly excludes buildings or their structural components. Proposed § 1.48E–2(b)(3)(v) provides that while buildings are generally not integral parts of a qualified facility because they are not integral to the intended function of the qualified facility (to generate electricity), the following structures are not treated as buildings for this purpose: (A) a structure that is essentially an item of machinery or equipment; and (B) a structure that houses components of property that is integral to the intended function of the qualified facility if the use of the structure is so closely related to the use of the housed components of property therein that the structure clearly can be expected to be replaced if the components of property it initially houses are replaced.

Although the proposed regulations do not list particular buildings that may qualify as an integral part of a qualified facility, the Treasury Department and the IRS have concluded that the guidance and examples included are adequate to illustrate the intended application of the rules. The revenue rulings raised by a commenter with respect to special-purpose buildings or building-like structures involved specific situations arising under section 48. A definitive response regarding the situations in the revenue rulings or other specific situations described by the previous comments would require the Treasury Department and the IRS to conduct a complete factual analysis of the property in question, which may include information beyond that which was provided by the commenters. Because more information is needed to make the determinations requested by the commenters, the requested clarifications are not addressed in these final regulations.

In the case of hydropower facilities, a commenter stated that it is critical that final regulations confirm that costs incurred for new property with respect to a hydropower facility qualify for the section 48E credit even though certain portions of a hydropower project may be owned by Federal agencies. This commenter explained that in some cases, the U.S. Army Corps of Engineers may own all or a portion of the dam and associated property but asserted that this circumstance should not affect the credit eligibility of other qualified property (the electric-generating assets) within the qualified facility owned by the taxpayer.

While a taxpayer may not claim the section 48E credit for any property that is not owned by the taxpayer even if it is an integral part of a qualified facility, the inverse is not true. A taxpayer is not required to own all the other tangible property that is an integral part of a qualified facility to claim a credit for the qualified facility. In the case of a hydropower facility, the qualified facility consists of a unit of qualified facility including water intake, water isolation mechanisms, turbine, pump, motor, and generator. The associated impoundment (dam) and power conditioning equipment are integral property to the unit of qualified facility. Therefore, in response to the commenter's example, the final regulations incorporate a new example in §§ 1.45Y–2 and 1.48E–3 illustrating that property such as a dam being owned by a Federal agency would not prevent a taxpayer that owns the hydropower facility from qualifying for a section 45Y or 48E credit.

F. Shared Integral Property

Proposed § 1.45Y–2(b)(3)(vi) provided that multiple qualified facilities (whether owned directly by one or more taxpayers), including qualified facilities with respect to which a taxpayer has claimed a credit under section 48E or another Federal income tax credit, may include shared property that can be considered an integral part of each qualified facility. A component of property that is shared by a qualified

facility as defined in section 45Y(b)(45Y Qualified Facility) and a qualified facility as defined in section 48E(b)(3)(48E Qualified Facility) that is an integral part of both qualified facilities will not affect the eligibility of the 45Y Qualified Facility for the section 45Y credit or the 48E Qualified Facility for the section 48E credit. Proposed § 1.45Y–2(b)(3)(vii) provides examples illustrating proposed § 1.45Y–2(b)(3).

Proposed § 1.48E–2(b)(3)(vi) provided that multiple qualified facilities (whether owned by one or more taxpayers), including qualified facilities with respect to which a taxpayer has claimed a credit under section 48E or another Federal income tax credit, may include shared property that may be considered an integral part of each qualified facility so long as the cost basis for the shared property is properly allocated to each qualified facility and the taxpayer only claims a section 48E credit with respect to the portion of the cost basis properly allocable to a qualified facility for which the taxpayer is claiming a section 48E credit. The total cost basis of such shared property divided among qualified facilities may not exceed 100 percent of the cost of such shared property. Property that is shared by a 48E Qualified Facility and a 45Y Qualified Facility that is an integral part of both qualified facilities will not affect the eligibility of the 48E Qualified Facility to claim the section 48E credit or the 45Y Qualified Facility to claim the section 45Y credit. To better illustrate the treatment of shared integral property, these final regulations add an additional example to § 1.48E–4(d)(5) regarding related taxpayers.

A commenter expressed confusion with what is meant by ''another facility'' in proposed § 1.45Y–2(c)(1), in the context of defining a qualified facility co-located with another facility. Additionally, as explained in section IV.B. of this Summary of Comments and Explanation of Revisions, each Code section has its own unique definition of a facility that must be considered. Proposed § 1.45Y–2(c)(3) (Examples 1 and 2) involve fact patterns addressing the ability of one or more taxpayers to claim a section 45Y credit for a solar farm and a section 48E credit for a co-located EST. The Treasury Department and the IRS view these examples as adequately addressing this comment.

G. Ownership

1. Qualified Facility

Proposed § 1.48E–4(d) provided rules related to the ownership of a qualified facility or EST. In addition to the ownership rules in proposed § 1.48E–4(d), proposed § 1.48E–2(b)(3)(i) provided a taxpayer may not claim the section 48E credit for any property that is an integral part of the taxpayer's qualified facility that is not owned by the taxpayer.

Some commenters opposed the proposed rule that only the taxpayer that owns a unit of qualified facility is eligible for a section 48E credit with respect to property that is an integral part of that qualified facility. These commenters asserted that property that is treated as an integral part of a qualified facility should be eligible for the section 48E credit regardless of whether the taxpayer also owns any interest in the unit of qualified facility. As an example, one commenter described a qualified facility in which generation assets and transfer equipment are constructed together but owned by separate taxpayers and suggested that both taxpayers should be able to claim a section 48E credit on the basis of their respectively owned portions. This commenter similarly suggested that if a unit of qualified facility is constructed and placed in service by a taxpayer, and another taxpayer later constructs and places in service an integral part of such qualified facility, both taxpayers should be able to claim section 48E credits on their respective property.

A commenter opposed to the ownership requirement suggested that, under their reading of the proposed regulations and the existing section 48 regulations, different components treated as ''integral parts'' would still be energy property and, thus, should still qualify for the section 48E credit when separately owned. According to this commenter, under section 48 taxpayers have the flexibility to own and claim credit for separate ''integral parts.'' The commenter stated that this flexibility in ownership is essential for many projects because it may be impractical (if not impossible) for one taxpayer to own all components of a larger system. The commenter stated that the limitation in the proposed regulations that a taxpayer may not claim the section 48E credit for any property that is an integral part of a qualified facility that is not owned by the taxpayer is not found in the statutory text and could have an unnecessary chilling effect on investment.

Raised in the context of offshore wind, commenters requested that the final regulations eliminate the requirement that the generating facility and the integral power conditioning and transfer equipment be owned by the same taxpayer. In the commenters' view, this would allow owners of offshore wind power conditioning and transfer equipment that do not own an interest in the offshore turbines to claim the section 48E credit. A commenter stated that the ownership rules, as proposed, would result in the buildout of more equipment and cables at a greater total expense, be more disruptive of the environment, and cause more interference with coastal communities, while at the same time failing to achieve the desired resiliency, reliability, flexibility, and ability to plan for future expansion of offshore wind. A comment submitted jointly by seven states requested that the Treasury Department and the IRS reconsider the rule to require that the owner of integral power conditioning and transfer equipment to also own the offshore wind facility to claim the section 48E credit. This comment expressed similar concerns regarding potential impacts of the ownership rules.

A commenter proposed that the Treasury Department and the IRS revise the proposed rule to allow owners of integral property that do not own an interest in the associated unit of qualified facility to claim a section 48E credit if the integral property is used in the trade or business of furnishing or selling electrical energy and if a regulatory authority determines that ownership of integral property separate from ownership of the underlying unit of qualified facility is in the public interest.

The Treasury Department and the IRS have determined that the ownership rules provided in the proposed regulations are appropriate. Although commenters asserted that property that is treated as an integral part of a qualified facility should be eligible for the credit regardless whether the taxpayer also owns any interest in the unit of qualified facility (as defined in proposed § 1.48E–2(b)(2)), such an approach would conflict with the statutory requirement that a credit only be available for a qualified facility, that is, a facility that generates electricity and for which the anticipated GHG emissions rate is not greater than zero. Integral property alone does not constitute a qualified facility. Adopting the commenters' recommendation that a taxpayer be able claim the section 48E credit for integral property alone would conflict with the application of several other provisions in the statute that apply to an entire qualified facility rather than individual components of property (including the PWA requirements, certain bonus credit amounts, and certain rules applicable to lower-output qualified facilities to

include expenditures for qualified interconnection property).

The Treasury Department and the IRS conclude that no section 48E credit may be determined with respect to a taxpayer's ownership of integral property which is a separate component of a qualified facility (or EST) if the same taxpayer does not own the components that constitute a unit of qualified facility (as defined in proposed § 1.48E–2(b)(2)) or unit of EST (as defined in proposed § 1.48E–2(g)(2)). Additionally, based on similar considerations, the Treasury Department and the IRS maintain that no section 48E credit may be allowed unless a taxpayer directly owns at least a fractional interest in the entire unit of qualified facility or unit of EST. Thus, in the case of an offshore wind farm, a taxpayer directly owning power conditioning and transfer equipment would only be able to claim a section 48E credit on that equipment if the same taxpayer also directly owned a fractional interest in at least one qualified facility (wind turbine, tower, and pad) for which such power conditioning and transfer equipment in is integral property.

In response to the comment that retaining the common ownership requirement will result in the buildout of more equipment and cables at a greater total expense, more disruption of the environment, and more interference with coastal communities, the Treasury Department and the IRS acknowledge the commenters' concerns. However, as explained later, retaining the rule is necessary based on legal and administrability concerns.

Section 48E provides an investment credit equal to a specified percentage of the taxpayer's qualified investment with respect to a qualified facility or EST. Section 48E(b)(1) defines a qualified investment with respect to a qualified facility as the sum of ''the basis of any qualified property placed in service by the taxpayer during such taxable year which is part of a qualified facility, plus the amount of any expenditures which are paid or incurred by the taxpayer for qualified interconnection property . . .'' Section 48E(b)(2) provides, in part, that the term qualified property means property which is tangible personal property or other tangible property (not including a building or its structural components) but only if such property is used as an integral part of the qualified facility.

While the language in section 48E(b)(1) and 48E(b)(2), on its own, could be read to suggest that a taxpayer may claim a section 48E credit with respect to any property that does not constitute a unit of qualified facility, section 48E must be read holistically to give effect to its provisions. The statute provides a credit with respect to a qualified facility, which is a facility that generates electricity and that has a GHG emissions rate not greater than zero. Only once it has been determined that a facility is a qualified facility that is eligible for a section 48E credit may the amount on which the credit will be calculated—the qualified investment in that qualified facility—be determined under section 48E(b)(1) and (2). Section 48E(b)(1) identifies what items comprise that qualified investment—the basis of any qualified property that is part of the qualified facility plus certain qualified interconnection costs. Section 48E(b)(2) specifies what types of property are considered qualified property—tangible personal property or, only if used as an integral part of the qualified facility, other tangible property (not including a building or its structural components). The term ''integral part'' specifically modifies the term ''other tangible property.'' It serves to include or exclude items like fencing that are not directly related to the function of the qualified facility. The statutory language thus provides that any property that does not meet the definition of ''qualified property,'' or any property that is not part of the qualified facility, is not part of the qualified investment.

Once the qualified investment has been determined, the credit rate by which that qualified investment will be multiplied to calculate the credit amount must be determined. The credit rate is the applicable percentage under section 48E(a)(2)(A), which is either 6 percent or 30 percent depending on whether the qualified facility satisfies any of the three tests for the alternative rate set forth in section 48E(2)(A)(ii). The requirements of section 48E apply to the qualified facility (rather than components of property comprising such qualified facility): a qualified facility is a facility that generates electricity and that has a GHG emissions rate not greater than zero; the applicable percentage depends on whether the qualified facility meets the various requirements for PWA, or the domestic content and energy communities bonus credit amounts. Within this statutory structure, section 48E(a)(1)(A) and (2)(A) operate to identify what is included and what is excluded from the credit base. Accordingly, the statute requires ownership of a qualified facility rather than mere components of property.

Section 48E provides a credit for an investment in a qualified facility that satisfies the definition of ''qualified facility'' provided at section 48E(b)(3). The statute defines a ''qualified facility'', in part, by requiring that the facility be used for the generation of electricity and that the anticipated GHG emissions rate is not greater than zero. The Treasury Department and the IRS view the concepts of qualified investment and qualified property as inextricably tied to the statutory definition of a qualified facility. As discussed throughout this Summary of Comments and Explanation of Revisions, the section 48E credit is available for a qualified facility that generates electricity for which the anticipated GHG emissions rate is not greater than zero. Electricity can only be generated by, and GHG emissions can only be determined with respect to, a unit of qualified facility. Integral property, by itself, does not satisfy this statutory definition because integral property is not property used for the generation of electricity, nor can the GHG emissions of a qualified facility be determined solely on the basis of integral property.

Furthermore, a taxpayer who owns only property that is an integral part of a qualified facility may not be able to establish the anticipated GHG emissions rate for the entire qualified facility. For the determination of the anticipated GHG emissions rate of a qualified facility, section 48E mandates rules similar to those in section 45Y(b)(2)(C)(ii), which requires that ''[i]n the case of any facility for which an emissions rate has not been established by the Secretary, *a taxpayer which owns such facility* may file a petition with the Secretary for determination of the emissions rate with respect to such facility'' (emphasis added). The statute does not appear to permit a taxpayer who does not own a unit of qualified facility, but instead only owns property that is integral to a unit of qualified facility, to petition for a determination of the emissions rate. This further bolsters the conclusion that ownership interest in a qualified facility, not in mere integral part, is required for the credit to operate.

Several other key provisions of section 48E are only applicable to a qualified facility: the placed in service date; the applicable percentage; application of the PWA requirements, eligibility for the domestic content and energy communities bonus credit amounts; and inclusion of qualified interconnection expenditures for lower-output qualified facilities. These provisions apply at the level of a qualified facility, not to components of property within such qualified facility or components of property that are an

integral part of such qualified facility. For example, the owner of a component of property within a qualified facility cannot claim a domestic content bonus credit amount if another owner of components of property included within the unit of qualified facility does not satisfy the domestic content requirements with respect to its components. The determination requires an analysis of the entire qualified facility.

Unless a taxpayer directly owns at least a fractional interest in the entire unit of qualified facility, the taxpayer cannot effectively claim the section 48E credit or the bonus or increase credit amounts. The availability of the section 48E credit for the taxpayer who owns only integral property would depend on whether another taxpayer's qualified facility meets the GHG emission requirements. The availability of any bonus or increased credit amounts for the taxpayer who owns only integral property would also depend on whether other taxpayers who invested in the qualified facility satisfy all the adder requirements. Similarly, in cases in which one taxpayer's tangible property ceases to be eligible for the credit, recapture under sections 48E(g) and 50(a) would implicate all other taxpayers who invest in the qualified facility. All these cases further support the conclusion that the statutory scheme applies at the level of a qualified facility, and that the owner of only integral property cannot effectively claim the credit or the bonus or increased credit amounts.

Finally, taxpayers would need access to information about all other property that is part of the qualified facility to properly determine whether the taxpayer's specific investment in integral property is eligible for a section 48E credit and to determine the amount of that credit. This would impose a high burden of information sharing on the taxpayers and increase uncertainty, as one taxpayer's choices would impact another taxpayer's eligibility for the credit and bonus or increased credit amounts. It would also create corresponding administrative problems for the IRS to effectively analyze and, if necessary, adjust multi-party credit claims.

Some commenters pointed to Internal Revenue Bulletin guidance, caselaw, and other guidance to support their position that a taxpayer that owns property that is an integral part of a qualified facility should not be required to also own the qualified facility to be eligible for a section 48E credit. Commenters cited Rev. Rul. 78–268, 1978–2 C.B. 10, PLR 201536017, PLR 201208035, and FAQ 35 of guidance from the Treasury Department regarding payments under section 1603 of the American Recovery and Reinvestment Act of 2009 [3] (Section 1603 Grant Program) to support the premise that ownership of an entire qualified facility is not required to be eligible to claim a section 48E credit.

The commenters' reliance on Revenue Ruling 78–268, which addressed a prior version of the section 48 credit, is misplaced. In Revenue Ruling 78–268, four parties, two of which were tax-exempt, owned an electric generating facility through a tenancy in common. In other words, each taxpayer owned a fractional interest in the entire energy property. Revenue Ruling 78–268 held that the presence of the tax-exempt owners did not disqualify the other owners from claiming a section 48 credit because the fractional interests in the tenancy in common were treated as separate assets. Because the fractional ownership arrangement in Revenue Ruling 78–268 is consistent with the fractional ownership rule in proposed § 1.48E–4(d)(2), the Treasury Department and the IRS disagree with commenters that the holding of Revenue Ruling 78–268 supports their position.

Commenters' reliance on PLR 201536017 is also misplaced. Private letter rulings (PLR) are not precedential and cannot be relied upon by a taxpayer other than the one addressed in the letter (*see* section 6110(k)(3) of the Code). Furthermore, this PLR involved the section 25D credit, which, in relevant part, provides a credit for ''qualified solar electric property expenditures,'' rather than the section 48E credit. Regardless, like Revenue Ruling 78–268, the PLR involves credit eligibility through fractional ownership of an entire energy property, not ownership of just certain components. The PLR addresses a factual scenario in which a taxpayer purchased solar PV panels in an offsite array (that also contains other solar PV panels owned by other individuals) as well as a partial ownership in racking equipment, inverter equipment, and wiring and other equipment and installation services required for the integration of the panels in the array and the interconnection of the array to a local utility's electric distribution system. The PLR concludes that the taxpayer made a ''qualified solar electric property expenditure'' under section 25D(d)(2) and is eligible to claim a section 25D credit. To the extent this PLR provides any helpful analysis to a section 48E credit, it involves partial ownership in all the equipment necessary to integrate the solar PV panels into the array and interconnect the array to a local utility's electric distribution system. It does not apply the section 25D credit to just certain components of property. Like Revenue Ruling 78–268, the PLR involves credit eligibility through fractional ownership of a unit of property analogous to a qualified facility under section 48E rather than ownership of mere components of property.

Similarly, commenters' reliance on PLR 201208035 for the proposition that taxpayers should be permitted to claim the section 48E credit on any portion of eligible property owned by such taxpayer is inapposite. The factual scenario in that PLR involved a taxpayer seeking to add energy storage property to an existing wind facility for which section 48 credits had been claimed with respect to certain phases of the facility and a Section 1603 Grant Program payment had been received with respect to another phase of the facility. Because the same taxpayer owned the existing wind facility and the later added energy storage property (which was treated as property integral to the wind facility under the relevant version of section 48), the cited PLR does not establish that a taxpayer who has no ownership of a unit of a qualified facility is entitled to the section 48E credit for ownership of integral parts only.

Finally, commenters also relied on FAQ 35 of the Section 1603 Grant Program guidance to support their contention that ownership of an entire qualified facility is not required to claim the section 48E credit. Under the Section 1603 Grant Program, the Treasury Department made payments in lieu of section 45 and 48 credits to eligible applicants for specified energy property. FAQ 35 addressed the procedural requirements of the Section 1603 Grant Program in a situation in which an open-loop biomass facility was owned by one party that uses off-site feedstock conversion equipment owned by another party. FAQ 35 provided that the party that owns the conversion equipment and the party that owns the open-loop biomass facility must each submit an application in order to receive Section 1603 Grant Program payments. While the Section 1603 Grant Program guidance borrowed important concepts from the section 45 and 48 credits, it is not based on any specific income tax provisions and is

[3] Payment for Specified Energy Property in Lieu of Tax Credits Under the American Recovery and Reinvestment Act of 2009, Frequently Asked Questions and Answers.

not precedential for purposes of the section 48E credit.

Moreover, FAQ 35 required the multiple parties that owned the different components of property to join in each separate application for the Section 1603 Grant Program payment and agree to the terms and conditions. The Treasury Department would then review those applications together and make any determination regarding eligibility for a Section 1603 Grant Program payment for the entire facility based on information provided with respect to the entire facility rather than each party's respective components. This is very different from the commenters' requests to allow taxpayers to claim and substantiate separate section 48E credits claimed by separate taxpayers on Federal income tax returns. This type of tax filing has significantly fewer guardrails than Treasury's advance review of Section 1603 Grant Program applications. And, as discussed earlier, the statute requires ownership of a qualified facility, rather than ownership of mere components of property to claim the credit.

Other commenters cited *Cooper* v. *Comm'r,* 88 T.C. 84 (1987), to support allowing a taxpayer to claim a section 48E credit with respect to components of property they own that are an integral part of a qualified facility owned by a different taxpayer. *Cooper,* which was decided under prior versions of sections 46 and 48 and the regulations thereunder, does not directly support the commenters' contention. In *Cooper,* the taxpayer asserted that owning specific components of solar water heating system was sufficient to claim the section 48 credit for solar energy property. Acknowledging that the taxpayer did not own the entire working solar water heating system, the Tax Court held that the definition of a solar energy property provided by the regulations under former section 48(l)(4) were sufficiently broad to provide a credit for component parts of a solar water heating system. In a subsequent case, the Tax Court distinguished *Cooper,* explaining that ''the property in *Cooper* consisted of integrated water-heating systems that were ready for installation to discharge their designated function.'' *Olsen* v. *Commissioner,* T.C. Memo 2021–41, *14, aff'd, 52 F.4th 1039 (10th Cir., 2022). Conversely, in the *Olsen* case, the taxpayer owned certain solar lenses that the Tax Court described as ''mere components of a system'' that were ''intended to operate as part of a complicated solar energy system and were incapable of performing any useful function in isolation.'' *Id.* at 13–14. The Tax Court held that the solar lenses ''were not 'placed in service' because the solar energy system as a whole was not 'in a condition or state of readiness and availability for a specifically assigned function.''' *Id.* at 13. Thus, the taxpayer was not entitled to claim a section 48 credit.

Finally, the IRS has no authority to compel taxpayers to coordinate tax credit claims or share tax return information with other taxpayers. Accordingly, the rules as provided in proposed §§ 1.48E–4(d) and 1.48E–2(b)(3)(i) that require a taxpayer to directly own at least a fractional interest in the entire unit of qualified facility or unit of EST and that deny a credit for owners of integral property alone are adopted and moved to § 1.48E–1(c) of the final regulations.

However, while the final regulations maintain the overall structure of the proposed ownership rules, after further consideration, the Treasury Department and the IRS have determined that certain modifications to proposed § 1.48E–2 are required to more closely reflect the statutory language. The final regulations adopt those modifications.

2. Ownership of EST

A commenter requested clarification that the section 48E credit can be claimed with respect to an EST that is co-located and used in conjunction with a qualified facility for which the section 45 or 45Y credit is claimed even if the EST could be considered a functionally interdependent or an integral part of that qualified facility and whether the EST and the facility may be owned by different taxpayers. Proposed § 1.48E–2(g)(3) provides that a taxpayer may not claim the section 48E credit for any property that is an integral part of an EST that is not owned by the taxpayer. Commenters expressed concern that this rule prohibits the owner of an EST from claiming a section 48E credit if that EST is an integral part of a qualified facility that is owned by another taxpayer.

This commenter's concerns are misplaced. Section 48E(a) describes the clean electricity investment credit generally as determined separately with respect to any qualified facility and any EST. Accordingly, an EST cannot be included in a unit of qualified facility under either the integral part or functional interdependence rules for purposes of section 48E. Therefore, the Treasury Department and the IRS confirm that an EST is eligible for the section 48E credit if it satisfies the requirements of section 48E, even if the EST is co-located with a qualified facility that has claimed the section 45 or 45Y credits. Assuming all statutory and regulatory requirements are satisfied, a qualified facility owned by one taxpayer and an EST owned by another taxpayer may each be eligible for a separate section 48E credit. From the perspective of credit eligibility, EST is not an integral part of a qualified facility.

H. Incremental Production Rule

Proposed § 1.45Y–4(c)(1) provided, solely for purposes of proposed § 1.45Y–4(c), that the term ''qualified facility'' includes either a new unit or an addition of capacity placed in service after December 31, 2024, in connection with a facility described in section 45Y(b)(1)(A) (without regard to clause (ii) of such paragraph), which was placed in service before January 1, 2025, but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit or addition of capacity. Proposed § 1.45Y–4(c)(1) also provided that a new unit or an addition of capacity will be treated as a separate qualified facility. Proposed § 1.45Y–4(c)(1) provided, for purposes of proposed § 1.45Y–4(c), that a new unit or an addition of capacity requires the addition or replacement of components of property, including any new or replacement integral property, added to a facility necessary to increase capacity. Proposed § 1.45Y–4(c) provided that, if applicable, taxpayers must use modified or amended facility operating licenses or the International Standard Organization (ISO) conditions to measure the maximum electrical generating output of a facility to determine its nameplate capacity. Additionally, proposed § 1.45Y–4(c)(1) provided that for purposes of section 45Y(a)(2)(B)(i) (that is, the One Megawatt Exception), the capacity for a new unit or an addition of capacity is the sum of the nameplate capacity of the added qualified facility and the nameplate capacity of the facility to which the qualified facility was added.

Proposed § 1.45Y–4(c)(2) provided that, solely for purposes of proposed § 1.45Y–4(c), a facility that is decommissioned or in the process of decommissioning and restarts can be considered to have increased capacity if certain conditions are met. Proposed § 1.45Y–4(c)(3) described how to compute the increased amount of electricity produced as a result of a new unit or an addition of capacity. Proposed § 1.45Y–4(c)(4) illustrated the application of these rules to determine the increased amount of electricity attributable to a new unit or an addition of capacity described in proposed § 1.45Y–4(c).

Proposed § 1.48E–4(b)(1) provided, solely for purposes of proposed § 1.48E–4(b), that the term ''qualified facility'' includes either a new unit or an addition of capacity placed in service after December 31, 2024, in connection with a facility described in section 48E(b)(3)(A) (without regard to clause (ii) of such paragraph), which was placed in service before January 1, 2025, but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit or addition of capacity. A new unit or an addition of capacity will be treated as a separate qualified facility. For purposes of proposed § 1.48E–4(b), a new unit or an addition of capacity requires the addition or replacement of qualified property (as defined in proposed § 1.48E–2(e)), including any new or replacement integral property added to a facility necessary to increase capacity. Proposed § 1.48E–4(b) provided that, if applicable, taxpayers must use modified or amended facility operating licenses or ISO conditions to measure the maximum electrical generating output of a facility to determine its nameplate capacity. Additionally, proposed § 1.48E–4(b)(1) provided that for purposes of section 48E(a)(2)(A)(ii)(I) (that is, the One Megawatt Exception), the capacity for a new unit or an addition of capacity is the sum of the nameplate capacity of the added qualified facility and the nameplate capacity of the facility to which the qualified facility was added.

Proposed § 1.48E–4(b)(2) provided that, solely for purposes of proposed § 1.48E–4(b), a facility that is decommissioned or in the process of decommissioning and restarts can be considered to have increased capacity if certain conditions are met. Proposed § 1.48E–4(b)(3) described how to compute the qualified investment for a new unit or an addition of capacity. Proposed § 1.48E–4(b)(4) illustrated the application of the rules described in proposed § 1.48E–4(b).

1. General Rules

A commenter noted that proposed §§ 1.45Y–4(c)(1) and 1.48E–4(b)(3) both reference ''components of property,'' whereas proposed § 1.48E–4(b)(1) references ''qualified property,'' and requested that the final regulations use a consistent reference to property included in the qualified facility. The final regulations at § 1.48E–4(b)(4) change the term ''components of property'' in proposed § 1.48E–4(b)(3) to ''components of qualified property'' to align with the requirement of section 48E(b)(1)(A) that the qualified investment (as defined in proposed § 1.48E–1(a)(6)) in a qualified facility is the basis of any qualified property (as defined in proposed § 1.48E–2(e)) placed in service by the taxpayer which is part of a qualified facility. However, the term ''components of property'' in proposed § 1.45Y–4(c)(1) remains unchanged in these final regulations, because the term ''qualified property'' is not used in section 45Y.

Several commenters recommended permitting modifications to a facility to qualify as an addition of capacity, and specifically requested that the final regulations define additions of capacity as ''modifications to the facility, including any new or replacement integral property added to a facility necessary to increase the capacity of the facility *by replacing or modifying,* in whole or in part, the existing capacity of the facility. . .'' (emphasis added). Several commenters also requested that the final regulations clarify whether such modifications could be to existing components, physical or digital, or whether existing components need to be replaced or new components added.

Other commenters asked whether any uprate, upgrade, or efficiency improvement to an existing facility that results in an incremental increase in the electric-generating output based on the actual productive capacity of the facility would qualify as an addition of capacity. A commenter noted that sometimes components, including software, are modified or adjusted to increase electrical generating output. Another commenter stated that the example related to an addition of capacity in proposed § 1.45Y–4(c)(4)(ii) does not represent a typical fact pattern.

In response to these comments, the Treasury Department and the IRS confirm that the Incremental Production Rule is based on the increased amount of electricity produced at a facility as a result of a new unit or an addition to capacity. For purposes of the section 45Y credit, a new unit or an addition of capacity requires an addition or replacement of components of property, including any new or replacement integral property, added to a facility necessary to increase capacity. For purposes of the section 48E credit, a new unit or addition of capacity requires the addition or replacement of qualified property (as defined in § 1.48E–2(e)), including any new or replacement integral property, added to the facility necessary to increase capacity.

Several commenters asked whether there is a minimum capital expenditure necessary to qualify as a new unit or an addition of capacity. Additionally, a commenter suggested that the final regulations list the types of new units that would be considered to increase the amount of electricity produced. In response to these comments, the Treasury Department and the IRS note there is no minimum capital expenditure that would satisfy the Incremental Production Rule for either a new unit or an addition to capacity. Additionally, to provide greater clarity regarding what would qualify as a new unit or an addition to capacity, additional examples are included in proposed §§ 1.45Y–4(c)(4) and 1.48E–4(b)(4), and moved to §§ 1.45Y–4(c)(5) and 1.48E–4(b)(5), respectively, in the final regulations. These additional examples illustrate the range and diversity of types of investments that can result in an addition of capacity.

Another commenter requested that each stage of a multi-staged expansion be eligible for the section 45Y credit even if the larger, overall program for improvement and expansion has not yet been completed. A commenter requested permitting multiple additions of capacity or new units added to the same facility over time to separately qualify for the section 45Y credit. The commenter noted that, in this case, a taxpayer would measure the electricity production attributable to each new addition by reducing earlier additions' proportionate share of total energy production. Another commenter recommended that taxpayers should be permitted to aggregate all components added to a facility and placed in service in the same tax year as a single new unit or addition of capacity.

In response to comments that taxpayers should be able to aggregate all components of property added to a facility and placed in service in the same tax year as a single new unit or addition of capacity, the Treasury Department and the IRS note that proposed §§ 1.45Y–4(c)(1) and 1.48E–4(b)(1) both provided, in part, that a new unit or an addition of capacity that meets the requirements of the Incremental Production Rule will be treated as a separate qualified facility. In response to the commenters' request that a series of additions to capacity should be eligible for the Incremental Production Rule, the Treasury Department and the IRS interpret section 45Y(b)(1)(C) (and by reference, section 48E(b)(3)(B)) to mean that if a single facility includes multiple new units or additions to capacity, the taxpayer must apply the Incremental Production Rule to each of the new units or additions to capacity to determine whether such property meets the Incremental Production Rule.

A commenter also suggested treating new units as qualified facilities that are distinct and separate from the existing qualified facility to which they are added and clarifying that all energy produced by the new unit would qualify for the section 45Y credit. In response to this comment, the Treasury Department and the IRS confirm that the Incremental Production Rule is only applicable to additions of capacity and new units that would not otherwise qualify as a separate qualified facility as defined in section 45Y(b)(1)(A) (or by reference section 48E(b)(3)) and therefore clarify this in the final regulations at § 1.45Y–4(c)(1) and § 1.48E–4(b)(1).

2. Application to Hydropower Facilities

Commenters noted that FERC guidance has described ''additions of capacity'' to mean any increase in generating capacity other than an addition resulting from an efficiency improvement or an addition resulting from an operational change. Commenters noted that FERC has provided guidance generally indicating that efficiency improvements encompass additional generation from existing equipment in the form of upgrades to generators or turbines. Commenters also noted that FERC guidance provides examples of efficiency improvements that include rewinding generators, replacing turbines with more efficient units, and computerizing control of turbines and generators to optimize regulation of flows for generation.

A commenter requested that the final regulations define an ''addition of capacity'' for purposes of a hydropower facility and referenced a FERC certification procedure required by section 45(c)(8), which provides a production tax credit for certain incremental hydropower production. While the commenter acknowledged that section 45(c)(8) does not define the term ''additions of capacity,'' the commenter noted that FERC has provided guidance related to certification required under section 45(c)(8) in which FERC describes ''additions of capacity'' as ''any increase in generating capacity other than an addition resulting from an efficiency improvement or an addition resulting from an operational change.''

Commenters also requested that efficiency improvements and upgrades to a hydropower facility consisting of refurbished or modified existing components, but not the addition or replacement of existing components, may qualify as an addition of capacity. Commenters specifically noted that upgrades to generators or turbines, rewinding generators, replacing turbines with more efficient units, and computerizing control of turbines and generators to optimize regulation of flows for generation should be treated as efficiency improvements and upgrades that should qualify as additions of capacity.

Similarly, another commenter noted that the requirements for establishing incremental hydropower are well-established and well-understood, and provide precedent for modifications and changes to a hydropower facility that result in incremental hydropower production. The commenter asserted that the final regulations should take those precedents into account in establishing rules for determining an increase in capacity for purposes of sections 45Y and 48E.

The Treasury Department and the IRS acknowledge that section 45(c)(8) provides that incremental hydropower production attributable to ''efficiency improvements'' or ''additions of capacity'' are eligible for the section 45 credit. However, section 45(c)(8) does not define the terms ''efficiency improvements'' nor ''additions of capacity.'' While section 45(c)(8)(B) allows for a determination of incremental hydropower production at an existing facility attributable to the efficiency improvements or additions of capacity, section 45Y(b)(1)(C) (and by reference section 48E(b)(3)(B)(i)) provides a credit for a new unit or any additions of capacity, but only to the extent of the increased amount of electricity production at the facility. Notably, section 45Y(b)(1)(C) does not provide for a credit for efficiency improvements. As a result, the relevant determination is whether a facility's electrical generation capacity increased as a result of an addition or replacement of components or property (including any new or replacement integral property) to a facility necessary to increase capacity. Accordingly, these final regulations do not adopt the recommendation that any efficiency improvement could meet the requirements of the Incremental Production Rule. However, efficiency improvements that are an addition or replacement of components of property (including integral property) that result in an addition to capacity could meet the requirements of the Incremental Production Rule.

The final regulations add an additional example at §§ 1.45Y–4(c)(5) and 1.48E–4(b)(5) to illustrate the application of the Incremental Production Rule to a hydropower facility.

3. Method of Measuring Increased Amount of Electricity Produced at the Facility by Reason of New Units or Additions of Capacity

As noted earlier, the Incremental Production Rule is based on the increased amount of electricity produced at a facility as a result of a new unit or an addition to capacity. The Incremental Production Rule is focused on measuring the amount of the capacity increase. In response to commenters, the final regulations permit the measurement of increased capacity in several ways, including: (i) modified or amended facility operating licenses from the Federal Energy Regulatory Commission (FERC) or the Nuclear Regulatory Commission (NRC), or related reports prepared by FERC or NRC as part of the licensing process (as described in section IV.H.4. of this Summary of Comments and Explanation of Revisions); (ii) the ISO conditions to measure the nameplate capacity of the facility consistent with the definition of nameplate capacity provided in 40 CFR 96.202; or (iii) a measurement standard prescribed by the Secretary in guidance published in the Internal Revenue Bulletin (*see* 26 CFR 601.601). The final regulations also clarify that taxpayers able to use the measurement standard described in § 1.45Y–4(c)(2)(i) or § 1.48E–4(b)(2)(i) may not use the method described in § 1.45Y–4(c)(2)(ii) or § 1.48E–4(b)(2)(ii) (permitting use of the ISO conditions to measure the maximum electrical generating output of a facility to determine its nameplate capacity).

A commenter asserted that all energy produced by a new unit should be eligible for the section 45Y credit regardless of the degree to which that new unit and its electricity replaced existing electricity production at that facility. The Treasury Department and the IRS disagree with this comment, as the statute limits the application of the Incremental Production Rule to the increased amount of electricity produced at the facility by reason of the new unit or an addition of capacity.

As proposed, the Incremental Production Rule provided that if applicable, taxpayers must use modified or amended facility operating licenses or the ISO conditions to measure the maximum electrical generating output of a facility to determine its nameplate capacity. Several commenters supported the use of the ISO conditions to measure the maximum electrical generating output of a facility to determine nameplate capacity. Additionally, a commenter noted that the proposed regulations properly focus on measuring

the maximum generating output, rather than measuring increases in annual generation that do not impact the maximum output.

Conversely, several commenters expressed concern with the proposed rule requiring the use of nameplate capacity to measure the increased amount of electricity produced at a facility because section 45Y(b)(1)(C) does not mention the term ''nameplate capacity'' and only provides that the credit is available to the extent of the increased amount of electricity produced at a facility without additional elaboration. A commenter also raised the importance of consistency when referring to a facility's ''electrical generating output,'' ''electrical generating capacity,'' ''nameplate capacity,'' and ''additions of capacity.'' Several commenters contended that using nameplate capacity would not be an accurate way to measure additions of capacity and emphasized that not every addition of capacity results in a new nameplate issued by the manufacturer.

Additional commenters noted that manufacturer-stamped nameplate capacity is, by design, the maximum theoretical output of the facility and differs from a facility's actual electric generating capacity. The ISO conditions generally require that this measurement be done by the manufacturer and would normally occur when the facility is originally placed in service. As a result, several commenters noted that measurement of nameplate capacity using the ISO conditions would not take into account physical depreciation, degradation, and other factors that may significantly reduce the maximum generating output and safe operating conditions of the facility over time when compared to the facility's original nameplate capacity. The Treasury Department and the IRS acknowledge that using the ISO conditions to determine nameplate capacity may limit nameplate capacity to the nameplate capacity of the facility on the original placed in service date, or to a revised nameplate capacity of the facility based on major upgrades that would result in a revised nameplate capacity rating.

Commenters noted that the proposed regulations only define nameplate capacity by adopting the definition at 40 CFR 96.202 in reference to the Five-Megawatt Limitation while noting that the final regulations did not adopt the same definition for the Incremental Production Rule. In response, the Treasury Department and the IRS have modified the Incremental Production Rule at §§ 1.45Y–4(c)(2)(ii) and 1.48E–4(b)(2)(ii) to clarify that the definition of nameplate capacity for the Incremental Production Rule is consistent with the definition of nameplate capacity provided in 40 CFR 96.202.

A commenter requested additional flexibility in demonstrating incremental generation, including through the use of actual baseline generation data reported to government and quasi-government agencies such as independent system operators, regional transmission organizations, or other balancing authorities where the generator is connected. Additionally, several commenters stated that ISO standards are not widely used in the industry and that other standards more widely used by the industry would be more effective at determining true capacity additions. Several commenters that recommended other standards for measuring increased capacity noted that geothermal facilities, hydropower facilities, and other clean energy facilities would be disadvantaged by relying on nameplate capacity to satisfy the Incremental Production Rule. Several commenters provided options for alternative measurements standards, including the American Society of Mechanical Engineers (ASME) Performance Tests, IEC standards, and NERC procedures, and other comparable technical standard conditions. Additionally, a commenter suggested permitting taxpayers to use an accredited measurement method, such as the ASME Performance Test, suitable for the particular circumstances associated with the facility modification or addition, provided that the accredited method can be used to reasonably measure electrical generating capacity, can be consistently applied to measure electrical generation capacity before and after the modification or addition, and can be clearly documented by a third-party engineering report specific to the project.

Other commenters proposed measuring additional capacity based on changes in output compared to the facility's historical baseline output. A commenter proposed permitting taxpayers to measure by themselves the amount by which all components of property added to the facility in a taxable year increases the generating capacity of the facility, relative to a baseline in which the components of property are not added to the facility. Several commenters also noted that measurements should be adjusted as reasonably practicable to ensure a like-for-like comparison pre- and post-addition. Conversely, a commenter noted that additional capacity measurements should not rely on monthly or annual output of a facility prior to and after a project or modification because other factors, such as weather, demand, and outages will affect a facility's output from one period to another. The Treasury Department and the IRS have determined that increased capacity should not be based on a measurement methodology that simply compares electricity production before the increase in capacity to electricity production after the increase in capacity because such measurement methodologies involve seasonal or other fluctuations that are too easily manipulated to show a greater increase in capacity than the actual increase.

The Treasury Department and the IRS considered the comments regarding different methods for measuring increased capacity and found that many of the proposed measurement standards were not broadly applicable across technologies. Additionally, many were not sufficiently objective. The Treasury Department and the IRS recognize, though, that different methods may exist that are broadly applicable across technologies and sufficiently objective. The Treasury Department and the IRS will continue to consult with experts on potential additional measurement standards that could apply. The final regulations are amended to reflect this continuing consideration and to provide flexibility by permitting the Secretary to prescribe additional measurement standards in guidance published in the Internal Revenue Bulletin.

The Treasury Department and the IRS recognize the limitations of measuring increased capacity with nameplate capacity. As a result, the Treasury and the IRS have provided additional measurement options in the final regulations. Measurement options in the final rule include: modified or amended facility operating licenses from FERC or NRC, or related reports prepared by FERC or NRC as part of the licensing process (as described in section IV.H.4. of this Summary of Comments and Explanation of Revisions); and any measurement standard prescribed by the Secretary in guidance published in the Internal Revenue Bulletin (*see* 26 CFR 601.601). The final regulations also clarify that taxpayers that are able to use the measurement standard described in § 1.45Y–4(c)(2)(i) or § 1.48E–4(b)(2)(i) may not use the method described in § 1.45Y–4(c)(2)(ii) or § 1.48E–4(b)(2)(ii) (permitting use of the ISO conditions to measure the maximum electrical generating output of a facility to determine its nameplate capacity). Additionally, the final regulations add an additional example at §§ 1.45Y–4(c)(5) and 1.48E–4(b)(5) to illustrate the application of the Incremental Production Rule to a geothermal facility.

4. Documentation Used To Demonstrate Increased Capacity

As proposed, the Incremental Production Rule allowed taxpayers to use modified or amended facility operating licenses to measure capacity and changes therein. Several commenters noted that nuclear facilities are unable to use modified or amended facility operating licenses to measure an addition of capacity, because a NRC operating license lists a reactor's maximum power level in megawatts thermal, rather than maximum electric generating capacity, and changes can be made to improve a plant's thermal efficiency (and thus electric generating capacity) without altering the reactor's thermal power or necessitating a modified or amended operating license. Nonetheless, the Treasury Department and the IRS understand that, under certain circumstances, FERC and NRC modified or amended licenses and reports related to those modified or amended licenses do report electrical capacity and changes therein.

For example, the NRC reports the electric capacity of nuclear power plants before and after uprates involving amendments to NRC licenses. Electric generating capacity is not typically included in NRC operating licenses, as operating licenses do not condition or limit the electric power output. However, electric capacity can be included in related NRC-authored safety evaluation reports, which are a required element of the license amendment process. These reports typically express power output in MW thermal but can also provide information related to capacity in MW electric. The final regulations at §§ 1.45Y–4(c)(2)(i) and 1.48E–4(b)(2)(i) allow taxpayers to use the electric capacity, and changes therein, presented in safety evaluation reports that are part of a modified or amended operating license to demonstrate an increased amount of electricity produced at the facility by reason of a new unit or addition of capacity, and to calculate the amount of that increase. Similarly, the final regulations at §§ 1.45Y–4(c)(2)(i) and 1.48E–4(b)(2)(i) also allow taxpayers to use electrical capacity and changes therein as reported in FERC modified or amended licenses, and reports related to those modified or amended licenses. The final regulations clarify, though, that taxpayers that are able to use the measurement standard described in § 1.45Y–4(c)(2)(i) or § 1.48E–4(b)(2)(i) may not use the method described in § 1.45Y–4(c)(2)(ii) or § 1.48E–4(b)(2)(ii) (permitting use of the International Standard Organization (ISO) conditions to measure the maximum electrical generating output of a facility to determine its nameplate capacity).

Several commenters proposed various additional methods for documenting an increase in capacity including the use of a third-party engineering report. The Treasury Department and the IRS determined that without a specific measurement standard and certification requirements, an independent third-party engineering report alone does not provide an adequate method to substantiate a facility's increased capacity.

5. Measurement of Eligible Basis for a New Unit or an Addition of Capacity Under Section 48E

Several commenters recommended that the cost of any uprates, upgrades, efficiency, or other improvements that result in additional generation capacity at a facility be considered a qualified investment for purposes of the section 48E credit. Specifically, commenters asserted that the qualified investment with respect to a qualified facility should include the entire cost of a new unit or any additions of capacity, rather than a proportionate share of those costs reflective of the extent to which the electricity produced attributable to a new unit or addition of capacity increased (as opposed to replaced) the existing facility's production. Commenters supported this recommendation by noting a similar treatment of basis was used in the Section 1603 Grant Program for improvements to hydropower facilities.

Commenters also noted that the proposed regulations allow for the full basis of a qualified investment in a new unit to be eligible for the credit, but not for additions of capacity. A commenter emphasized that this approach creates challenges for administrability, and application of the rule based on measuring fractional additions of capacity. As an example, the commenter indicated that some replacement parts do not have a nameplate capacity but are essential to the total nameplate capacity of the overall facility. Several commenters recommended an alternative rule that prorates an investment between qualified and non-qualified property when the investment is a discretionary replacement of existing capacity but suggested that the entire amount of an investment should be treated as eligible for the credit if the investment would not have occurred but for increasing capacity.

In response to the comments, the Treasury Department and the IRS acknowledge that a qualified investment for an addition of capacity would not be paid or incurred but for the increase in electricity generation capacity and agree that the rules for computing the qualified investment for an addition of capacity should be modified. Therefore, the final regulations at § 1.48E–4(b)(4) are amended to make the rule for an addition of capacity equivalent to that of a new unit by providing that a taxpayer's qualified investment during the taxable year that resulted in an increased capacity of a facility by reason of a new unit or an addition of capacity is its total qualified investment in components of qualified property that result in the new unit or addition of capacity.

6. Special Rule for Restarted Facilities

A few commenters requested further guidance specific to decommissioned facilities. These commenters suggested treating the capacity of decommissioned facilities before restarting as zero and clarifying that facilities meeting the special rule for restarted facilities under proposed §§ 1.45Y–4(c)(2) and 1.48E–4(b)(2) can treat their entire capacity as an addition of capacity. One commenter noted that a decommissioned facility ceases operations and is not legally permitted to produce electricity due to a lack of operating license. Another commenter requested that, instead of requiring a period without a valid operating license, the final regulations cover the typical situation for decommissioning a hydropower facility in which the licensee maintains an operating license that no longer authorizes the operation of the facility. Another commenter similarly asserted that a nuclear facility must maintain its operating license until decommissioning is concluded. The commenter stated that a nuclear facility's operating license (issued by the NRC) generally does not authorize operation and electricity production after the licensee submits a written certification to the NRC that they have determined to permanently cease operations and once fuel has been permanently removed from the reactor vessel. Accordingly, both commenters suggested revising proposed §§ 1.45Y–4(c)(2)(ii) and 1.48E–4(b)(2)(ii) to treat a facility that is decommissioned or in the process of decommissioning and restarts to have increased capacity if the facility shuts down for at least one calendar year, during which it was not authorized to operate by its respective Federal Agency or did not generate more than 0 megawatt-hours, while holding a license from the FERC or NRC.

An additional commenter recommended expanding the special

rule for restarted facilities to include continuous operation in the case of a facility that obtains a renewed operating license and enters an initial or subsequent period of extended operation under the renewed operating license after December 31, 2024. The commenter suggested treating such a scenario as an addition of capacity equal to the full capacity of the facility.

In contrast, a commenter raised concerns regarding the special rule for restarted facilities, pointing to abuse by certain taxpayers and noting that the rule strays from the intention of the tax credits to deploy new resources. The commenter further highlighted a potential lack of readiness by implicated government agencies, noting specifically that the NRC does not have regulations governing license reinstatement. The commenter recommended removing the special rule for restarted facilities from the final regulations or, in the alternative, engaging in further fact finding before finalizing such a rule. If a special rule for restarted facilities is implemented, the commenter requested that additional requirements be incorporated to raise the bar to entry for decommissioned facilities to prevent abuse of loopholes.

In response to these comments, the final regulations make four changes to proposed §§ 1.45Y–4(c)(2) and 1.48E–4(b)(2) and moved them to §§ 1.45Y–4(c)(3) and 48E–4(b)(3), respectively. First, the final regulations modify the language in proposed §§ 1.45Y–4(c)(2)(ii) and 1.48E–4(b)(2)(ii) to state that ''[t]he existing facility must have a shutdown period of at least one calendar year during which it *was not authorized to operate* by its respective Federal regulatory authority (that is, the FERC or the NRC).'' (Emphasis added.) Second, the final regulations modify the language in proposed §§ 1.45Y–4(c)(2)(iii) and 1.48E–4(b)(2)(iii) to state that the restarted facility must be eligible to restart based on an operating license issued by either FERC or NRC. Third, the final regulations are modified to reflect the Treasury Department and the IRS' agreement with the commenter's concerns regarding potential abuse by certain taxpayers related to the decommissioning and shutdown steps in the proposed regulations. In order to limit this potential abuse, the final regulations add an anti-abuse rule to §§ 1.45Y–4(c)(3) and 1.48E–4(b)(3) that provides that a facility may not cease operation for the purpose of qualifying for the special rule for restarted facilities. Finally, the final regulations reflect that the addition of capacity in the case of a restarted facility is the total capacity of the facility after it is restarted by modifying the language to state that a facility that is decommissioned or in the process of decommissioning and restarts can be considered to have increased capacity *from a base of zero* if certain conditions are met. The final regulations add an additional example at §§ 1.45Y–4(c)(5) and 1.48E–4(b)(5) to illustrate the application of the Incremental Production Rule to a restarted facility.

I. Dual Use Rule

A commenter requested clarifying the applicability of the ''dual use'' concept to sections 45Y and 48E. Specifically, the commenter suggested clarifying that the ''75 percent cliff'' for energy property with integrated storage does not apply. A previous version of § 1.48–9 included a Dual Use Rule, referred to as the ''75-percent cliff,'' which provided that a solar energy property, wind energy property, or geothermal equipment is eligible for the section 48 credit to the extent of the energy property's basis or cost allocable to its annual use of energy from a qualified source if the use of energy from ''non-qualifying'' sources does not exceed 25 percent of the total energy input of the energy property during an annual measuring period.

Historically, the Dual Use Rule was used in the section 48 regulations to address the treatment of energy storage property that stored energy from a qualified source and a non-qualified source. This was necessary because prior to the IRA amendments to section 48, energy storage property was only allowed for the section 48 credit as part of an energy property. After the IRA amendments, energy storage property became a separate type of energy property, referred to as ''energy storage technology,'' and the need for the Dual Use Rule changed. Similar to the treatment of EST in section 48, a separate credit is provided under section 48E. Accordingly, the Treasury Department and IRS clarify that the Dual Use Rule contained in a prior version of § 1.48–9 is not applicable to the section 45Y and 48E credits.

V. Rules Relating to the Increased Credit Amount for Satisfying Certain Prevailing Wage and Apprenticeship Requirements

A. In General

The PWA final regulations provide generally applicable rules on the PWA requirements. Comments on the general PWA requirements (including comments that referenced section 45Y or 48E but addressed the PWA requirements more generally) were addressed in the PWA final regulations. To the extent consistent with this Summary of Comments and Explanation of Revisions, the Explanation of Revisions described in the PWA final regulations is incorporated in these final regulations. Therefore, general comments addressed in the preamble to the PWA final regulations are not readdressed in this Summary of Comments and Explanation of Revisions.

Increased credit amounts are generally available under section 45Y(a)(2)(B) for qualified facilities and section 48E(a)(2)(A)(ii) for qualified facilities and EST if beginning of construction of the qualified facility or EST occurs before January 29, 2023 (BOC Exception). Under the relevant BOC Exception in sections 45Y and 48E, taxpayers may claim the amount of the increased credit without satisfying the PWA requirements if construction ''begins prior to the date that is 60 days after the Secretary publishes guidance with respect to the [PWA requirements].'' On November 30, 2022, the Treasury Department and the IRS published Notice 2022–61, 2022–52 I.R.B. 560, providing initial guidance with respect to the PWA requirements and starting the 60-day period described in those sections. To qualify for the BOC Exception, a taxpayer must begin construction before January 29, 2023.

Additionally, increased credit amounts are generally available under sections 45Y and 48E with respect to qualified facilities with a maximum net output (or capacity for EST under section 48E) of less than one megawatt (One Megawatt Exception). If a taxpayer satisfies the PWA requirements, meets the BOC Exception, or meets the One Megawatt Exception, the amount of section 45Y credit or section 48E credit determined is equal to the otherwise determined amounts multiplied by five.

B. Application of the PWA Requirements to Section 45Y

Section 45Y(g)(9) provides that rules similar to the rules of section 45(b)(7) apply with respect to the prevailing wage requirements (Prevailing Wage Requirements). Section 45Y(g)(10) provides that rules similar to the rules of section 45(b)(8) apply with respect to the apprenticeship requirements (Apprenticeship Requirements). Section 1.45Y–3(b)(3) adopted by cross-reference the rules in the PWA final regulations promulgated under section 45(b)(7) and (8); specifically, §§ 1.45–7 (Prevailing Wage Requirements), 1.45–8 (Apprenticeship Requirements), and 1.45–12 (recordkeeping and reporting).

As previously explained, the PWA final regulations addressed general

application of the PWA requirements and provided the rules (except the One Megawatt Exception) applicable for section 45Y in § 1.45Y–3. To provide consistent descriptions and terminology, non-substantive, technical updates have been made to § 1.45Y–3 to reflect these final regulations. As revised, § 1.45Y–3 also includes a new applicability date. These final regulations make no substantive change regarding application of the general PWA requirements, notwithstanding the new applicability date, apart from the amendments made to address the One Megawatt Exception. Taxpayers that began construction after June 25, 2024, and taxpayers that begin construction after the publication of the final regulations continue to follow the same general rules with respect to the PWA requirements.

Taxpayers also have the option to apply these final regulations to qualified facilities that began construction before the publication of the final regulations, provided that taxpayers follow these final regulations in their entirety and in a consistent manner. Likewise, taxpayers that choose to apply these final regulations must also follow the PWA final regulations, consistent with prior § 1.45Y–3. There are no changes to the application of the transition rules provided for in the PWA final regulations for taxpayers choosing to apply these final regulations for construction that began before the publication of the final regulations as the general PWA requirements did not change between prior § 1.45Y–3 in the PWA final regulations and § 1.45Y–3 in these final regulations.

The Treasury Department and the IRS understand that taxpayers may need additional time to comply with the amendments made by these final regulations to the One Megawatt Exception. Therefore, the amendments made to § 1.45Y–3 with respect to the One Megawatt Exception have a delayed applicability date that is 60 days after publication of the final regulations. Comments received regarding the One Megawatt Exception under section 45Y are addressed in these final regulations and explained in section V.D. of this Summary of Comments and Explanation of Revisions.

C. Application of the PWA Requirements to Section 48E

1. In General

The PWA requirements in section 48E cross-reference both sections 45 and 48 for operative rules. Section 48E(d)(3) provides that rules similar to the rules of section 48(a)(10) apply with respect to the prevailing wage requirements. Section 48(a)(10) provides rules with respect to the prevailing wage requirements under section 48, including the special recapture provision under section 48(a)(10)(C). Section 48(a)(10)(B) provides that the correction and penalty procedures under section 45(b)(7)(B) for a failure to satisfy the prevailing wage requirements generally apply prior to a recapture event under section 48(a)(10)(C). Section 48E(d)(4) provides that rules similar to the rules of section 45(b)(8) apply with respect to the apprenticeship requirements. Proposed § 1.48E–3 would adopt by cross-reference those rules in the section 48 final regulations promulgated under section 48(a)(10) and the PWA final regulations promulgated under section 45(b)(7) and (8); specifically, §§ 1.48–13(c) (Prevailing Wage Requirements), 1.45–8 (Apprenticeship Requirements), and 1.45–12 (recordkeeping and reporting). These rules are generally adopted by cross-reference in § 1.48E–3 with additional clarifications to reflect §§ 1.48–13, 1.45–8, and 1.45–12 and these final regulations.

At least one commenter requested that C&G facilities fueled by woody biomass feedstocks be eligible to qualify for the domestic content bonus credit amount and increased credit amount for satisfying PWA requirements. As discussed in section IV.A. of this Summary of Comments and Explanation of Revisions, a facility that meets the definition of a qualified facility may qualify for the relevant section 45Y and 48E credits. Accordingly, a qualified facility may also qualify for an increased credit amount under sections 45Y and 48E provided that the facility satisfies the relevant domestic content bonus or PWA requirements.

A commenter praised the PWA final regulations for using restraint in incorporating elements of the Davis-Bacon Act and suggested that the Treasury Department and the IRS exercise the same restraint in drafting these regulations. The Treasury Department and the IRS generally agree with the commenter that the final regulations for section 48E should apply a similar approach as in the PWA final regulations in order to ensure consistency across different Code sections, provide taxpayer certainty, and further tax administration. These final regulations reflect such an approach.

2. Transition Rules

As stated in the preamble to the PWA final regulations and reiterated in the preamble to the section 48 final regulations, the Treasury Department and the IRS have determined that given the complexity of the PWA requirements, the uncertainty regarding the potential retroactive effects of the PWA requirements, and the benefits to tax administration gained with consistency across the various Code sections containing PWA requirements, that a transition rule is appropriate. The PWA final regulations provide that any work performed before January 29, 2023 (that is, the date that is 60 days after the publication of Notice 2022–61) is not subject to the PWA requirements, regardless of whether there is an applicable BOC Exception. This transition rule also applies for taxpayers that may initially satisfy the BOC Exception, but later fail to meet the BOC Exception (for example, by failing to meet certain continuity requirements). These taxpayers must satisfy the PWA requirements for construction, alteration, or repair (as applicable) that occurs on or after January 29, 2023, but do not need to meet the PWA requirements for work that occurred prior to that date. For similar reasons, this transition rule also applies to the PWA requirements under section 48E and is incorporated by cross-reference to §§ 1.48–13 and 1.45–8 in these final regulations.

The section 48 final regulations (and as described in the PWA final regulations) also provide a limited transition waiver for the penalty payment with respect to the correction and penalty procedures described in section 45(b)(7)(B) for a failure to satisfy the Prevailing Wage Requirements. The PWA final regulations provide that the penalty payment is waived with respect to a laborer or mechanic who performed work in the construction, alteration, or repair of a qualified facility on or after January 29, 2023, and prior to June 25, 2024, if the taxpayer relied upon Notice 2022–61 or the PWA proposed regulations for determining when the obligation to pay prevailing wages began, provided the taxpayer makes the appropriate correction payments to the impacted workers within 180 days of June 25, 2024. These final regulations clarify that this limited transition waiver applies to section 48E (by incorporation of the cross-reference to section 48(a)(10)) provided the taxpayer makes the appropriate correction payments to the impacted workers within 180 days of the publication of these final regulations.

Similarly, these final regulations also allow taxpayers to use Notice 2022–61 for determining when construction begins for purposes of the applicable percentage of labor hours performed by qualified apprentices required under

section 45(b)(8) in satisfying the labor hours requirement described in § 1.45–8. These transition rules are further explained in the preamble to the PWA final regulations.

3. Recapture

The section 48 final regulations also addressed the recapture rules under section 48(a)(10)(C). The preamble to the section 48 final regulations contains detailed discussion of the recapture rules, and similar rules apply for purposes of the special recapture rule in section 48E(d)(3) (by reference to section 48(a)(10)). The recapture rules in § 1.48–13 are incorporated by cross-reference in § 1.48E–3. These final regulations do clarify that if there is no alteration or repair that occurs during the relevant year during the five-year recapture period, the taxpayer is deemed to satisfy the PWA requirements with respect to that year.

4. Interconnection Property

Some commenters suggested clarifying that the PWA requirements do not apply to the construction, alteration, or repair of interconnection property. Section 48E(a)(2)(A)(ii) provides that the increased credit amount (for satisfying the PWA requirements) is determined in the case of a qualified facility. The qualified investment with respect to a qualified facility described in section 48E(b) is the sum of the basis of any qualified property placed in service by the taxpayer during such taxable year that is part of a qualified facility, plus the amount of expenditures that are paid or incurred by the taxpayer for qualified interconnection property. Therefore, interconnection property is eligible for the increased credit amount. However, consistent with section 48(a)(8), § 1.48E–4(a)(2) clarifies that interconnection property is not part of a qualified facility and therefore is not subject to the PWA requirements.

In addition to not being part of the qualified facility, as defined in section 48E(b)(3)(A), interconnection property generally is also not within the control of the taxpayer that owns the qualified facility because it generally is not owned by the same taxpayer. Instead, qualified interconnection property is generally owned by a utility and is part of an addition, modification, or upgrade to a transmission or distribution system that is required at or beyond the point at which the qualified facility interconnects to such transmission or distribution system. It would therefore be difficult or impossible in such a case for the taxpayer to control or monitor whether the construction of the interconnection property complies with the PWA requirements. This may explain why the statute permits the increased credit amount for amounts paid or incurred for qualified interconnection property, without subjecting the construction of that property to the PWA requirements.

With respect to EST, section 48E(c)(1) describes the qualified investment with respect to EST without reference to interconnection property. This differing treatment of interconnection property between qualified facilities under section 48E(b) and EST under section 48E(c) is further supported by section 48E(b)(4), which solely defines interconnection property ''[f]or purposes of this paragraph [(b)(4)].'' Accordingly, the qualified investment with respect to any EST does not include qualified interconnection costs and qualified interconnection property is not subject to PWA requirements. Interconnection property with respect to EST is further discussed in section III.D.6. of this Summary of Comments and Explanation of Revisions.

D. One Megawatt Exception Under Section 45Y

The preamble to the PWA final regulations explained that the One Megawatt Exception for purposes of section 45Y would be addressed in these final regulations. Comments pertaining to the technical aspects of measuring output for the purposes of the One Megawatt Exception under 45Y were limited. Commenters stated that some technologies, such as solar, generate electricity in direct current not alternating current, so it is unclear how to measure such technologies.

The Treasury Department and the IRS agree that the One Megawatt Exception under section 45Y(a)(2)(B)(i) requires clarification. The final regulations under § 1.45Y–3(c)(1) provide that the determination of whether a qualified facility has a maximum net output of less than one megawatt of electricity (as measured in alternating current) is based on the nameplate capacity of the qualified facility. The nameplate capacity for purposes of the One Megawatt Exception is the maximum electrical generating output in megawatts that a qualified facility is capable of producing on a steady state basis and during continuous operation under standard conditions, as measured by the manufacturer and consistent with the definition of nameplate capacity provided in 40 CFR 96.202. If applicable, taxpayers must use the ISO conditions to measure the maximum electrical generating output of a qualified facility. For qualified facilities that generate electrical output in direct current, the final regulations under § 1.45Y–3(c)(2) provide an alternative nameplate capacity measurement. For qualified facilities that generate electricity in direct current, the taxpayer may choose to determine the maximum net output (in alternating current) of each qualified facility for purposes of the One Megawatt Exception by using the lesser of: (i) the sum of the nameplate generating capacities within the unit of qualified facility in direct current, which is deemed the nameplate generating capacity of the unit of qualified facility in alternating current; or (ii) the nameplate capacity of the first component of property that inverts the direct current electricity into alternating current.

When evaluating whether the One Megawatt Exception under section 45Y applies, the Treasury Department and the IRS have determined that a consistent approach should apply for purposes of sections 48E and 45Y. A plain reading of the statutory exception for facilities with a maximum net output of less than one megawatt demonstrates Congress's intent to have only lower output, small facilities excepted from the PWA requirements and still be eligible for the increased credit amount. For purposes of determining whether a qualified facility must satisfy the PWA requirements to obtain an increased credit amount, the output of any qualified facility must be evaluated consistent with its operations. These final regulations provide, in part, that the unit of qualified facility includes all functionally interdependent components of property owned by the taxpayer that are operated together and that can operate apart from other property to produce electricity. The Treasury Department and the IRS intended for the term ''operated together'' to be given effect when considering whether the One Megawatt Exception applies to the PWA requirements.

When measuring nameplate capacity for the purposes of the One Megawatt Exception under section 45Y, these final regulations provide parity with the rules for section 48E and include the same special rule that if the qualified facility has *integrated operations* with one or more other qualified facilities, then the aggregate nameplate capacity of the qualified facilities is used for purposes of determining whether the One Megawatt Exception applies to the qualified facility. Solely for the purposes of the One Megawatt Exception, these final regulations provide that a qualified facility is treated as having *integrated operations* with any other qualified facility of the

same technology type if the facilities are: (i) owned by the same or related taxpayers; (ii) placed in service in the same taxable year; and (iii) transmit electricity generated by the facilities through the same point of interconnection or, if the facilities are not grid-connected or are delivering electricity directly to an end user behind a utility meter, are able to support the same end user. The final regulations also provide a definition for related taxpayers. For purposes of the One Megawatt Exception, the term *related taxpayers* means members of a group of trades or businesses that are under common control (as defined in § 1.52–1(b)). Related taxpayers are treated as one taxpayer in determining whether a qualified facility has integrated operations.

The Treasury Department and the IRS understand that some taxpayers who have integrated operations may need additional time to comply with the PWA requirements where construction has already begun, or is imminent, before publication of these final regulations. To alleviate these circumstances, the rule for qualified facilities with integrated operations has a delayed applicability date that is 60 days after publication of the final regulations.

E. Election To Group Qualified Facilities for Purposes of PWA Requirements Under Section 45Y

Commenters suggested that the taxpayers should be allowed to group facilities as they chose when applying the PWA requirements for an increased credit amount. For example, a commenter suggested that a taxpayer that owns interrelated facilities should be allowed elect to combine multiple interrelated facilities into one aggregated unit or, alternatively, elect to treat the facilities individually for the PWA requirements. Some commenters asserted that it is difficult to certify compliance at each qualified facility level, so taxpayers should be allowed to certify PWA compliance at an interrelated facilities level.

To claim an increased credit amount for satisfying the PWA requirements, section 45Y requires that each qualified facility satisfy the requirements. The statute does not support commenters' request to allow PWA certification for qualified facilities based on one qualified facility. If a taxpayer does not satisfy the PWA requirements for a qualified facility, the taxpayer may cure with correction payments paid to impacted workers and a penalty paid to the IRS. The PWA final regulations provide taxpayers the rules for the Prevailing Wage Requirement, Apprenticeship Requirement, and the recordkeeping and reporting applicable to section 45Y.

F. One Megawatt Exception Under Section 48E

The preamble to the PWA final regulations explained that the One Megawatt Exception for purposes of section 48E would be addressed in these final regulations. Proposed § 1.48–13 would have provided by cross-reference that maximum net output is based on nameplate capacity and proposed conversion formulas for certain types of qualified facilities and ESTs.

Some commenters recommended revisions to the conversion formulas. For example, one commenter asserted that by defining the threshold for the One Megawatt Exception for thermal systems at about a quarter of the equivalent output of electrical energy systems, investors in thermal energy storage systems will not qualify for the One Megawatt Exception. The commenter recommended that the One Megawatt Exception be measured as the maximum net output according to a facility's electrical equivalent. The commenter explained this means that for thermal energy resources, the use of electricity (in kW) that would be avoided or offset by each unit of thermal energy (Btu/h for heat, or Ton of cooling) provided by the thermal energy resource. The commenter recommended that the conversion value for thermal energy cooling systems for purposes of measuring the One Megawatt Exception for qualified facilities be 1,550 tons for water-cooled systems and 870 tons for air-cooled systems.

The Treasury Department and the IRS have concluded that the conversion formulas in the proposed regulations provide a direct and accurate conversion and that no changes are needed to the conversion factors for thermal energy storage property. By providing a broadly applicable rule, the conversion formulas should provide accurate results for a broad set of applications and technologies. The commenters' requests for specific formulas applicable to specific technologies conflict with the approach of these final regulations to provide general, rather than narrow, rules. Therefore, the final regulations do not adopt these comments. The final regulations provide conversion formulas for thermal energy storage technology in § 1.48E–3(c)(3)(iii) and hydrogen storage technology in § 1.48E–2(g)(6)(iii).

Commenters also stated that certain technologies generate electricity in direct current, not alternating current, so it is unclear how such qualified facilities could qualify for the One Megawatt Exception. The Treasury Department and the IRS agree that the One Megawatt Exception under section 48E requires clarification for technologies that generate output in direct current.

The final regulations provide that the determination of whether a qualified facility has a maximum net output of less than one megawatt of electricity (as measured in alternating current) is based on the nameplate capacity of the qualified facility. The nameplate capacity for purposes of the One Megawatt Exception is the maximum electrical generating output in megawatts that a qualified facility is capable of producing on a steady state basis and during continuous operation under standard conditions, as specified by the manufacturer and consistent with the definition of nameplate capacity provided in 40 CFR 96.202. If applicable, taxpayers must use the ISO conditions to measure the maximum electrical generating output of a facility. Section 48E(a)(2)(B)(ii)(I) describes the One Megawatt Exception for EST as based on the capacity of the EST. The final regulations adopt this general term, and also clarify that the nameplate capacity of the for EST is based on the output of the EST.

For qualified facilities that generate electrical output in direct current, the final regulations provide a new alternative nameplate capacity measurement. Only for qualified facilities that generate electricity in direct current, the taxpayer may choose to determine the maximum net output (in alternating current) of each qualified facility by using the lesser of: (i) the sum of the nameplate generating capacities within the unit of qualified facility in direct current, which is deemed the nameplate generating capacity of the unit of qualified facility in alternating current; or (ii) the nameplate capacity of the first component of property that inverts the direct current electricity into alternating current. The final regulations also provide these same rules apply for ESTs that have output in direct current for the purposes of determining if the EST One Megawatt Exception applies.

Commenters also stated opposition to adopting the concept of an ''energy project'' or aggregation rule similar to those in the section 48 proposed regulations for purposes of claiming the increased rate for meeting the PWA requirements under section 48E (as well as section 45Y). Commenters asserted that there is no legal basis for using the definition of an energy project or any aggregation rule for the section 48E

credit. A commenter instead suggested permitting a taxpayer to elect to combine multiple interrelated facilities into one aggregated unit or, alternatively, elect to treat the facilities individually for purposes of the PWA requirements. Another commenter requested permitting taxpayers to certify that individual qualified facilities meet the PWA requirements if interrelated facilities meet the PWA requirements. The commenter stated that taxpayers typically contract with mechanics and laborers for an entire project, rather than for an individual qualified facility, and that it would be difficult to certify compliance with the PWA requirements at the qualified facility level.

The Treasury Department and the IRS do not agree with commenters that there is no legal basis to incorporate an aggregation rule into section 48E. Section 48E(d)(3) provides that ''[r]ules similar to the rules of section 48(a)(10) shall apply.'' Section 48(a)(10) applies the prevailing wage requirements to ''energy projects,'' which requires the aggregation of energy properties under section 48. Additionally, the reference in section 48E(d)(3) to the prevailing wage requirements provided in section 48(a)(10)[4] indicates that the express delegation of authority in section 48(a)(16) also applies in the context of section 48E for implementation of the prevailing wage requirements. Although the apprenticeship requirements provided in section 48E(d)(4) applies rules similar to section 45(b)(8) rather than section 48(a)(11), an appropriate reading of the statute is to apply a consistent interpretation to both of section 48E's prevailing wage requirements and apprenticeship requirements, as inconsistent interpretations would frustrate congressional intent by creating different standards for the prevailing wage requirements and apprenticeship requirements and would be difficult for the IRS to administer. For the reasons noted in this Summary of Comments and Explanation of Revisions, interpreting the PWA requirements for section 48E consistently with section 48(a)(10) is the best implementation of the overall statutory framework because it results in the PWA requirements being applied appropriately and consistently across credits.

The concept of interrelated facilities raised by commenters is relevant to the One Megawatt Exception. As discussed in section IV.B. of this Summary of Comments and Explanation of Revisions, these final regulations apply a functional definition to implement the term ''qualified facility.'' These final regulations provide, in part, that the unit of qualified facility includes all functionally interdependent components of property owned by the taxpayer that are operated together and that can operate apart from other property to produce electricity. This functional definition could result in some qualified facilities with a maximum net output that is far greater than one megawatt being treated as though they were many separate facilities each with a maximum net output of less than one megawatt. This would have unintended impacts on the PWA requirements. Accordingly, the Treasury Department and the IRS intend to give effect to the term ''operated together'' when considering whether and how the One Megawatt Exception applies to the PWA requirements.

A plain reading of the statutory exception for facilities with a maximum net output of less than one megawatt demonstrates Congress's intent to have only lower output, small facilities excepted from the PWA requirements and still be eligible for the increased credit amount. Any other interpretation undermines the purpose of the statutory exception and Congress's intent to have PWA requirements apply to the construction of clean energy facilities. For purposes of determining whether a qualified facility must satisfy the PWA requirements to obtain an increased credit amount, the output of any qualified facility must be evaluated consistent with its operations. This supports the purpose of the One Megawatt Exception, provides certainty for taxpayers seeking increased credit amounts under section 48E, and furthers sounds tax administration.

When measuring nameplate capacity for the purposes of the One Megawatt Exception, the final regulations provide a special rule. Solely for the purposes of the One Megawatt Exception, if the qualified facility has *integrated operations* with one more other qualified facilities, then the aggregate nameplate capacity of the qualified facilities is used for the purposes of determining if the One Megawatt Exception applies. The final regulations under § 1.48E–3(c)(4)(i) provide that solely for the purposes of the One Megawatt Exception, a qualified facility is treated as having *integrated operations* with any other qualified facility of the same technology type, if the facilities are: (i) owned by the same or related taxpayers; (ii) placed in service in the same taxable year; and (iii) transmit electricity generated by the facilities through the same point of interconnection or, if the facilities are not grid-connected or are delivering electricity directly to an end user behind a utility meter, are able to support the same end user. The final regulations under § 1.48E–3(c)(4)(ii) provide a similar *integrated operations* rule for EST.

As discussed in section IV.G. of this Summary of Comments and Explanation of Revisions, the final regulations provide for a generally applicable related taxpayer rule in § 1.48E–1(c), including for purposes of the One Megawatt Exception. The term *related taxpayers* means members of a group of trades or businesses that are under common control as defined in § 1.52–1(b). Related taxpayers are treated as one taxpayer in determining whether a qualified facility or EST has integrated operations.

As with section 45Y, the Treasury Department and the IRS understand that some taxpayers who have integrated operations may need additional time to comply with the PWA requirements where construction has already begun, or is imminent, before publication of these final regulations. To alleviate these circumstances, final regulations for § 1.48–3 have an applicability date that applies 60 days after publication of the final regulations.

For the reasons provided herein, aggregation of the nameplate capacity of qualified facilities with integrated operations is applicable only to the One Megawatt Exception under the PWA requirements and is not applicable to other circumstances related to qualified facilities, such as the Five-Megawatt Limitation for qualified interconnection property for Qualified Interconnection Property, evaluation of eligibility for the domestic content or energy communities bonuses.

G. Election To Group Qualified Facilities or ESTs for Purposes of the PWA Requirements Under Section 48E

As with section 45Y, commenters suggested that the taxpayers should be allowed to group facilities as they chose when applying the PWA requirements for an increased credit amount under section 48E. A commenter suggested that a taxpayer that owns interrelated facilities should be allowed to elect to combine multiple interrelated facilities into one aggregated unit or, alternatively, elect to treat the facilities individually for the PWA requirements. A commenter suggested that taxpayers should be allowed to certify compliance with the PWA requirements for an individual facility based on compliance of interrelated facilities. Commenters'

[4] Section 48(a)(16) provides the same broad authority for administering the PWA provisions in section 48(a).

suggestions to allow elective grouping to certify compliance with the PWA requirements or allow taxpayers to certify for an individual qualified facility based on compliance of interrelated facilities are not adopted. The statute requires that each qualified facility satisfy the requirements and for this reason the commenter's suggestions cannot be adopted. If a taxpayer does not satisfy the PWA requirements for a qualified facility, the taxpayer may cure with correction payments paid to impacted workers and a penalty paid to the IRS. The PWA final regulations provide taxpayers the rules for the Prevailing Wage Requirement, Apprenticeship Requirement, and the recordkeeping and reporting applicable to section 48E.

VI. Domestic Content Bonus

The proposed regulations provided rules related to the increase in credit rate for qualified facilities (or EST in the case of section 48E) that meet the domestic content bonus requirements.

Some commenters supported and some commenters opposed adopting the concept of an ''energy project'' or aggregation rule similar to those in the section 48 proposed regulations for purposes of claiming the domestic content bonus credit amount under section 45Y or 48E. Commenters contended that there is no legal basis for importing the definition of an energy project or any aggregation rule for the section 48E credit. A commenter instead suggested permitting a taxpayer to elect to combine multiple interrelated facilities into one aggregated unit or, alternatively, elect to treat the facilities individually for purposes of the domestic content bonus credit amount.

An aggregation rule is incorporated into the section 48 final regulations for purposes of claiming the domestic content bonus credit amount, because section 48 applies the domestic content bonus credit amount to an entire energy project defined as one or more energy properties that are part of a single project. However, section 45Y(g)(11)(A) defines the domestic content bonus credit amount in general with respect to a qualified facility, without reference to section 48. Although section 48E(a)(3)(B) provides that ''[r]ules similar to the rules of section 48(a)(12) shall apply'' for purposes of the domestic content bonus credit amount, section 48(a)(12)(B) dictates that ''[r]ules similar to the rules of section 45(b)(9)(B) shall apply.'' Additionally, even though section 48(a)(12)(A) describes the domestic content bonus credit amount rules ''[i]n the case of any energy project,'' sections 45Y and 48E do not have the energy project concept like section 48 to allow grouping. Under section 45(b)(9)(B), the domestic content bonus credit amount applies with respect to a qualified facility. Accordingly, for purposes of claiming the domestic content bonus credit amount, more than one qualified facility under section 45Y and more than one qualified facility or EST under section 48E may not be treated as a single qualified facility or EST. Each qualified facility under section 45Y and each qualified facility or EST under section 48E must separately qualify for the increased credit rate for meeting domestic content bonus requirements.

VII. Energy Communities

Similar to some commenters' opposition to aggregation with respect to the domestic content bonus credit amounts, some commenters also opposed adopting the concept of an ''energy project'' or aggregation rule similar to those in the section 48 proposed regulations for purposes of the increase in credit for energy communities, under section 45Y or 48E. Commenters contended that there is no legal basis for importing the definition of an energy project or any aggregation rule for the section 48E credit. However, one commenter instead suggested permitting a taxpayer to elect to combine multiple interrelated facilities into one aggregated unit or, alternatively, elect to treat the facilities individually for purposes of the increase in credit in energy communities.

An aggregation rule is incorporated into the section 48 regulations for purposes of claiming the increase in credit rate in energy communities under section 48, because section 48 applies the increase in credit rate to an entire energy project defined as one or more energy properties that are part of a single project. However, section 45Y(g)(7) and section 48E(a)(3)(A)(i) define an energy community by cross-reference to section 45(b)(11)(B), instead of section 48. Section 45 does not have the energy project concept like section 48 to allow grouping. Nor do section 45Y or 48E. Accordingly, for purposes of claiming the increase in credit in energy communities, more than one qualified facility under section 45Y and more than one qualified facility or EST under section 48E will not be treated as a single qualified facility or EST. Each qualified facility under section 45Y and each qualified facility or EST under section 48E must separately qualify for the increased credit rate for a qualified facility or EST located in an energy community.

VIII. Greenhouse Gas Emissions Rates for Qualified Facilities

Section 45Y(b)(2) provides rules for determining GHG emissions rates. Section 48E(b)(3)(B)(ii) provides that rules similar to the rules of section 45Y(b)(2) regarding GHG emissions rates apply for purposes of section 48E.[5] Proposed § 1.45Y–5 provided rules pertaining to GHG emissions rates as well as definitions of terms relevant to determining GHG emissions rates.

A. Definitions Related to Greenhouse Gas Emissions Rates

Proposed § 1.45Y–5(b) provided definitions of terms relevant to determining GHG emissions rates.

1. CO_2e per kWh

Section 45Y(e)(1) defines the term ''CO_2e per kWh'' to mean, with respect to any GHGs, the equivalent carbon dioxide (as determined based on global warming potential (GWP)) per kilowatt hour of electricity produced. Proposed § 1.45Y–5(b)(1) clarified that the determination must be based on the 100-year time horizon global warming potential (GWP–100). Proposed § 1.45Y–5(b)(1) also provided GWP–100 amounts for certain specific GHGs from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5).

Commenters presented a range of views on the proposed definition of ''CO_2e per kWh.'' Some agreed with the proposed definition, including one commenter who noted that the proposed definition aligns with Congressional intent in enacting sections 45Y and 48E.

Some commenters advocated for revisions to the proposed definition of ''CO_2e per kWh.'' One commenter stated that the urgent need for near-term GHG emissions reductions may justify the use of different GWP values. Several commenters suggested that the proposed definition be revised to use a 20-year GWP for methane to appropriately prioritize methane reductions. The commenters asserted that despite its prevalence, relying on GWP–100 is arbitrary and lacks scientific basis. To support this position, one commenter further asserted that the IPCC does not specifically recommend the use of GWP–100, or any other specific metric for the conversion of non-CO_2 GHG emissions into CO_2 equivalents. The commenter also noted recent adoptions of a 20-year GWP by individual States and asserted that other policymakers

[5] Some of the proposed regulations related to recapture and substantiation are relevant only to section 48E and not section 45Y. Those rules are discussed separately later.

recognize the urgency to incorporate the use of the 20-year GWP to accelerate efforts towards reducing methane emissions.

After consideration of the comments the Treasury Department and the IRS decline to modify the proposed definition of the term ''CO2e per kWh.'' GWP–100 is a commonly accepted standard that appropriately captures the GWP of relevant GHGs and it is the internationally accepted standard for reporting GHG emissions. Specifically, the AR5 GWP–100 is required for all nations reporting national GHG emissions inventories to the United Nations Framework Convention on Climate Change (UNFCCC). Additionally, the use of a GWP–100 is consistent with the use of GWP–100 to calculate GHG emissions rates reported to the EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks (GHGI). The GHGI is one of the datasets that proposed § 1.45Y–1(c)(4) requires to confirm when the applicable year threshold has been passed as required by section 45Y(d). The Treasury Department and the IRS view a uniform standard for GWP that is consistent across GHGs as necessary for evaluating the GWP of different GHGs for purposes of the section 45Y and 48E credits. An approach that uses different GWP time horizons for different types of GHGs would not provide a consistent basis for evaluating GHG emissions rates. Therefore, proposed § 1.45Y–5(b)(1) will be adopted without change.

2. Combustion

Section 45Y(b)(2)(B) provides rules for determining a GHG emissions rate for a facility that produces electricity through combustion or gasification. Proposed § 1.45Y–5(b)(2) provided that the term ''combustion'' means a rapid exothermic chemical reaction, specifically the oxidation of a fuel that liberates energy including heat and light. This proposed definition of ''combustion'' would include, for example, burning fossil fuels, but it would not include the reaction that produces electricity from hydrogen inside a hydrogen fuel cell. The Treasury Department and the IRS received no comments on the proposed definition of ''combustion'' and the definition will be adopted as proposed. For discussion of the definition of Facility which Produces Electricity through Combustion or Gasification (C&G Facility) see section VIII.A.4. of this Summary of Comments and Explanation of Revisions.

3. Gasification

Proposed § 1.45Y–5(b)(3) provided that the term ''gasification'' means a thermochemical process that converts carbon-containing materials into syngas, a gaseous mixture that is composed primarily of carbon monoxide, carbon dioxide, and hydrogen. Commenters expressed support for this definition and it will be adopted without change. For discussion of the definition of Facility which Produces Electricity through Combustion or Gasification (C&G Facility) see section VIII.A.4. of this Summary of Comments and Explanation of Revisions.

4. Facility Which Produces Electricity Through Combustion or Gasification (C&G Facility)

Building on the definitions of ''combustion'' and ''gasification'' provided in the proposed regulations, proposed § 1.45Y–5(b)(4) defined the phrase ''facility which produces electricity through combustion or gasification'' (C&G Facility) in section 45Y(b)(2)(B) as a facility that produces electricity through combustion or uses an input energy source to produce electricity, if the input energy source was produced through a fundamental transformation, or multiple transformations, of one energy source into another using combustion or gasification. In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment on this proposed definition of a C&G Facility, including comment on whether the application of this proposed interpretation should be clarified with respect to any type of fundamental transformation of an energy source and any related activities or operations.

Many commenters supported the proposed definition of a C&G Facility. Several commenters noted that the proposed definition is a reasonable interpretation of section 45Y(b)(2)(B) because it reflects the reality that electricity production can drive combustion and gasification reactions elsewhere in the production chain even if those reactions are not occurring directly at the electricity generation facility. Other commenters supported the proposed definition and noted that section 45Y(b)(2)(B) provides the appropriate statutory basis for looking at transformations beyond the generation facility to determine GHG emissions from a C&G Facility. The commenters asserted that this interpretation is supported by two concepts within the statutory language. First, the inclusion of gasification in section 45Y(b)(2)(B) supports the proposed interpretation because ''gasification produces fuel not electricity,'' and, therefore, gasification must be given independent meaning from the term combustion. Second, the commenters asserted that it is appropriate to look at transformations outside the generation facility because the statute's use of the word ''through'' requires looking at the larger electricity production process to determine whether electricity is produced ''through'' combustion or gasification. In this context, the commenters noted that ''through'' means ''because of,'' ''by means of,'' or ''as a result of.'' Therefore, the commenters asserted that the plain meaning of ''through'' is broad enough to indicate that all the reactions leading up to the production of electricity are relevant in determining whether electricity is produced through gasification.

Some commenters questioned or suggested revisions to the proposed definition of the term C&G Facility. Many of these commenters raised questions and concerns regarding the application of the proposed definition of C&G Facility, particularly as applied to fuel cells. Several commenters asserted that the proposed definition of a C&G Facility misinterprets the statute. Commenters asserted that Congress intended the determination of whether a facility should be treated as being described under section 45Y(b)(2)(B) to be based on consideration of only the activities occurring at the facility such as a fuel cell itself, not a far-removed process concerning a third-party fuel or feedstock producer's production process, or inputs used in such process. These commenters further asserted that the proposed definition of C&G Facility is not a credible reading of the statutory reference to a ''facility which produces electricity through combustion or gasification,'' in section 45Y(b)(2)(B) because that language should be interpreted narrowly as requiring consideration of facilities that engage in combustion or gasification within the facility itself, such as within a solid oxide fuel cell. In other words, the commenters suggested that consideration of fuel production processes occurring upstream from the electricity-generating facility is not relevant to determining whether a facility is a ''facility which produces electricity through combustion or gasification,'' as provided in section 45Y(b)(2)(B).

Commenters also asserted that the proposed definition would result in most or all fuel cells being categorized as C&G Facilities. The commenters asserted that this categorization is

erroneous and further asserted that fuel cell GHG emissions are not directly produced by the fundamental transformation of the input energy source into electricity. The commenters stated that fuel cell systems, including non-hydrogen fuel cells, use neither combustion nor gasification to produce electricity but are electrochemical devices. Other commenters asserted that at least a subset of fuel cells should be unequivocally treated as Non-C&G Facilities by drawing a comparison to nuclear facilities. A commenter stated that nuclear facilities (which are categorized as Non-C&G Facilities by proposed § 1.45Y–5(c)(2)) generally use uranium fuel that is enriched, in part, using grid electricity generated through combustion.

Another commenter specifically noted that fuel cells that directly use biogas or renewable natural gas (RNG) do not require combustion or gasification to produce electricity because combustion is not necessary to produce biogas or RNG. As a result, the commenter asserted that fuel cells utilizing biogas or RNG should be categorized as Non-C&G Facilities. After consultation with the DOE, the Treasury Department and the IRS note that in some cases, biogas or RNG can be produced through gasification or combustion. Therefore, categorizing fuel cells that directly use biogas or RNG as Non-C&G Facilities would be improper.

Some commenters disagreed with the proposed definition of C&G Facility because of its application to hydrogen fuel cells. These commenters requested that if the proposed definition is retained, the GHG emissions determination for hydrogen used to operate a fuel cell facility should follow the carbon intensity standards provided in section 45V of the Code. The commenters asserted that this approach would appropriately result in a hydrogen fuel cell that uses ''qualified clean hydrogen'' as defined in section 45V being considered a Non-C&G Facility. Another commenter noted that the proposed definition of combustion and gasification included the entire supply chain for hydrogen fuel cells and recommended an alternative approach to determining whether hydrogen fuel cells produce electricity through combustion. Under this alternative approach, only transformations happening at the fuel production and generation facilities would be considered and a full examination of the supply chain would not be required.

The Treasury Department and the IRS acknowledge that the preamble to the proposed regulations addressed the application of the definition of a C&G Facility to fuel cells by explaining that, under proposed § 1.45Y–5(b)(4), a facility that produces electricity using any fuel that was produced using electricity that had been produced, in whole or in part, from the combustion of fossil fuels would be considered a C&G Facility. Thus, because the energy transformation that produces electricity in a fuel cell would not be considered combustion under the definition in proposed § 1.45Y–5(b)(2), a fuel cell facility would only be considered a C&G Facility if the fuel it used to produce electricity was produced through combustion or gasification under the proposed regulations.

The Treasury Department and the IRS generally agree with the commenters' rationale for retaining the proposed definition of the term C&G Facility but view certain modifications to this definition as appropriate to address some of the concerns raised by other commenters. To appropriately give effect to the term ''gasification'' in section 45Y(b)(2)(B), consideration of transformations beside the transformation directly producing electricity are necessary in determining the appropriate classification of a facility as a C&G Facility. Congress's use of the word ''through'' in section 45Y(b)(2)(B) indicates that the steps leading up to the production of electricity by a C&G Facility are relevant in determining whether electricity is produced through combustion or gasification. However, requiring an evaluation of whether a fuel or feedstock used by an electricity-generating facility involved combustion or gasification at any point of the fuel or feedstock supply chain would be difficult to administer, particularly given the complexity of such supply chains. To enable the section 45Y and 48E credits to be administered, the Treasury Department and the IRS are limiting the analysis of production ''through combustion or gasification'' to the electricity production itself and the production of the input energy source.

The Treasury Department and the IRS continue to view proposed § 1.45Y–5(b)(4) as reflecting the best interpretation of the term ''facility that produces electricity through combustion or gasification'' in section 45Y(b)(2)(B). However, after consideration of the comments and the administrability challenges the proposed definition may pose, the final regulations revise the definition of the term ''facility that produces electricity through combustion or gasification'' to ''a facility that produces electricity through combustion or uses an input energy source to produce electricity, if the input energy source was produced through a fundamental transformation of one energy source into another using combustion or gasification.''

Under the revised definition in these final regulations, a hydrogen fuel cell would still be considered a C&G Facility if it produced electricity using hydrogen that was produced through combustion or gasification, for example through steam methane reforming. A fuel cell facility such as a solid oxide fuel cell, which uses methane as fuel, would also still be considered a C&G Facility, because the methane reforming reaction that produces syngas within the fuel cell prior to the production of electricity would be considered a gasification reaction. In contrast, a hydrogen fuel cell facility using hydrogen produced using electrolysis would not be considered a C&G Facility, because the input energy source was not produced through a transformation of one energy source into another using combustion or gasification. This modified definition of C&G Facility is consistent with section 45Y(b)(2)(B) because it gives appropriate effect to the word ''gasification'' and considers whether the facility produces electricity through combustion or through the use of a fuel produced using combustion or gasification in determining the net GHG emissions rate for the qualified facility in the production of electricity. Considering only the process that produced the input energy source that is used by a facility to generate electricity implements section 45Y(b)(2)(B)'s directive to assess whether electricity was produced ''through combustion or gasification'' while addressing significant administrability concerns posed by the task of tracing complex fuel and feedstock supply chains beyond the production of the input energy source to assess whether they involved combustion or gasification.

5. Non-C&G Facility

Proposed § 1.45Y–5(b)(7) defined a ''Non-C&G Facility'' as a facility that produces electricity and is not described in proposed § 1.45Y–5(b)(4). Generally, commenters supported the proposed definition of a ''Non-C&G Facility.'' Several commenters requested that the final regulations remove the terms ''C&G Facility'' and ''Non-C&G Facility'' in favor of the term ''qualified facility.''

Section 45Y(b)(2)(A) specifically provides rules to determine the GHG emissions rate for a Non-C&G Facility and section 45Y(b)(2)(B) provides similar rules for a C&G Facility. As a result, the Treasury Department and the IRS view the proposed definitions of a ''Non-C&G facility'' and a ''C&G

Facility'' as required to implement the distinct requirements provided in section 45Y(b)(2)(A) and (B). An electricity-generating facility must be a qualified facility to be eligible for the credits provided under section 45Y or 48E but categorizing a facility as a C&G Facility or a Non-C&G Facility is required for purposes of section 45Y(b)(2)(A) and (B). The proposed definition of the term ''Non-C&G Facility'' is therefore adopted as proposed.

6. Greenhouse Gas Emissions Rate

Proposed § 1.45Y–5(b)(5) provided that, consistent with section 45Y(b)(2)(A), the term ''greenhouse gas emissions rate'' means the amount of GHGs emitted into the atmosphere by a facility in the production of electricity, expressed as grams of CO_2e per kWh. Several commenters requested that the definition of ''greenhouse gas emissions rate'' be expanded to take account of emitted co-pollutants such as particulate matter, nitrogen oxides, and sulfur dioxides. Some commenters noted that, because of their effect on local air quality, environmental justice communities are significantly impacted in the near term by the co-pollutants of energy generation in addition to the impact of GHGs. The commenters further noted that increased and prolonged exposure to co-pollutants results in increased local air pollution and the development of a plethora of diseases, from skin conditions to cancer. The commenters asserted that co-pollutant emissions must be integrated into all GHG emissions rate calculations to view emissions holistically and understand and account for both climate impacts and human health impacts. The commenters further asserted that this approach would ensure that electricity production does not contribute to climate change and global GHG emissions and does not increase the levels of local air pollution.

Section 45Y(e)(2) defines the term ''greenhouse gas'' as having the same meaning given such term under section 211(o)(1)(G) of the Clean Air Act (CAA) (42 U.S.C. 7545(o)(1)(G)), as in effect on August 16, 2022. Pollutants or gases that are described in 42 U.S.C. 7545(o)(1)(G) are already treated as GHGs under sections 45Y and 48E. However, pollutants or gases that are not described in 42 U.S.C. 7545(o)(1)(G) may not be treated as GHGs under section 45Y or 48E and any requests to do so cannot be adopted. Therefore, proposed § 1.45Y–5(b)(5) will be adopted without change.

7. Greenhouse Gases Emitted Into the Atmosphere by a Facility in the Production of Electricity

Proposed § 1.45Y–5(b)(6) provided that, for purposes of section 45Y(b)(2)(A), and for both C&G Facilities and Non-C&G Facilities, the term ''greenhouse gases emitted into the atmosphere by a facility in the production of electricity'' means emissions from a facility that directly occur from the process that transforms the input energy source into electricity. Proposed § 1.45Y–5(b)(6)(i) through (vi) provided a list of certain GHG emissions associated with a facility and relevant electricity production process excluded from the definition in proposed § 1.45Y–5(b)(6) (for example, GHG emissions associated with facility siting). For Non-C&G Facilities only, proposed § 1.45Y–5(c)(1)(i) provided additional types of excluded emissions associated with a facility and relevant electricity production process (for example, emissions occurring due to activities and operations occurring off-site such as the production and transportation of fuels used by the facility). For C&G Facilities only, proposed § 1.45Y–5(d)(2) provided additional rules on included and excluded GHG emissions associated with a facility and relevant electricity production processes that apply in order to conduct a GHG emissions lifecycle analysis (LCA) as required by section 45Y(b)(2)(B). The Treasury Department and the IRS received a wide range of comments in response to the definition of ''greenhouse gases emitted into the atmosphere by a facility in the production of electricity'' at proposed § 1.45Y–5(b)(6).

One commenter suggested that the final regulations clarify which emissions (both direct and indirect) must be included (rather than excluded) in determining GHG emissions. The Treasury Department and the IRS note that the proposed definition would include emissions that occur from the processes that transform the input energy source into electricity. This definition provides a standard for determining included emissions that may be applied to multiple types of facilities that may be eligible for the section 45Y and 48E credits. However, the Treasury Department and the IRS have made modifications to the proposed standard for determining included emissions to further clarify the principles outlined in the proposed regulations.

Several commenters requested additions to the list of excluded emissions. A commenter requested an exclusion for emissions from standby and auxiliary power for critical infrastructure that is not used directly for the production of an input used to produce electricity. Proposed § 1.45Y–5(b)(6)(i) and these final regulations provide that emissions from electricity production by back-up or auxiliary generators that are primarily used in maintaining critical systems in case of a power system outage or for supporting restart of a generator after an outage would be excluded. The Treasury Department and the IRS would generally consider standby and auxiliary power systems to fall within this exclusion. This commenter also requested an exclusion for emissions offset by indirect financial or ''book'' accounting methods, including but not limited to, renewable energy certificates and environmental attribute certificates that demonstrate a carbon intensity no greater than 0 kg CO_2e per unit of output. Whether indirect or book-and-claim accounting methods are permitted is addressed in section VIII.E.4.d. of this Summary of Comments and Explanation of Revisions and whether offsets are permitted is addressed in section VIII.C.2.d of this Summary of Comments and Explanation of Revisions.

Another commenter requested that emissions associated with various processes related to the production of electricity from stationary fuel cells be excluded from the scope of assessed emissions. The commenter specifically requested that this exclusion cover upstream emissions occurring due to the production of fuels, including hydrogen, methane, RNG, and other hydrocarbons, for stationary fuel cell systems; and emissions related to the production or refinement of fuel for stationary fuel cell systems, such as steam reformation, whether or not such processes are internal reactions. This commenter also requested an exclusion for emissions associated with the distribution of hydrogen to consumers. The Treasury Department and the IRS decline to adopt these requested revisions to the proposed definition of the term ''greenhouse gases emitted into the atmosphere by a facility in the production of electricity.'' Because the final regulations provide rules that may result in fuel cells being categorized as either a C&G Facility or a Non-C&G Facility depending on its operations and the fuel it uses to produce electricity, which would entail different rules for assessing emissions, it would not be appropriate to provide fuel-cell-specific emissions exclusions applicable to all categories of fuel cells. In addition, some of the exclusions requested by the

commenter would inappropriately deviate from the requirement in section 45Y(b)(2)(B) to take into account lifecycle GHG emissions, as described in 42 U.S.C. 7545(o)(1)(H). The final regulations thus do not adopt the changes recommended by the commenter.

Commenters requested other changes to the list of excluded emissions. Several commenters supported excluding emissions from backup generators, step-up transformers, routine operational and maintenance activities, construction, infrastructure, and distribution associated activities from the definition. Other commenters voiced concerned about the breadth of emissions excluded from the proposed definition for certain activities. A commenter asserted that the definition improperly excluded emissions from the activities listed in proposed § 1.45Y–5(b)(6)(i) through (vi). The commenter noted that each of these activities are critical steps in electricity generation, production, and distribution. As an example, the commenter noted that if operational and maintenance activities are disrupted, an energy producing facility may need to shut down and pause production. Therefore, the commenter asserted that routine maintenance is a vital component to electricity generation. Additionally, several commenters specifically opposed the exclusion of emissions from infrastructure associated with a facility, including, but not limited to, emissions from road construction for feedstock production. A commenter noted that road construction generates substantial emissions from the clearing of vegetation, ground disturbance, and equipment operation. Commenters asserted that GHG emissions from these activities must be factored into the definition of the GHG emissions rate.

Several commenters asserted that the breadth of the exclusions proposed was too narrow. A commenter specifically disagreed with the scope of the exclusion for emissions from electricity production by back-up generators that are primarily used in maintaining critical systems in case of a power system outage or for supporting restart of a generator after an outage. The commenter asserted that the proposed definition includes emissions from back-up generators used to *avoid* system outages while only excluding emissions that occur during or after an outage. The commenter stated that as a result, this exclusion could significantly limit the time period during which a qualified facility could be eligible for the section 45Y and 48E credits.

The Treasury Department and the IRS decline to modify the list of excluded emissions as requested by these commenters. The excluded emissions are appropriate in scope because they address emissions associated with activities that are ancillary to the electricity generating operations of a facility. Excluding emissions from contingency operations, operations that are tangentially related to the regular electricity generating operations of a facility, or activities that are beyond the scope of the production of electricity (for example, emissions from construction of a facility or distribution of the electricity) allows for a more accurate evaluation of the emissions stemming from a facility's production of electricity and related processes. Although the activities covered by these exclusions (such as construction, routine maintenance, or distribution) may in fact enable a facility to generate electricity, these activities are ancillary to the process of generating electricity and the final regulations retain the list of excluded emissions as originally proposed.

B. Determining GHG Emissions Rates for Non-C&G Facilities

1. General Rules

Proposed § 1.45Y–5(c) provided rules for determining a GHG emissions rate for Non-C&G Facilities, including for determinations by the Secretary when publishing the table described in section 45Y(b)(2)(C)(i) or by the Secretary when determining a provisional emissions rate under section 45Y(b)(2)(C)(ii). Proposed § 1.45Y–5(c)(1)(i) provided that, with respect to Non-C&G Facilities only, GHG emissions that are not directly produced by the fundamental transformation of the input energy source into electricity are excluded from the emissions accounting. The proposed regulations excluded emissions that may relate to a Non-C&G Facility but do not occur ''in the production of electricity'' as specified in section 45Y(b)(2)(A) because such emissions do not arise directly from the transformation of the input energy source into electricity. Proposed § 1.45Y–5(c)(2) provided a list of specific types or categories of facilities that are Non-C&G Facilities with a GHG emissions rate that is not greater than zero. The Treasury Department and the IRS received a number of comments on this proposed provision, including several in support of it.

While one commenter requested that these Non-C&G Facilities be listed in the Secretary's Annual Table as having a GHG emissions rate that is not greater than zero, another recommended that the Treasury Department and the IRS confirm that inclusion of these types or categories of facilities in the Annual Table or PER certification described in proposed § 1.45Y–5(f) and (g) are not required for such listed facilities. The Treasury Department and the IRS confirm that taxpayers may rely on the inclusion of these types or categories of facilities in these final regulations as having a GHG emissions rate that is not greater than zero unless and until the regulations are amended.

The Treasury Department and the IRS received a variety of comments regarding the inclusion of specific technologies in proposed § 1.45Y–5(c)(2), which are discussed in sections VIII.B.2. through 6. of this Summary of Comments and Explanation of Revisions by type of technology.

2. Nuclear

Several commenters expressed their support for the inclusion of nuclear fission and nuclear fusion facilities as a type or category of facility that is a Non-C&G Facility with a GHG emissions rate of not greater than zero in proposed § 1.45Y–5(c)(2)(vi) and (vii). One commenter recommended clarification of why the use of electricity, which may be produced through combustion and gasification, to enrich uranium and produce nuclear fuel would not render nuclear energy a C&G Facility. Based on the definition of a facility that produces electricity through combustion or gasification provided in § 1.45Y–5(b)(4), only the fundamental transformations of energy from one energy source into another are considered when determining whether a facility uses combustion or gasification. In the case of nuclear fission and nuclear fusion facilities, the fundamental transformations of energy are the conversion of nuclear binding energy in the nuclear fuel into heat and electricity. Nuclear fuel often contains uranium, which may require enrichment. However, the energy used to enrich the uranium only increases the concentration of the isotope needed for nuclear fuel. It does not transform the energy in the isotope, and accordingly, it does not transform one energy source into another. Therefore, enrichment is not considered when determining whether a facility is a C&G Facility. Because there is no other process in the production of enriched uranium or nuclear energy that would involve combustion or gasification, the final regulations retain nuclear fission as a type or category of facility that is a Non-C&G Facility.

Some commenters who supported this inclusion asked that the final regulations amend the reference to ''nuclear fusion'' in proposed § 1.45Y–5(c)(2)(vii) to reduce confusion with nuclear fission. These commenters noted that Congress recently enacted the ADVANCE Act of 2024, Public Law 118–67, which included a definition of ''fusion energy machine'' within the Atomic Energy Act and asked that the final regulations amend proposed § 1.45Y–5(c)(2)(vii) to align with that terminology. The Treasury Department and the IRS agree that the term ''nuclear fusion'' in proposed § 1.45Y–5(c)(2)(vii) should be amended and adopt one commenter's suggestion that the new term be ''fusion energy.'' The final regulations under § 1.45Y–5(c)(2)(vii) reflect this change.

3. Hydropower

Proposed § 1.45Y–5(c)(1)(i)(A) and (B) provided that in the case of Non-C&G Facilities, emissions from hydropower reservoirs due to anoxic conditions and ebullitive, diffuse, and degassing emissions from hydropower operations are not GHGs emitted into the atmosphere by a facility in the production of electricity. Proposed § 1.45Y–5(c)(1)(i) explained that these emissions are not directly produced by the fundamental transformation of the input energy source into electricity.

Some commenters stated that the Treasury Department and the IRS erred in excluding the emissions related to hydropower as described in proposed § 1.45Y–5(c)(1)(i)(A) and (B). These commenters stated that, because the language in section 45Y(b)(2)(A) provides that a GHG emissions rate means the amount of GHGs emitted into the atmosphere by a facility in the production of electricity, the exclusion of such emissions because they are not ''directly produced by the fundamental transformation of the input energy source into electricity'' by the facility is flawed. Several commenters noted that hydropower facilities do in fact result in GHG emissions that are directly produced by the fundamental transformation of the input energy source into electricity within the meaning of proposed § 1.45Y–5(c)(1)(i). The commenters noted that a reservoir, which is an integral component of a hydropower facility, is one of the primary sources of emissions because they emit GHGs due to the decomposition of organic matter through diffusion and ebullition. Accordingly, the commenters asserted that such emissions should not be excluded for hydropower facilities.

Another commenter stated that degassing emissions that result from water passing through a turbine in a hydropower facility are part of the ''fundamental transformation of [the input energy source into] electricity,'' because the kinetic energy of flowing water passing through turbines is harnessed to produce electricity. The GHGs that may be released during degassing exist before flowing water passes through turbines that are harnessed to create electricity. Such methane is therefore not directly produced or created by flowing water passing through turbines. In addition, the GHGs associated with degassing may have been emitted passively into the atmosphere even in the absence of hydropower electricity generation. For these reasons, the Treasury Department and the IRS affirm that GHGs released during degassing are properly excluded because they are not directly produced by the fundamental transformation of the input energy source into electricity.

The Treasury Department and the IRS have determined that the proposed treatment of emissions accounting for hydropower is appropriate and the best implementation of section 45Y(b)(2)(A). A hydropower facility converts the kinetic energy of flowing water into electricity with a turbine that spins a rotor within a generator to produce electricity. GHGs may be released from the hydropower reservoir due to diffusion at the water surface or due to ebullition, and from degassing from water passing through a pump house or turbine. The GHGs that may be released during degassing exist before flowing water passes through turbines that are harnessed to create electricity. Such GHGs are therefore not directly produced or created by flowing water passing through turbines. In addition, the GHGs associated with degassing may be emitted passively into the atmosphere even in the absence of hydropower electricity generation. It is not appropriate to treat such emissions as GHGs emitted into the atmosphere by a hydropower facility in the production of electricity because these emissions are not created by the fundamental transformation of potential energy in flowing water into electricity.

Some commenters stated that because dams and reservoirs are required components of hydropower facilities in order for such facilities to generate energy, GHG emissions associated with these components should not be excluded from emissions accounting. The Treasury Department and the IRS have determined that GHG emissions associated with dams and reservoirs are properly excluded emissions. Emissions associated with the construction and maintenance of such dams and reservoirs are properly excluded under proposed § 1.45Y–5(b)(6)(iv), which states, in relevant part, that emissions that occur before commercial operations commence are properly excluded. Furthermore, emissions associated with the continued existence of such dams or reservoirs are properly excluded because they are not directly produced by the fundamental transformation of the input energy source into electricity within the meaning of proposed § 1.45Y–5(c)(1)(i).

Commenters also had varied reactions to the inclusion of hydropower as a type or category of Non-C&G Facility with a GHG emissions rate of not greater than zero in proposed § 1.45Y–5(c)(2)(ii). Many commenters supported the proposed designation of and rationale for treating hydropower as a type or category of Non-C&G Facility with a GHG emissions rate of not greater than zero. For the reasons summarized earlier in this section, the Treasury Department and the IRS agree with these commenters that the fundamental energy transformation of kinetic energy into electricity does not result in GHGs emitted in the production of electricity.

Some commenters, however, questioned this proposed treatment of hydropower by questioning the excluded emissions rules in proposed § 1.45Y–5(c)(1)(i)(A) and (B), citing aspects of hydropower operations that they asserted give rise to emissions from a hydropower facility's production of electricity. For the reasons summarized earlier in this part of the Summary of Comments and Explanation of Revisions, the Treasury Department and the IRS disagree with these commenters. One commenter opposed to this proposed treatment of hydropower stated that hydropower causes adverse ecological impacts and recommended that facilities be eligible for the credit based not only on whether they have a GHG emissions rate that is not greater than zero but also on whether they have an ''environmentally low impact'' more generally.

Section 45Y(b)(1) defines a qualified facility, in relevant part, as a facility used for the generation of electricity, placed in service after December 31, 2024, and for which the GHG emissions rate is not greater than zero. The statute does not provide the Treasury Department and the IRS the authority to consider environmental impacts beyond GHG emissions rates in determining eligibility for the section 45Y and 48E credits. Therefore, the final regulations do not adopt the commenter's suggestion.

4. Waste Energy Recovery Property (WERP)

Proposed § 1.45Y–5(c)(2)(viii) provided that waste energy recovery property (WERP) that derives energy from a source described in proposed § 1.45Y–5(c)(2)(i) through (vii) is a Non-C&G Facility with a GHG emissions rate that is not greater than zero. The preamble to the proposed regulations explained that WERP is property that generates electricity solely from heat from buildings or equipment if the primary purpose of such building or equipment is not the generation of electricity. In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment on this proposed definition and on whether and why it would be appropriate to revise proposed § 1.45Y–5(c)(2)(viii) to include additional energy sources (such as energy from exothermic chemical reactions or pressure drop technologies) that do not rely on combustion or gasification but could include equipment related to the transport of fossil fuels (for example, natural gas).

Some commenters supported the proposed definition of WERP. One commenter stated that this long-standing definition is appropriate for the purpose of the section 45Y and 48E credits and would provide taxpayers with strong incentives to install WERP to produce electricity using heat that would otherwise be wasted. The commenter further noted that this definition would also prevent facilities whose primary purpose is to generate electricity from ''double dipping'' by taking a tax credit on the original electricity generated and again on electricity generated from WERP.

Some commenters requested that facilities using exothermic reactions or pressure drop technologies be included in the definition of WERP for purposes of the section 45Y and 48E credits. Additionally, these commenters asserted that these types of technologies do not rely on combustion or gasification and thus could and should be classified as Non-C&G Facilities. A commenter further recommended that GHG emissions that occur with respect to exothermic reactions or pressure drop technologies (for example, turboexpanders on a pipeline) that do not rely on combustion or gasification should be treated as Non-C&G Facilities and any significant direct or indirect emissions should be accounted for. Other commenters suggested that the final regulations revise proposed § 1.45Y–5(c)(2)(viii) to include additional energy sources (such as energy from exothermic chemical reactions or pressure drop technologies) that do not rely on combustion or gasification but could include equipment related to the transport of fossil fuels (for example, natural gas).

The Treasury Department and the IRS have determined that the final regulations should not be revised to explicitly include these additional types of facilities as WERP, which is included as a Non-C&G Facility at § 1.45Y–5(c)(2)(viii). Because some facilities that employ exothermic reactions release energy into the environment in the form of heat via combustion, it would not be appropriate to classify all WERP facilities using exothermic reactions as Non-C&G Facilities.

Pressure drop technologies are also not appropriately considered WERP for purposes of the section 45Y and 48E credits because they convert pressure, rather than heat, directly to electricity. As a result, this type of technology does not fall within the definition of WERP provided in the preamble to the proposed regulations. At this time, this type of technology is also not included within the list of certain Non-C&G Facilities with a GHG emissions rate that is not greater than zero provided at § 1.45Y–5(c)(2). The preamble to the proposed regulations defined WERP as property that generates electricity solely from heat from buildings or equipment if the primary purpose of such building or equipment is not the generation of electricity. This definition of WERP is appropriate for the purposes of the section 45Y and 48E credits because it mirrors the statutory definition provided in section 48(c)(5)(A). As a result, these final regulations add the definition of WERP, as provided in the preamble to the proposed regulations, to § 1.45Y–1(a)(12) and to § 1.48E–1(a)(12).

The Treasury Department and the IRS also received a number of comments recommending that the final regulations provide that all WERP be included in the list of Non-C&G Facilities with a GHG emissions rate that is not greater than zero at § 1.45Y–5(c)(2). The Treasury Department and the IRS have determined that because many of the energy sources for WERP rely on combustion or gasification, it would not be appropriate to classify all WERP facilities as Non-C&G Facilities because some WERP facilities produce electricity using an input energy source that was produced through a fundamental transformation of one energy source into another using combustion or gasification. WERP facilities that produce electricity through combustion or gasification would be considered C&G Facilities and can be evaluated for inclusion in the Annual Table or for a PER as described later in section VIII.H. of this Summary of Comments and Explanation of Revisions.

One commenter recommended that the definition of WERP be amended to allow for the use of waste heat to create thermal energy. However, section 45Y(b)(1)(A)(i) requires a facility to be ''used for the generation of electricity'' to be considered a qualified facility that is eligible for the section 45Y and 48E credits and section 45Y(a)(1)(A) provides that the credit is granted on the basis of the electricity produced by a qualified facility. The facilities described by the commenter do not produce electricity, so they would not qualify on that basis. The Treasury Department and the IRS do not have authority under the statute to expand the scope of eligible facilities as requested by the commenter. The final regulations thus adopt the provisions of proposed § 1.45Y–5(c)(2)(viii) and the proposed definition of WERP without modification. To aid taxpayers in determining whether a specific facility meets that definition, the final regulations include examples in § 1.45Y–1(a)(12) that illustrate buildings or equipment the primary purpose of which is not the generation of electricity. These examples remain largely the same as those provided in the preamble of the proposed regulations, but, for clarity, pipeline compressor stations have not been included in the examples in the final regulations. While pipeline compressor stations are buildings or equipment the primary purpose of which is not the generation of electricity, they do not generate electricity solely from heat and thus are not appropriately considered WERP.

5. Geothermal

Proposed § 1.45Y–5(c)(2)(v) provided that facilities using geothermal energy, including flash and binary plants, were Non–C&G Facilities with a GHG emissions rate that is not greater than zero. The Treasury Department and the IRS requested comment on whether the identification of flash geothermal facilities as Non–C&G Facilities with a GHG emissions rate that is not greater than zero in proposed § 1.45Y–5(c)(2)(v) was appropriate.

Several commenters supported the inclusion of geothermal facilities in proposed § 1.45Y–5(c)(2)(v), with some noting that inclusion of these facilities on this list is appropriate because the carbon dioxide emitted by the geothermal facility is emitted naturally and passively from geothermal

reservoirs. Commenters noted that some emissions often occur even without a geothermal facility in place.

One commenter stated that the Treasury Department and the IRS should consider measuring the incremental emissions associated with the production of electricity at flash geothermal facilities as compared to the emissions occurring without such production. The Treasury Department and the IRS have determined that such measurement will not be required in the final regulations. As described in the preamble to the proposed regulations, such emissions from flash geothermal facilities would not be considered GHGs emitted into the atmosphere by a facility in the production of electricity under proposed § 1.45Y–5(c)(1)(i)(C), because the GHGs are already present in the underground water and are not created by the fundamental transformation of the thermal energy in the water into electricity, but rather by processes that are not fundamental to the transformation of the thermal energy into electricity. This proposed treatment of flash geothermal facilities is also supported by surveys indicating that underground carbon dioxide in certain geothermal reservoirs is emitted passively into the atmosphere even in the absence of geothermal electricity generation. Furthermore, such measurement may not be possible given the challenges associated with quantifying emissions from geothermal sites with and without electricity production facilities. Therefore, proposed § 1.45Y–5(c)(2)(v) is adopted without change.

6. Solar Technologies

Concentrated solar power facilities may have auxiliary burners that in some cases use combustion exclusively for the purposes of cold starts or freeze protection of thermal working fluids, but in other cases, may also be used to generate electricity in hybrid configurations. The Treasury Department and the IRS requested comment on whether the existing definitions of C&G Facility and Non-C&G Facility are sufficient to distinguish between these two categories of facilities, or whether additional clarification is needed.

One commenter requested that the Treasury Department and the IRS clarify that the use of auxiliary burners at a concentrated solar power (CSP) facility does not necessarily mean that a facility will be considered a C&G Facility. This commenter stated that CSP facilities may have auxiliary burners that in some cases use combustion exclusively for the purposes of cold starts or freeze protection of thermal working fluids, but in other cases, may also be used to generate electricity in hybrid configurations. As previously indicated in the preamble to the proposed regulations and reiterated here, in the former instance, such use of auxiliary burners would not mean that a facility is properly categorized as a C&G Facility. However, in the latter instance, a facility would be producing electricity through combustion within the meaning of proposed § 1.45Y–5(b)(4) and thus would be a C&G Facility.

C. GHG Emissions Rates for C&G Facilities

1. Determining a Greenhouse Gas Emissions Rate for C&G Facilities

Consistent with section 45Y(b)(1)(A)(iii), proposed § 1.45Y–2(a)(3) provided that, for purposes of the section 45Y credit, a qualified facility must have a GHG emissions rate of not greater than zero. Proposed § 1.45Y–5(d) provided the rules applicable to the Secretary for determining a net GHG emissions rate for C&G Facilities, including for publishing a table described in section 45Y(b)(2)(C)(i) or determining an emissions rate as provided in section 45Y(b)(2)(C)(ii). Proposed § 1.45Y–5(d)(1) provided, consistent with section 45Y(b)(2)(B), that the GHG emissions rate for a facility that produces electricity through combustion or gasification (C&G Facility) equals the net rate of GHGs emitted into the atmosphere by such facility (taking into account lifecycle GHG emissions, as described in 42 U.S.C. 7545(o)(1)(H)) in the production of electricity, expressed as grams of CO_2e per kWh.

The Treasury Department and the IRS received comments supporting these proposed regulations and some comments recommending alternative approaches for evaluating the GHG emissions rate of a C&G Facility. One commenter recommended that the final regulations apply a standard of ''commercially acceptable practices'' or ''commercially reasonable practices'' as of the date of passage of the section 45Y and 48E credits for inputs and considerations in determining the LCA of GHG emissions from a C&G Facility. Other commenters recommended that the final regulations not take into account lifecycle GHG emissions in the production of electricity for a C&G Facility. Some commenters suggested that the final regulations permit the GHG emissions rate of a facility to be greater than zero. The changes requested by these commenters cannot be adopted because they are not permitted by the statutory mandate to take into account lifecycle GHG emissions for C&G Facilities as required by section 45Y(b)(2)(B).

A number of commenters also requested that certain types of C&G Facilities be categorically deemed to have a net GHG emissions rate of not greater than zero in the final regulations. Other commenters requested that certain types of C&G Facilities be categorically deemed to have a net GHG emissions rate of greater than zero in the final regulations. The Treasury Department and the IRS decline to adopt this request at this time. Additional analysis is required to achieve sufficient certainty that a type or category of facility has a net GHG emissions rate that is greater than or not greater than zero as determined by an LCA conducted in accordance with the principles required under section 45Y(b)(2)(B) and these final regulations.

The Treasury Department and the IRS note that many C&G Facilities using particular technologies and fuel sources are highly likely to have GHG emissions rates that are greater than zero, whereas other C&G Facilities with similar but varied technologies or fuels may have GHG emissions rates that are not greater than zero. For example, review of existing scientific and technical literature indicates that C&G Facilities that combust natural gas—such as natural gas-fired boilers and combustion turbines—are expected to have GHG emissions rates greater than zero, even with the use of carbon capture and sequestration (CCS) technology, because the LCA must consider emissions in the fuel lifecycle prior to CCS through the point of electricity production and the rate of capture and sequestration of carbon dioxide produced when combusting the gas is not technically capable of reaching 100 percent.[6] However, subject to further analysis and dependent on specific facts and circumstances, there may be cases in which a C&G Facility that uses a blend of natural gas and other feedstocks that have negative lifecycle emissions and use CCS could potentially achieve lifecycle GHG emissions not greater than zero.

A number of commenters submitted analyses or referred to studies supporting their request that certain

[6] *See, e.g.,* National Renewable Energy Laboratory (2021), Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update, NREL/FS–6A50–80580, *https://www.nrel.gov/docs/fy21osti/80580.pdf;* O'Donoughue, P.R., Heath, G.A., Dolan, S.L. and Vorum, M. (2014), Life Cycle Greenhouse Gas Emissions of Electricity Generated from Conventionally Produced Natural Gas. Journal of Industrial Ecology, 18: 125–144. *https://doi.org/10.1111/jiec.12084.*

types of C&G Facilities that burn biomass be categorically deemed to have a net GHG emissions rate of not greater than zero in the final regulations. Some of these comments state that biomass, industrial wastes, or manufacturing residuals used for generating electricity have negative lifecycle GHG emissions. The studies submitted in support of this recommendation rely on studies that (i) use assumptions that are not adopted in this final rule, (ii) use assumptions that are potentially specific to a particular facility and thus are not appropriate for use in evaluating the emissions rate for a type or category of facility as listed in the Annual Table without further study, or (iii) do not consistently apply the requirements for an LCA that are required by these final regulations pursuant to the statute. For example, some of these studies consider grid electricity displacement or fossil fuel displacement, neither of which can be considered in an LCA for electricity generation from C&G Facilities as it is outside of the LCA boundary. Moreover, some studies do not take into account the direct emissions and significant indirect emissions outlined in § 1.45Y–5(d)(2)(v)(A) and (B) or other requirements finalized in this rule. The Treasury Department and the IRS will continue to consider all analysis submitted by commenters in evaluating the emissions of the relevant types or categories of facilities. However, studies that rely on assumptions or LCA principles that are inconsistent with the requirements of this final rule or those within the underlying statute will be given less weight. Several commenters note that any LCA must include rigorous modeling, carefully consider assumptions, follow recognized protocols, as well as apply consistent principles. The Treasury Department and the IRS agree that the principles identified in these comments reflect appropriate LCA practices.

Furthermore, as stated in the preamble to the proposed regulations, the Treasury Department and the IRS intend to include in the Annual Table the types or categories of facilities that are described in the final regulations as having a GHG emissions rate of not greater than zero and intend to publish the first Annual Table after the publication of the final regulations. In addition, the Treasury Department and the IRS intend to include in the Annual Table the types or categories of facilities that are described in the final regulations as having a GHG emissions rate of greater than zero. Any types or categories of facilities that are added or removed from this list in the first publication of the Annual Table will be accompanied by the publication of an expert analysis of such change as provided in proposed § 1.45Y–5(f)(2). If any type or category of C&G Facility is added to this list in the publication of the Annual Table, the accompanying expert analysis of the addition will explain the basis for the lifecycle GHG emissions analysis that has been conducted to determine that a given type or category of facility has a net GHG emissions rate of not greater than zero or greater than zero.

One commenter noted that the proposed regulations assumed a binary distinction between C&G Facilities and Non-C&G Facilities and requested that the final regulations clarify how the rules for categorizing facilities would apply in the case of fuel-switching facilities such as linear generators. The Treasury Department and the IRS have determined that the classification of a facility, such as a linear generator, that may or may not produce electricity through combustion or gasification depends upon the fuel's method of production and whether the facility does in fact produce electricity through combustion or gasification, and this assessment must be made separately for each taxable year. A facility that uses a fuel produced via combustion or gasification in the production of electricity any time during a given taxable year is properly classified as a C&G Facility for the duration of that taxable year. For example, if a linear generator exclusively uses hydrogen produced with electrolysis or other fuels not produced via combustion or gasification during a taxable year, then that linear generator would be a Non-C&G Facility for that taxable year. However, if in the production of electricity, a facility uses a fuel produced using combustion or gasification (for example, steam methane reforming) during a taxable year, even if only to produce a portion of the electricity generated that year, that facility is a C&G Facility for that year. Such facility's status can change from year to year depending on the fuel it uses during a taxable year. The Treasury Department and the IRS view this scenario as analogous to the treatment of WERP facilities and fuel cells.

A few commenters recommended that the net rate of GHGs emitted into the atmosphere by a C&G Facility should not take into account lifecycle GHG emissions because there is no similar requirement when calculating the GHG emissions rate of Non-C&G Facilities. Section 45Y(b)(2)(B) states that, ''[i]n the case of a facility which produces electricity through combustion or gasification, the [GHG] emissions rate for such facility shall be equal to the net rate of [GHGs] emitted into the atmosphere by such facility (taking into account lifecycle GHG emissions, as described in . . . 42 U.S.C. 7545(o)(1)(H))) in the production of electricity, expressed as grams of CO_2e per kWh.'' Because the requirement that lifecycle GHG emissions be taken into account for C&G Facilities is statutory and does not apply to Non-C&G Facilities, the final regulations cannot implement this recommendation.

One commenter recommended that C&G Facilities be subject to an attributional LCA rather than a consequential LCA. This commenter stated that consequential models are highly dependent on the assumptions used, are more complex, and have more uncertainty.

The Treasury Department and the IRS have determined that a consequential analysis is required to accurately assess GHG emissions outcomes under section 45Y(b)(2)(B), which requires taking into account lifecycle GHG emissions, as described in 42 U.S.C. 7545(o)(1)(H). As explained in the preamble to the proposed regulations, in a 2010 notice-and-comment rulemaking establishing the regulatory framework for the updated renewable fuel standard (RFS) program, the EPA interpreted 42 U.S.C. 7545(o)(1)(H) as requiring the agency to account for the real-world emissions consequences of increased production of biofuels. The EPA determined that, in the context of the RFS program, the inclusion of ''direct emissions and significant indirect emissions such as significant emissions from land-use changes'' in 42 U.S.C. 7545(o)(1)(H) requires a ''consequential'' approach to considering the real-world emissions associated with biofuel production. Such an approach includes consideration of market interactions induced by expanded biofuel production and use that may result in secondary or indirect greenhouse gas emissions. The Treasury Department and the IRS have determined it is appropriate to adopt this interpretation and overall approach in the context of the section 45Y and 48E credits. The Treasury Department and the IRS further note that attributional analytical approaches may be part of the broader consequential analysis in appropriate cases.

2. LCA Requirements

Proposed § 1.45Y–5(d)(2) provided certain requirements for conducting an LCA of GHG emissions for purposes of the section 45Y and 48E credits. These

requirements and responsive comments are discussed in section VIII.C. of this Summary of Comments and Explanation of Revisions. *See also* section VIII.F. (Carbon Capture and Sequestration) and section VIII.E.4. (Use of Natural Gas Alternatives) of this Summary of Comments and Explanation of Revisions for a discussion of responsive comments addressing the requirements of proposed § 1.45Y–5(d)(2) in relation to those topics.

a. Starting Boundary

Proposed § 1.45Y–5(d)(2)(i) provided, for the purposes of the section 45Y and 48E credits, a definition of the starting boundary for an LCA involving generation-derived feedstocks (such as biogenic feedstocks) and for an LCA involving extraction-derived feedstocks (such as fossil fuel feedstocks).

One commenter expressed support for the starting boundaries provided in the proposed regulations. Another commenter opposed the proposed starting boundary, asserting that the boundaries for a C&G Facility should be the same as those for a Non-C&G Facility. Because the statute requires distinct treatment of a C&G Facility and a Non-C&G Facility in assessing their GHG emissions rate, the final regulations do not adopt this commenter's request.

One commenter asserted that section 45Y is ''limited by statute to the boundaries of the electricity generation facility (which may include carbon capture equipment) but excludes upstream and downstream emissions.'' The Treasury Department and the IRS have determined that the change requested by this commenter would be contrary to the statute because it would fail to give effect to the requirement in section 45Y(b)(2)(B) that the net rate of GHG emissions for a C&G Facility take into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H). Therefore, the final regulations do not adopt this commenter's recommendation.

Another commenter requested that the final regulations clarify the activities that constitute the starting boundary. The commenter requested that the final regulations provide a specific example illustrating that the starting boundary for biomass feedstock includes the activities to grow the plant material. The Treasury Department and the IRS have determined that such activities are sufficiently included within the definition of starting boundary, and no further examples are required within the final regulations.

After consideration of all comments, the Treasury Department and the IRS have determined that the final definition of starting boundary should be adopted without substantive change.

b. Ending Boundary

Proposed § 1.45Y–5(d)(2)(ii) provided, for the purposes of the section 45Y and 48E credits, that the ending boundary of the LCA for electricity that is transmitted to the grid or electricity that is used on-site is the meter at the point of electricity production at a C&G Facility. The use of such electricity generated by the C&G Facility (and what other types of energy sources it displaces), including emissions from transmission and distribution, are outside of the LCA boundary. For the reasons provided in the preamble to the proposed regulations, the distribution, transmission, and use of such electricity generated by a C&G Facility (and other types of energy sources it may displace while in use) are outside of the LCA boundary, such emissions would not be taken into account because they do not occur in the ''production of electricity'' as described in section 45Y(b)(2)(B) but rather occur in the distribution and use of such electricity. The preamble to the proposed regulations further explained that this result is consistent with section 45Y(b)(2)(B) (and the term ''ultimate consumer'' in 42 U.S.C. 7545(o)(1)(H) as referenced therein) because it would treat the C&G Facility as the ultimate consumer of the fuel used to produce electricity.

Several commenters supported the ending boundary of the LCA provided in the proposed regulations. Other commenters requested that the ending boundary of the LCA be extended to take into the account circumstances in which the emissions from a C&G Facility or the emissions related to the production of electricity available on the grid are less than they would have been in the absence of the credits because of a facility's use of a different fuel or feedstock.

The Treasury Department and the IRS have determined that extending the ending boundary of the LCA as requested by these commenters would impermissibly shift the GHG emissions rate inquiry from whether electricity production at a C&G Facility has a net GHG emissions rate of not greater than zero to whether such facility has fewer emissions than either (i) the emissions the C&G Facility would have or did have in the absence of the credit or (ii) the marginal unit emissions of the grid to which the facility is connected. Conducting the LCA in such a manner would conflict with the plain text of the statute, which requires that the net rate of GHGs emitted by a C&G Facility, considering lifecycle GHG emissions, in the production of electricity not be greater than zero.

Furthermore, the Treasury Department and the IRS have determined that the meter at the point of electricity production at a C&G Facility is an appropriate ending boundary because eligibility for the section 45Y and 48E credits depends on the net rate of GHG emissions associated with electricity production rather than use. Extending the boundary beyond the meter would consider activities that are beyond the scope of electricity generation which is beyond the scope of these provisions. For these reasons and the reasons further explained in section VIII.C.2.f. of these Summary of Comments and Explanation of Revisions, the final regulations do not adopt this request, and the definition of ending boundary is adopted as proposed. *See* section VIII.C.2.f. of these Summary of Comments and Explanation of Revisions for further discussion of the interaction between the LCA ending boundary, avoided emissions, and use of a particular fuel or feedstock in the generation of electricity in lieu of a fuel or feedstock with a greater rate of GHG emissions.

The Treasury Department and the IRS further note that the ending boundary of an LCA, as discussed earlier, is not intended to limit the rules applicable to carbon capture and sequestration. *See* section VIII.F. of these Summary of Comments and Explanation of Revisions for further discussion of these carbon capture and sequestration rules.

c. Baseline

Proposed § 1.45Y–5(d)(2)(iii) provided that an LCA must be based on a future anticipated baseline, which projects future status quo in the absence of the availability of the section 45Y and 48E credits (taking into account anticipated changes in technology, policies, practices, and environmental and other socioeconomic conditions).

The Treasury Department and the IRS received comments on several aspects of the proposed rule regarding an LCA baseline. A number of commenters recommended that an LCA baseline take into account the relevant laws and regulations already in place, including any mitigation of emissions already legally required. The Treasury Department and the IRS have determined that this recommendation is already incorporated in the proposed rule on LCA baselines, which project the future status quo, including relevant laws and regulations, in the absence of the availability of the section 45Y and 48E credits. As such, a baseline would

necessarily incorporate mitigation of emissions already required, and the effects of other law and regulations. Accordingly, further clarification in the final rule is unnecessary.

Some commenters supported the proposed rule, while providing recommendations on how to approach the creation of an LCA future anticipated baseline. For instance, one commenter recommended considering historical data and anticipated future conditions under a business-as-usual trajectory, incorporating key drivers and trends to project future emissions; a second commenter recommended a dynamic, adaptive baseline that would account for broader system effects such as market dynamics; and a third commenter recommended that the baseline focus on the geographic location of the facility to accurately reflect local conditions and market dynamics. The Treasury Department and the IRS appreciate this feedback and will consider these recommendations at a later time as development of LCA baselines continues.

The Treasury Department and the IRS also received comments specifically addressing the approach to LCA baselines for biomass feedstocks. One commenter encouraged the use of historical forest data to inform the creation of a baseline, taking into account longer growth cycles of forests, drivers of regional forest management, and economic factors. Another commenter recommended that each source of woody biomass have its own LCA baseline. Finally, one commenter recommended that the LCA baseline take into account the current use of pertinent feedstocks and existing facilities.

The Treasury Department and the IRS appreciate these recommendations and have taken them into consideration. However, given the diversity of fuels and feedstocks that may be evaluated in creating LCA baselines for the purposes of the section 45Y and 48E credits, the final regulations provide general requirements for baseline development but do not specify requirements for specific fuels or feedstocks. Therefore, the commenters' specific recommendations will not be included in the final regulations, but they will be considered in developing LCAs for purposes of the section 45Y and 48E credits in the future. Specific recommendations related to LCA baselines will be considered and addressed as their development continues.

Several commenters recommended that the final regulations provide an LCA scenario design that compares a future anticipated baseline with biomass use to one without biomass use. The Treasury Department and the IRS have determined that this is not the most appropriate scenario design with which to assess GHG emissions pursuant to 45Y(b)(2)(B). Such a scenario would model a situation in which the entirety of the feedstock required for additional electricity production comes from additional removals of biomass materials. The commenters' suggestion would mean testing impacts from only one potential outcome at one end of a range of potential real-world responses. This contrasts with the scenario design approach that considers more than one likely scenario, which more accurately assesses the various ways that feedstock is sourced based on the supply options and markets in a model. This design approach is more accurate because, in reality, biomass feedstocks for a facility could be sourced from a variety of sources, including being diverted from other end uses. An LCA should reflect best estimates of how and from where biomass may be sourced taking into account historical and future anticipated feedstock, region, and market specific conditions. The Treasury Department and the IRS therefore decline to include these commenters' recommendation in the final regulations.

The Treasury Department and the IRS, in consideration of the comments received, have determined that certain additional principles pertaining to LCA baselines will be provided in the final regulations. LCA future anticipated baselines, which project future status quo in the absence of the availability of the section 45Y and 48E credits (taking into account anticipated changes in technology, policies, practices, and environmental and other socioeconomic conditions), will be updated as necessary to capture material regulatory, economic, supply chain, or environmental changes. The baseline must be updated at least every ten years, but not more often than every five years. Such updates will ensure that any LCA baseline applied for purposes of determining the net rate of GHG emissions associated with C&G Facilities under this rule robustly reflects the projected future status quo in the absence of the section 45Y and 48E credits.

d. Offsets and Offsetting Activities

Proposed § 1.45Y–5(d)(2)(iv) provided that offsets and offsetting activities that are unrelated to the production of electricity by the C&G Facility, including the production and distribution of any input fuel, may not be taken into account in the LCA.

Several commenters supported this proposed rule. However, one commenter requested that the final rules clarify that offsets and offsetting activities are not the same as accounting for avoided emissions, as avoided emissions are directly related to the electricity production value chain. The Treasury Department and the IRS have determined that such clarification is not necessary given the prohibition on offsets and offsetting activities provided in proposed § 1.45Y–5(d)(2)(iv) and the rule provided in proposed § 1.45Y–5(d)(2)(vii) that the LCA may consider alternative fates of feedstocks and fuels and account for avoided emissions. Both the prohibition on offsets and offsetting activities and the rule that the LCA may consider alternative fates and account for avoided emissions are retained in this final rule.

Furthermore, after reviewing the comments, the Treasury Department and the IRS have determined that the proposed regulations were not clear in the description of offsets and offsetting activities. In particular, the reference to offsets and offsetting activities that are unrelated to the production of electricity by the C&G Facility could have been read overly broadly to suggest that offsets and offsetting activities that are related to the production of electricity would be allowed. The reference was intended to make clear that offsets and offsetting activities should not be included because they are not related to the production of electricity or the lifecycle of the fuel used in electricity production rather than to specify a set of offsets and offsetting activities that may be permissible. The statute requires a C&G Facility's net GHG emissions rate to include the facility's lifecycle emissions from the production of electricity. To avoid taxpayer confusion, the Treasury Department and the IRS have revised the rule in proposed § 1.45Y–5(d)(2)(iv) to remove the phrase ''that are unrelated to the production of electricity by the C&G Facility, including the production and distribution of any input fuel.''

e. Principles for Included Emissions

Proposed § 1.45Y–5(d)(2)(v) provided that the LCA must take into account direct emissions, significant indirect emissions in the United States or other countries, emissions associated with market-mediated changes in related commodity markets, emissions associated with feedstock generation or extraction, emissions consequences of increased production of feedstocks, emissions at all stages of fuel and

feedstock production and distribution, and emissions associated with distribution, delivery, and use of feedstocks to and by a C&G Facility. The preamble to the proposed regulations explained that this provision interprets the reference to 42 U.S.C. 7545(o)(1)(H) as requiring under section 45Y(b)(2)(B) that an LCA must take into account these emissions as they are a part of the full fuel lifecycle through the point of electricity production. Proposed § 1.45Y–5(d)(2)(v)(A) provided that, for purposes of proposed § 1.45Y–5(d)(2)(v), direct emissions include, but are not limited to: (1) Emissions from feedstock generation, production, and extraction (including emissions from feedstock and fuel harvesting and extraction and direct land use change and management, including emissions from fertilizers, and changes in carbon stocks); (2) Emissions from feedstock and fuel transport (including emissions from transporting the raw or processed feedstock to the fuel processing facility); (3) Emissions from transporting and distributing fuels to electricity production facility; (4) Emissions from handling, processing, upgrading, and/or storing feedstocks, fuels and intermediate products (including emissions from on/offsite storage and preparation/pre-treatment for use (for example, torrefaction or pelletization) and emissions from process additives); and (5) Emissions from combustion and gasification at the electricity generating facility (including emissions from the combustion and/or gasification process and emission from gasification or combustion additives). Proposed § 1.45Y–5(d)(2)(v)(B) provided that, for purposes of proposed § 1.45Y–5(d)(2)(v), examples of significant indirect emissions include, but are not limited to, emissions from indirect land use and land use change and induced emissions associated with the increased use of the feedstock for energy production. The preamble to the proposed regulations explained that significant indirect emissions may include positive or negative emissions, and that, for biogenic resources, significant indirect emissions may include emissions from growth and regrowth.

The Treasury Department and the IRS received a range of comments about the proposal to include these emissions in the LCA. Most comments were supportive of this proposed approach. A few commenters suggested revisions to the proposal. One commenter recommended that market effects and induced land-use change not be assessed in the emissions included in an LCA due to what the commenters view as limited credible estimates of such dynamics. Another commenter cited a lack of Congressional intent to include market-mediated effects within the meaning of ''significant indirect emissions'' as this term does not appear in the statute. As explained earlier, the Treasury Department and the IRS interpret section 45Y(b)(2)(B) as requiring these emissions to be considered in the LCA, which by citing 42 U.S.C. 7545(o)(1)(H) directly specifies inclusion of ''significant indirect emissions such as land use change''. Estimating the emissions effects associated with increased electricity production, including significant indirect emissions such as land use change necessarily involves some amount of uncertainty, but inclusion of such elements was the clear Congressional directive. The final regulations will therefore not include the revisions requested by commenters.

Another commenter suggested that the LCA include emissions from ''co-pollutants'' such as sulfur dioxide, nitrogen oxides, and fine particulate matter, which are not GHG emissions within the meaning of sections 45Y and 48E. The Treasury Department and the IRS do not have the authority to adopt this proposal, as it is contrary to the text of the statute. Section 45Y(b)(2)(B) requires that an LCA be conducted to determine the amount of GHGs emitted into the atmosphere by a facility in the production of electricity, expressed in grams of CO_2e per kWh. Section 45Y(e)(1) states that ''CO_2e per kWh'' means, with respect to any greenhouse gas, the equivalent carbon dioxide (as determined based on global warming potential) per kilowatt hour of electricity produced. Section 45Y(e)(2) states that ''greenhouse gas'' has the same meaning given such term under 42 U.S.C. 7545(o)(1)(G), as in effect on the date of the enactment of this section. 42 U.S.C. 7545(o)(1)(G) defines greenhouse gas as ''carbon dioxide, hydrofluorocarbons, methane, nitrous oxide, perfluorocarbons, sulfur hexafluoride.'' The provision further states that ''[t]he Administrator may include any other anthropogenically-emitted gas that is determined by the Administrator, after notice and comment, to contribute to global warming.'' Because ''co-pollutants'' such as sulfur dioxide, nitrogen oxides, and fine particulate matter are not GHGs within the meaning of 42 U.S.C. 7545(o)(1)(G), the Treasury Department and the IRS do not have the authority to adopt the commenter's proposal.

The Treasury Department and the IRS generally adopt § 1.45Y–5(d)(2)(v) as proposed. The Treasury Department and the IRS clarify in § 1.45Y–5(b)(10) that market-mediated effects are those resulting from policy interventions and other factors (for example, technological advances) that alter the availability of and demand for marketed goods and activities and their related GHG emissions profiles. These effects are driven by and result in changes in absolute and relative prices which can occur at local, national, and global boundaries. Examples of market-mediated effects include direct and significant indirect emissions, such as land use changes or land use management changes that result from the production of fuels derived from biomass and shifts in total market demand and supply for input fuels, feedstocks and related commodities, and other materials, as a result of changes associated with the policy intervention.

For further clarity, the final regulations better distinguish in § 1.45Y–5(d)(2)(v) between included emissions that are direct emissions and those that are significant indirect emissions. The final rule also clarifies that all these emissions are within the system boundary of the LCA.

f. Principles for Excluded Emissions

Proposed § 1.45Y–5(d)(2)(vi) provided a list of types of emissions that the LCA must not take into account. The Treasury Department and the IRS received several comments on these proposed excluded emissions from the LCA. Several commenters requested that further items be excluded from emissions accounting in the LCA. For instance, a few commenters requested the exclusion of emissions resulting from standby auxiliary power for electrolyzers or emissions from supplementary ''peaker plants''. A few commenters proposed that emissions resulting from the conditioning and distribution of hydrogen be excluded from the LCA. In each of these instances, the Treasury Department and the IRS have determined that such emissions may be considered emitted into the atmosphere in the production of electricity within the meaning of section 45Y(b)(2)(B), and thus may not be appropriately excluded from an LCA. The Treasury Department and the IRS therefore decline to adopt these changes in the final regulations. The final regulations adopt the principles for excluded emissions as proposed.

g. Alternative Fates and Avoided Emissions

Proposed § 1.45Y–5(d)(2)(vii) provided that an LCA may consider alternative fates and may account for

avoided emissions. The preamble to the proposed regulations defined the term ''alternative fate'' to mean a set of informed assumptions (for example, production processes, material outcomes, and market-mediated effects) used to estimate the emissions from the use of each feedstock were it not for the feedstock's new use due to the implementation of policy (that is, to produce electricity). The final regulations adopt this definition of alternative fate in § 1.45Y–5(d)(2)(vii). Because the alternative fate for some feedstocks may be disposal, in the interest of completeness and clarity, these final regulations clarify that the term ''alternative fate'' may include the disposal of a feedstock.

The preamble to the proposed regulations defined the term ''avoided emissions'' to mean the estimated emissions associated with the feedstock, including the feedstock's production and use or disposal, that would have occurred in the alternative fate (if such feedstock had not been diverted for electricity production) but are instead avoided with the feedstock's use for electricity production. The preamble to the proposed regulations further explained that, while, in some circumstances, emissions may be avoided if compared to the alternative fate, in other circumstances the new use of the material (for example, for electricity production) may involve additional emissions that were not emitted in the alternative fate estimation. Relatedly, in some circumstances, emissions may be avoided in one part of the supply chain only to occur elsewhere along the supply chain due to the new use. The final regulations adopt this definition of avoided emissions in § 1.45Y–5(d)(2)(vii) without change.

Many commenters generally supported the proposed rule. Several commenters opposed allowing the LCA to consider alternative fates or avoided emissions because the commenters asserted that it is not possible to accurately measure avoided emissions and hence many claims of avoided emissions are unreliable.

Finally, a number of commenters suggested guardrails that might be implemented in the final regulations or in the analysis of emissions to enhance accuracy. One commenter recommended that the final regulations set a minimum carbon intensity score of zero for all fuels and feedstocks. The Treasury Department and the IRS have determined that, while this recommendation may have merit with respect to certain types of fuels or feedstocks, such an approach may not be appropriate for all fuels and feedstocks. Thus, this recommendation will not be adopted in the final regulations as a generally applicable rule but will be considered in targeted cases where the relevant facts and circumstances support its application.

Another commenter suggested that analysis of avoided emissions or alternative fates of fuel or feedstock employ a geographical limiting element to address local air pollution and health issues. However, sections 45Y and 48E do not authorize the Treasury Department and the IRS to specifically take into account local air pollution and health issues in the assessment of GHG emissions. Therefore, the Treasury Department and the IRS decline to adopt this commenter's recommendation in the final regulations.

Several commenters recommended that the LCA take into account only reliable and documented alternative fates that are supported by data, including land management records and market statistics, showing customary practice for the relevant feedstocks or fuels. The Treasury Department and the IRS agree that taking care to assess the reliability and documentation of any data elements, including those concerning alternative fates is good practice for conducting a GHG LCA. However, the Treasury Department and the IRS decline at this time to require the use of specific forms of documentation and data sources in the final regulations given the diversity of fuels and feedstocks and their alternative fates that may be evaluated for the purposes of the section 45Y and 48E credits. Therefore, the commenters' recommendation will not be adopted in the final regulations. Specific substantiation and documentation data requirements related to alternative fates or avoided emissions may be identified for specific fuels or feedstocks in future guidance.

One commenter further recommended that prospective claimants of the section 45Y credit be required to support the alternative fate of a feedstock or fuel with credible evidence and that verification of such fate be required to the maximum extent possible. The Treasury Department and the IRS view this request as covered by a taxpayer's existing general substantiation obligations under section 6001 of the Code so further clarification in the final regulations is not necessary. Therefore, the final regulations do not adopt this commenter's suggestion.

A number of commenters recommended that the evaluation of alternative fates be comprehensive, with suggestions including that the LCA assess multiple alternative fates to improve the robustness of the analysis, that such alternative fates account for emissions related to the full fuel lifecycle, that alternative fate assumptions be updated regularly, and that consideration be given to the influence of market conditions and effects.

The Treasury Department and the IRS agree that ensuring that the LCA assessment of alternative fates and avoided emissions is comprehensive and up to date is critical to ensure robust estimation of the net GHG emissions rates for C&G Facilities. These recommendations will be considered in the development of future LCA assessments.

Commenters also opined on whether the LCA should take into account emissions ''displacement'' from electricity grids. This analytical framework assumes that, in the absence of the incentive provided by the section 45Y and 48E credits, fuels or feedstocks that would otherwise have a greater GHG emissions rate will be used to generate electricity, and that the assumed reduction in emissions due to the use of fuels or feedstocks with a lesser GHG emissions rate at a facility due to this rule should be taken into account when evaluating the net GHG emissions rate of a facility using those fuels or feedstocks. A number of commenters recommended treating this displacement as an avoided emission that could lessen the net GHG emissions rate of a facility using those fuels or feedstocks, stating that such treatment would spur investment in a number of technologies and reduce net GHG emissions.

Other commenters recommended against treating this displacement as an avoided emission that could lessen the net GHG emissions rate of a facility using those fuels or feedstocks, asserting that to do so would improperly shift the GHG emissions rate inquiry from whether a C&G Facility has a net GHG emissions rate of not greater than zero to whether the facility has fewer emissions than the marginal unit emissions of the grid the facility is on.

The Treasury Department and the IRS have determined that the proposed rule in § 1.45Y–5(d)(2)(ii), which states that energy sources displaced by the electricity generated by a C&G Facility are outside of the LCA boundary, should be retained in the final regulations. This rule appropriately requires that the net GHG emissions rate be assessed at the level of the C&G Facility, with an ending boundary for assessment for electricity that is transmitted to the grid

or electricity that is used on-site is the meter at the point of electricity production of the C&G Facility. This ending boundary is consistent with section 45Y's focus on the C&G Facility and the full fuel lifecycle of any fuel or feedstock used by the C&G Facility to produce electricity as the relevant sources of GHG emissions, rather than any change to the emissions profile of the electricity grid.

The Treasury Department and the IRS agree with commenters that taking into account potential post-production grid electricity displacement as an avoided emission would impermissibly shift the GHG emissions rate inquiry from whether electricity production at a qualified facility has a net GHG emissions rate of not greater than zero to whether the facility has fewer emissions than the marginal unit emissions of the grid to which the facility is connected. Conducting the LCA in such a manner would conflict with the plain text of the statute, which requires that the net rate of GHGs emitted by a C&G Facility, considering lifecycle GHG emissions, in the production of electricity not be greater than zero. In contrast to this distinct concept of displacement of electricity production from other more highly polluting sources on the electricity grid due to electricity produced by a C&G Facility, the LCA of electricity production calculates the net GHG emissions of the electricity production by that facility, including by taking into account alternative fates and avoided emissions of the fuels or feedstocks that are themselves used to produce electricity at such a facility over the entire lifecycle of that particular fuel or feedstock or its supply chain. The statute directs the Treasury Department to calculate the GHG emissions associated with electricity production by a specific facility. The statute does not direct or authorize the Secretary to conduct a relative assessment of a facility's GHG emissions before and after earning the tax credit or a relative assessment of a facility's electricity production volumes and related GHG emissions compared to other facilities on the grid. For additional clarity, the Treasury Department and the IRS have determined that proposed § 1.45Y–5(d)(2)(vii) should be modified to add the phrase ''including for the fuels and feedstocks consumed in the fuel and feedstock supply chain and at the electricity generating facility.''

The Treasury Department and the IRS also received many comments regarding the purported alternative fates or avoided emissions associated with the use of a particular fuel or feedstock. Several commenters requested that an LCA of municipal solid waste take into account emissions that may be avoided by use of such waste to produce electricity rather than placement in a landfill. Others shared their views or research on common alternative fates of woody biomass, including natural decay, prescribed burning, wildfire fuel, and transfer to disposal sites.

The Treasury Department and the IRS appreciate the information shared by commenters on these matters and have taken it into consideration. Because these assertions make technical claims that must be evaluated in the context of an LCA and because they are applicable to only certain categories of feedstocks, the Treasury Department and the IRS have determined that incorporation of these recommendations in the final regulations as a broadly applicable rule would not be appropriate.

Finally, commenters had mixed reactions to the assertion that the use of woody biomass in the production of electricity drives forest regrowth that might render the use of such feedstock carbon neutral for purposes of the section 45Y and 48E credits. Some commenters asserted that woody biomass, when used to produce electricity, has a net GHG emissions rate of not greater than zero, and that therefore, facilities using such feedstock should be included as qualified facilities in the final regulations and in the Annual Table.

Because section 45Y(b)(2)(B) requires taking into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H), the Treasury Department and the IRS do not have the authority to designate such facilities as qualified facilities before ensuring that an LCA specific to implementation of sections 45Y and 48E is conducted in accordance with statutory requirements. The Treasury Department and the IRS thus decline to adopt these commenters' recommendations in the final regulations. The Treasury Department and the IRS appreciate commenters' feedback and note in particular that certain woody biomass-derived feedstocks require significant energy inputs which could make qualification of facilities using these specific feedstocks unlikely (for example, pelletized biomass due to the electricity used in pelletization processes).

D. Additional Issues Regarding Greenhouse Gas Emissions Rates for C&G Facilities

The determination of net GHG emissions rates for C&G Facilities raises a range of complex technical questions that are relevant to determining eligibility for the section 45Y and 48E credits. The Treasury Department and the IRS requested comment on the following topics: (i) the treatment of RNG and fugitive sources of methane; (ii) analytical LCA parameters, including spatial scales and time horizons; (iii) whether and how to distinguish between co-products, byproducts, and waste products and how emissions should be allocated to each in LCAs; (iv) how to attribute emissions to the heat produced by facilities using combined heat and power systems; (v) how to create and maintain LCA baselines; and (vi) certain issues related to LCA modeling.

1. Analytical LCA Parameters, Including Spatial Scales and Time Horizons

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment on the analytical LCA parameters that are most relevant to particular types of categories of C&G Facilities that may be eligible for the section 45Y and 48E credits. In particular, the Treasury Department and the IRS requested comment regarding spatial and temporal scales, including the factors that should be considered in setting the spatial and temporal scales for LCAs conducted for the section 45Y and 48E credits. As noted in the preamble to the proposed regulations, spatial scale involves defining the area over which emissions outcomes will be evaluated. Temporal scale involves defining the time period over which emissions outcomes will be evaluated. The decision of setting the spatial scale should be considered in conjunction with decisions on temporal scale, as the two can interact in ways that affect greenhouse gas assessment outcomes. The Treasury Department and the IRS received a number of comments on these topics.

a. Temporal Scales

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment regarding what factors should be considered in establishing the timeframe for the LCA analysis. Commenters suggested a number of specific considerations. Multiple commenters advocated for the LCA to account for the full timeframe over which lifecycle emissions can occur, with some commenters specifically asking for a ''climate-relevant'' timeframe. A commenter argued that a full accounting of the effects of activities should include the effects of small-scale projects over long time frames with each activity assessed individually. Another commenter argued that the full

timeframe over which emission effects persist into the future should be included. Conversely, a commenter noted that any approach that requires use of long-run future marginal grid emissions projections could be prohibitively challenging or problematically inaccurate. Some commenters advocated for inclusion of all relevant emissions fluxes on the same timescale. A commenter suggested counting any emissions counterbalanced by the regrowth of feedstock on the same time scale as the positive emissions from combustion and other direct and indirect positive emissions. A commenter also asked to match the time horizon with the economic life of a plant that abates existing methane or other GHG emissions. Some commenters argued that no specific geographic or temporal requirements were required as long as the timeframe covered the occurrence of emissions in the counterfactual scenario.

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment regarding what timeframe would provide confidence that significant emissions have been accounted for. Commenters suggested a wide variety of specific lengths of time, citing a variety of policy reasons. Some commenters suggested time horizons of 100 years (or more), citing the importance of accounting for potential long-term changes in emissions in order for certain feedstocks to qualify. Other commenters advocated for much shorter time horizons. One commenter requested that CHP property which relies on combustion, such as woody biomass energy, should be required to show carbon-neutrality over a short period of time such as a year. Multiple commenters advocated for a 10-year time horizon. Commenters also cited potential ranges somewhere in the middle, such as 20 to 50 years or 20 to 25 years.

After thorough review of the comments the Treasury Department and the IRS have determined that it is appropriate to base the selection of temporal scale on the regulatory context. This is reinforced by the 2019 recommendations by the Science Advisory Board (SAB) on EPA's Draft 2014 Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources. The SAB recommended ''using the 'emissions horizon' that is determined to be relevant by the specific regulatory objective,'' meaning the technical choice should be contingent upon the specific policy and regulatory context. The SAB went further to state that ''the SAB favors selecting the time horizon for calculating the [factor representing the net atmospheric biogenic CO_2 contributions associated with biogenic feedstock production, processing, and use at a stationary source] to comport with the objective under consideration, which is generally dependent on the regulation mandating use of that particular [factor].'' ISO guidance also states that an LCA should be conducted within the context of a specified goal.

The broader regulatory context requires the Treasury Department and the IRS to balance multiple considerations. The statute creates a pathway for C&G Facilities that have a net GHG emissions rate of zero or less as determined via LCA to qualify for the credit. Setting a relatively short time horizon would not allow for the consideration of potential increases or decreases in emissions that can occur as the result of electricity production, such as the regrowth of biogenic feedstocks or increased emissions from land use or land use management changes. However, while biogenic feedstock regrowth can occur over long timescales, commenters have raised significant concerns that longer time horizons introduce additional uncertainty about the likelihood that these theoretical future scenarios and emissions-offsetting activities will occur in practice. This uncertainty significantly decreases the confidence of the Treasury Department and the IRS that LCAs with a longer time horizon will ensure that a facility meets the requirements of the statute. Moreover, the broader structure of the IRA and specific features of sections 45Y and 48E—including the phase-out of the credit occurring after the later of 2032 or the achievement of specified GHG emissions reduction target and the requirement that qualified facilities have a GHG emissions rate of zero or less—demonstrate congressional intent for the section 45Y and 48E credits to contribute to significant reductions of GHG emissions in the power sector in the near- to medium-term. Setting a temporal scale that allows C&G Facilities that do not contribute to the reduction of GHG emissions (or even increase GHG emissions) in the near- and medium-term would also frustrate congressional intent.

In the preamble to the proposed regulations, the Treasury Department and the IRS asked whether the LCA should distinguish between an ''emissions horizon'' (the timeframe over which emissions effects from the feedstock use persist into the future) and an ''assessment horizon'' (the timeframe over which the emissions effects are included in the analysis), and how that would be reflected in the choice of temporal scale. Although some commenters advocated for applying different time horizons in different contexts (for example, for different electricity production pathways), the Treasury Department and the IRS have determined that it furthers the interest of fairness and administrability in the tax system to apply consistent rules for all LCAs under sections 45Y and 48E. Applying different time horizons, including different assessment and emissions horizons, in different contexts could lead to taxpayer confusion and disparate treatment for similarly situated facilities. Moreover, a single time horizon would allow LCAs to be conducted as efficiently and accurately as possible. The Treasury Department and the IRS further clarify that the final rules in § 1.45Y–5(d)(2)(viii) adopt the same assessment horizon and emissions horizon.

In balancing these considerations and commenters' different views, the final regulations adopt a time horizon for LCA of 30 years from the year in which a qualified facility produces electricity (or, for purposes of the section 48E credit, the year in which a qualified facility was placed in service). This 30-year time horizon is supported by several points, including consistency with the longstanding time horizon for EPA's RFS program. This program, authorized under the Energy Policy Act of 2005 and expanded under the Energy Independence and Security Act of 2007, determined that GHG emissions analysis for renewable fuels would quantify the GHG impacts over a 30-year period in a March 2010 rule (75 FR 14670) (RFS2). A 30-year analysis time period was further maintained in the Final Renewable Fuels Standards Rule for 2023, 2024, and 2025.[7] The RFS2 rule made this determination balancing a number of considerations, including the expected life of biofuel production facilities—and their long-term market impacts on emissions—and the inherent uncertainty in estimating GHG emissions over a longer period of time. The Treasury Department and the IRS assess that solely for the purposes of setting temporal scales in these final regulations, the section 45Y and 48E credits and RFS2 are similar regulatory contexts based on the information currently available.

A commenter advocated for modifying the Greenhouse Gases,

[7] Regulatory Impact Analysis for Renewable Fuel Standard (RFS) Program: Standards for 2023–2025 and Other Changes, Section 4.2.2. (pp129–130), available at *https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017OW2.pdf.*

Regulated Emissions, and Energy use in Transportation model (GREET model) to capture 20-year and 100-year time horizons as the GREET model already uses the GWP metric to capture both near-term and long-term climate impacts. The Treasury Department and the IRS note that the temporal scale of the LCA is the time period over which GHG emissions are assessed in the context of sections 45Y and 48E, rather than the warming potential of such emissions. Reliance upon specific GWPs to determine time horizons or upon the GREET model, which is a particular model that does not generally include explicit temporal considerations when applying certain assumptions about what activities and related GHG emissions to include, is therefore separate from the issue of temporal scales. The decision to use GWP–100 is discussed in section VIII.A.1. of this Summary of Comments and Explanation of Revisions.

b. Spatial Scales

Commenters also submitted a wide range of recommendations pertaining to spatial scales. A few commenters recommended that spatial boundaries be set narrowly around the geographic location of the facility, which they stated would more accurately reflect local conditions. Another commenter advocated for setting spatial scales such that they capture the potential impact of having multiple facilities with a GHG emissions rate of greater than zero in the same area. One commenter suggested that the LCA spatial scales not be beyond the facility producing the feedstock.

In the preamble to the proposed regulations, the Treasury Department and the IRS asked (i) what factors should be considered to assess whether a global scale is necessary for certain feedstocks to ensure that significant emissions are captured, and (ii) whether all feedstock/fuels assessments should be conducted with the same spatial scale to determine the extent to which increased use has estimated global ramifications. Some commenters had feedstock-specific suggestions regarding appropriate spatial scales. Several commenters recommended that, in the case of woody biomass, spatial boundaries be broad to more accurately represent forest dynamics. A commenter also suggested that spatial scales not be limited when taking into account wastes, including when such wastes are managed outside of the United States.

After consideration of all comments and of LCA modeling practices that take into account the full lifecycle of emissions as described by 42 U.S.C. 7545(o)(1)(H), the Treasury Department and the IRS have determined and provided in § 1.45Y–(d)(2)(ix) that spatial scales analysis for LCAs conducted for the section 45Y and 48E credits should identify GHG effects from changes in input fuel or feedstock production and use, including indirect emissions effects stemming from market-related changes in supply and demand. When estimating the net GHG emissions outcomes associated with a fuel or feedstock that has current or anticipated market uses and thus potential market-mediated impacts for the entity-level analysis (that is, for a Provisional Emissions Rate (PER)) or generally applicable analysis (that is, for the Annual Table), the LCA assessment must start with a qualitative market analysis to aid with the formation of parameters and other decisions in the LCA modeling. This market analysis serves the purpose of analyzing whether the prospective fuel or feedstock has been or is anticipated to be used directly in or as an input to an activity or commodity in local markets, is transported for use in domestic markets elsewhere, or is traded for use in international markets, whether use of the material does or is anticipated to have significant ramifications on other markets, and the magnitude of the use or anticipated use. Findings of this assessment should inform the decisions about what spatial scales, such as sub-regional, regional, national, or international, are most appropriate for assessing the market and related GHG emissions effects associated with the feedstock and use case under consideration. The GHG emissions analysis should then be conducted using the designated model(s) with the applicable spatial scales to estimate the market and GHG emissions implications of changing supply flows to provide the feedstock for energy purposes and sourcing new or additional feedstock material for electricity generation across the applicable market and spatial scales for use in the LCA assessment to determine the net GHG emissions rate needed as part of the eligibility qualification for the section 45Y and 48E credits. If the initial market analysis concludes that the prospective feedstock is (i) not currently, has not recently, nor is anticipated in the future in the absence of the section 45Y and 48E credits to be used or sold on the market, (ii) not used as an input to an activity or good in local markets, (iii) not transported for use in domestic markets elsewhere, (iv) not traded for use in international markets, or (v) use of the material does not or is not anticipated to have significant ramifications on other markets, then an analysis of market-mediated impacts would only need to apply across the spatial scales that are applicable to the fuel or feedstock in the LCA emissions assessment.

2. Distinguishing Between Co-Products, Byproducts, and Waste Products and How Emissions Should Be Allocated to Each in LCAs

As explained in the preamble to the proposed regulations, the categorization and assessment of products as co-products, byproducts, or waste products in an LCA may affect the LCA's results. The preamble to the proposed regulations provided potential definitions to guide the categorization of co-products, by products or waste products and further provided that products, co-products, byproducts, and wastes may all be produced in the full fuel cycle or used as inputs to the same.

The preamble to the proposed regulations further explained that the categorization of products as co-products, byproducts, and waste products may be relevant to an LCA's assessment of the GHG emissions related to the production of inputs to electricity generation or in the generation of electricity itself if the LCA modeling approach or approaches used for purposes of the section 45Y and 48E credits have the ability to distinguish between such categories.

In the preamble to the proposed regulations, the Treasury Department and the IRS stated an intent to clarify the principles for categorizing products as co-products, byproducts, or waste input materials and products and assessing the emissions outcomes for such products in an LCA for C&G Facilities in the final regulations for the section 45Y and 48E credits if such categorization is relevant to the LCA model or models used. To inform the development of these categorization principles for the final regulations, in the preamble to proposed regulations the Treasury Department and the IRS requested comment on what principles should be used to distinguish between co-products, byproducts, and waste products for the purposes of the section 45Y and 48E credits. The Treasury Department and the IRS also asked whether there are common scientific or industry definitions that can be relied upon to distinguish between co-products, byproducts, and waste products.

The Treasury Department and the IRS received a large number of comments in response to these questions. A few commenters suggested broad principles

that should be used to distinguish between co-products, byproducts, or waste products. One such commenter recommended that the definitions of co-products, byproducts, and waste products be less rigid than those shared in the preamble to the proposed regulations and that they reflect the scientific literature on the lifecycle GHG emissions of various materials. Another commenter recommended that the final regulations adopt simple common-sense definitions that assign emissions of the facility to primary products and co-products. This commenter further suggested that all materials left over after the production of any primary products be deemed waste unless they have significant value, and that the full breadth of potential co-product materials be considered. Another commenter recommended that the final regulations provide a broad definition of residue materials, citing the need to give industry the ability to respond to local market forces. Another commenter recommended using mass-based allocation to allocate emissions to co-products, byproducts, and waste products, stating that such an approach is straightforward to administer and can reduce abuse.

A number of commenters opposed distinguishing between co-products, byproducts, and waste products for the purposes of the section 45Y and 48E credits. Several stated that such categorization of products would result in impermissibly failing to associate all GHG emissions to the feedstock or fuel that produced the electricity, or that if such categories do not do so, they are therefore irrelevant. Some commenters opposed to such categorization noted its complexity, with one commenter stating opposition to including these categories in the final rule in favor of expert agencies due to the highly technical nature of the work. Another commenter, noting the complexity of the designations, recommended using caution in any such categorization process to avoid rewarding emissions shifting rather than a true reduction in emissions.

The Treasury Department and the IRS have determined that distinguishing between co-products, byproducts, and waste products will help facilitate efficient and consistent LCA taking into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H). Moreover, providing a framework of categorization will facilitate communications among stakeholders by providing a common set of terms. Such designations were also used in EPA's 2010 notice-and-comment rulemaking establishing the regulatory framework for the updated RFS program, in which EPA interpreted 42 U.S.C. 7545.

The Treasury Department and the IRS have determined that, as noted in the preamble to the proposed regulations, it is appropriate to provide clarifications to the definitions of products, co-products, byproducts, and waste and the principles for categorizing and informing the assessment of the GHG emissions associated with such materials in an LCA for C&G Facilities in the final regulations under § 1.45Y–5(d)(2)(x) for the section 45Y and 48E credits. These clarifications were informed by consideration of the comments received on these definitions and principles in the proposed regulations. The Treasury Department and the IRS have also determined that these clarifications are consistent with the statutory direction in section 45Y to determine GHG emissions rates taking into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H). The EPA interpreted 42 U.S.C. 7545(o)(1)(H) as requiring the agency, in the RFS context, to account for the real-world emissions consequences of increased production of biofuels, including consideration of market interactions that may result in indirect emissions. The Treasury Department and the IRS find that the clarifications to these definitions and principles therefore appropriately incorporate the concepts of marketability and market effects in the context of the designation and emissions assessment of primary products, co-products, byproducts, and waste products.

These clarifications include the definitions in § 1.45Y–(d)(2)(x)(A)(*1*) through (*4*):

- A ''primary product'' is an input or an output with marketability and is the main driver of the process from which it is produced.
- A ''co-product'' is an input or an output with marketability that is produced together with another product, both of which are economic drivers of the process from which they are produced.
- A ''byproduct'' is an input or an output that is produced together with another product, and which has a market recognized economic value of zero or greater, but the output is not an economic driver of the process from which it is produced.
- A ''waste product'' is an input or an output with negative economic value, demonstrated by (1) the absence of a market in which the product is purchased and sold and (2) the existence of a market in which producers pay for the collection and removal or disposal of the input or output material or the existence of a predominant operational practice in which producers themselves collect and remove, give away, or dispose of the input or output material as part of operational processes.

For the purposes of these definitions, the Treasury Department and the IRS note that a ''market'' should be an established set of transactions between parties and that whether or not a market exists—and therefore the categorization of the same product—may vary by region. A single or very small number of local transactions of insignificant volumes at nominal prices to expedite disposal generally would not constitute a market. Moreover, the existence of a market and therefore the analysis of market-mediated effects for a particular product or material does not prejudge the magnitude of those effects. For example, a market may have existed in the past for a particular product or material, but market analysis may indicate that this market is anticipated to not exist in the future, and vice versa. Relatedly, for the purposes of these definitions, marketability is defined as the ability to be consistently sold or marketed in the regular course of business.

For example, an input or output generated as part of operational processes that would otherwise be subsequently: (i) given away; (ii) sold at nominal prices to expedite disposal; or (iii) disposed of (without creating a commercial product or generating electricity) by burning onsite, burying, piling and burning onsite or leaving to decompose, or scattering would generally be considered a waste for the purposes of these definitions.

Consistent with this approach, the final regulations also add in § 1.45Y–5(d)(2)(x)(B)(*1*) through (*6*) principles for categorizing and informing the assessment of the GHG emissions for such materials in an LCA for C&G Facilities for the section 45Y and 48E credits if such categorization is relevant to the LCA model or models used. The principles are as follows:

- All classification of materials and LCAs should take into account relevant geospatial variations in supply and demand (that is, differences across local, sub-regional, and larger regions), as well as variations across specific product types and characteristics, and producer types as relevant. For example, a material may meet the previously described definition of a waste in certain regions and the definition of a by-product or co-product in other regions.
- The LCA should assess whether there are market-mediated effects and, if

so, take these into account as part of the GHG analysis. In some cases, market-mediated effects will be small or nonexistent.

- Regardless of how a material is categorized, the LCA should consider whether the availability of the section 45Y and 48E credits is expected to result in additional production of that material or in material changes in the supply chain, and, if so, should take into account the direct and indirect emissions impact of the additional production or changes in the supply chain.
- Policy and other interventions (for example, technological advances) can alter the availability and demand for marketed goods and services, which can alter the treatment of materials once disposed of. Therefore, reevaluation of material categorization should occur at least every ten years, but not more often than every five years.
- All determinations of marketability, market-mediated effects, and behavioral changes must be supported by an analytical assessment performed by one or more National Laboratories, in consultation with other Federal agency experts as appropriate.
- A material should be considered to have a market recognized economic value and an established market if one existed within the last five years as of the date of the analysis.

To inform the development of these categorization principles for the final regulations, in the preamble to proposed regulations the Treasury Department and the IRS requested comment on what principles should be used to determine whether a product has sufficient value to be considered a co-product or byproduct. Two comments were received in response. These commenters stated that if a policy rewards the use of a waste product, that product has inherent value, and that that value could possibly surpass the value of the ostensible primary product. One such commenter noted that this would make these materials co-products. Another recommended that the Treasury Department rigorously interrogate the designation of waste fuels because of the change in value of such items due to the section 45Y and 48E credits as well as any other relevant subsidies. This commenter further suggested that when product designation is likely shifted as a result of these incentives, so should the associated emissions accounting.

The Treasury Department and the IRS have considered these comments and others in evaluating the appropriate definition and treatment of co-products. The Treasury Department and the IRS have determined that the definition of ''co-product'' will be amended in the final regulations under § 1.45Y–5(d)(2)(x)(A)(*2*) to reflect that a co-product not only must be an economic driver of the production process alongside another product, but also must have marketability. However, regardless of how a material is categorized, the LCA will consider whether the availability of the section 45Y and 48E credits can result in additional production of that material or changes within the production and supply chain of that material and take into account any direct and indirect GHG emissions outcomes of the additional production or any such supply chain changes. Furthermore, because policy and other interventions can alter the availability and demand for marketed goods and services, even turning waste products into byproducts, co-products, or even primary products, the categorization of materials will be reevaluated and must be updated at least every ten years, but not more often than every five years.

In the preamble to the proposed regulations, the Treasury Department and the IRS also requested comment regarding whether the section 45Y and 48E credits may provide additional economic incentive for the consumption of a product categorized as waste prior to the availability of the incentive provided by the section 45Y and 48E credits. The Treasury Department and the IRS also asked how this additional economic incentive should be considered to determine if a product is a waste product, byproduct, or co-product, and asked whether this categorization should be reevaluated and, if so, how often.

The Treasury Department and the IRS received several comments about the economic incentive for the consumption of a product categorized as waste prior to the availability of the incentive provided by the section 45Y and 48E credits. One commenter recommended that, because of this possible incentive, the final regulations not distinguish between co-products, byproducts, and wastes for the purposes of emissions allocation. For all materials, the LCA must consider whether the availability of the section 45Y and 48E credits can result in additional production or use of that material, or changes in the production of or supply chain to provide that material and take into account any direct and indirect emissions outcomes of the additional production or use and any supply chain changes.

Another commenter similarly warned about the risk of incentivizing the classification of waste when such categorization is not factually justified. This commenter stated that the European Union's Renewable Energy Directive (RED) waives sustainability criteria for solid biomass fuels that are considered industrial residues, but that to protect against the risk of fraudulent classification of such fuels as waste, the RED requires that feedstock auditing verify such classification. The commenter recommended that the Treasury Department adopt similar measures for the section 45Y and 48E credits. The Treasury Department and the IRS have determined that a similar requirement would be appropriate to ensure accurate tracking and verification of any materials determined to constitute waste materials. If a qualified facility uses feedstocks that do not have marketability, but which are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer will be expected to maintain documentation substantiating the origin and original form of the feedstock. *See* section VIII.J. of this Summary of Comments and Explanation of Revisions for further discussion of substantiation.

The Treasury Department and the IRS also received several comments regarding the possible reevaluation of a material's categorization as a waste. A few commenters were opposed to recategorizing a material from a waste to another designation, arguing that such actions could be damaging to emissions mitigation efforts or to efforts to find productive uses for materials previously disposed of. Another commenter recommended that any reevaluation of the classification of waste be conducted predictably and only to prospective qualified facilities. The commenter further recommended that such reevaluations focus on only major changes external to the section 45Y and 48E credits or other Federal incentives.

The Treasury Department and the IRS have determined that reevaluation of material categorization should occur at least every ten years, but not more often than every five years, consistent with the reevaluation period outlined for baselines, because policy interventions and other developments in the market can alter the availability and demand for marketed goods and services, and can sometimes turn waste products into byproducts, co-products, or even primary products. This reevaluation is therefore necessary to ensure robust estimation of the net GHG emissions rates for C&G Facilities in a manner consistent with section 45Y(b)(2)(B). Regardless of the results of any such reevaluation, taxpayers may rely on the Annual Table in effect as of the date a

facility began construction or the provisional emissions rate determined by the Secretary for the taxpayer's facility to determine the facility's greenhouse gas emissions rate for any taxable year that is within the 10-year period described in section 45Y(b)(1)(B), provided that the facility continues to operate as a type or category of facility that is described in the Annual Table or the facility's emissions value request, as applicable, for the entire taxable year. If the facility changes the type or method of production of their fuel or feedstock, this constitutes a potential change in their provisional emissions rate determined by the Secretary.

To limit the additional production of waste, in the preamble to the proposed regulations, the Treasury Department and the IRS requested comment regarding whether the final regulations should limit eligible waste sources that existed as of a certain date, or waste or waste streams that were produced before a certain date, such as the date that the IRA was enacted. The Treasury Department and the IRS also requested comment regarding how these factual scenarios could be documented or verified, including any changes in volumes of waste and waste capacity at existing sources, and additional capture of existing waste or waste streams.

The Treasury Department and the IRS received several comments in response to these questions. One commenter recommended that, to limit the additional production of waste, materials be classified as waste only if the material was created before a qualified facility begins claiming the section 45Y and 48E credits. The Treasury Department and the IRS have determined that prohibiting classification of a material used by a qualified facility as waste after the qualified facility begins claiming the section 45Y and 48E credits is unnecessary in light of the requirements that the LCA take into account the emissions impact of any additional production or use of such material and the requirements that the LCA be conducted at the market level. In some cases, this may result in different emissions determinations for materials that make up waste streams that existed prior to the credits versus for those same materials produced after and potentially in response to the credits.

Another commenter responded to this question with a recommendation that materials not be classified as wastes unless disposal or incineration, as opposed to repurposing, is the only option for such material. The commenter offered the ''cascading'' principle in the European Union's revised RED that prioritize material use, reuse, and recycling of wood over burning for energy as a model for how incentives to burn materials should be treated under the section 45Y and 48E credits. The Treasury Department and the IRS have determined that, for the purposes of the final regulations, a waste product is defined as noted earlier. The requirement that a waste material lacks marketability for sale but has a market for disposal is consistent with this commenter's recommendation that materials be classified as waste only if such material lacks a productive use beyond such disposal.

In the preamble to the proposed regulations, the Treasury Department and the IRS also requested comment regarding the potential for and approaches to prevent the intentional generation of waste or co-products for the purposes of lowering the allocated process emissions to electricity. The Treasury Department and the IRS received several comments in response to this question. A few commenters, as discussed earlier, recommended against designating materials as wastes, co-products, or byproducts to avoid intentional generation of waste. Another commenter recommended use of a dynamic LCA that incorporates every product, flow, and material use when accounting for emissions, including assessing the environmental impact of production processes such as generation of waste or co-products. This commenter stated that this practice would prevent intentional generation of waste because the dynamic LCA would accurately reflect the potential benefit of not intentionally generating the waste. As discussed earlier, the Treasury Department and the IRS have determined that distinguishing between these products will facilitate efficient and consistent evaluation of GHG emissions rates taking into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H). However, regardless of how a material is categorized, the LCA must consider whether the availability of the section 45Y and 48E credits will result in additional production or use of that material or changes in the supply chain of that material resulting in GHG emissions effects and take into account any direct and indirect emissions impact of the additional production or use and such changes.

Another commenter stated that, in the case of municipal solid waste facilities, intentional generation of waste is unlikely because the cost of waste disposal will be greater than the value of the credit. The Treasury Department and the IRS appreciate this commenter feedback and have taken it into consideration. Because this is a technical claim that must be evaluated in the context of an LCA and is applicable to only certain categories of feedstock, it would not be appropriate to incorporate these recommendations in the text of the final regulations as a generally applicable rule.

In the preamble to the proposed regulations, the Treasury Department and the IRS also requested comment on whether the classification of feedstocks as products, co-products, byproducts, or waste change depending on the technology. Specifically, the Treasury Department and the IRS asked whether products, co-products, byproducts, and waste should be described and accounted for differently if derived from biogenic sources.

The Treasury Department and the IRS received a wide range of comments in response to this question. A number of commenters requested that either all or a subset of woody biomass feedstocks be designated as waste or residue, with many pointing to woody biomass-specific industry definitions of terms like waste, residue, co-product, and byproduct. Some commenters requested that woody biomass feedstocks be designated as waste or residue if the feedstock is not intentionally grown and harvested for wood energy applications or if the feedstock is grown in a particular region where woody biomass has an alternative fate that is typically high in GHG emissions. One commenter requested that woody biomass feedstock that is left over from the manufacturing and repair of wood pallets be classified as a residue.

One commenter suggested that products, co-products, byproducts, and waste be accounted for differently if derived from biogenic sources by using ASTM D6866 Method B to determine and report their biogenic content. This commenter noted this standard's use in Canada's Clean Fuels Regulation.

Other commenters recommended against classifying woody biomass feedstocks as waste or residue. Some stated that the definition of these terms as used in the forest industry is broadly defined and does not sufficiently consider alternative uses of the feedstock. Some further expressed concern that the appropriate designation of woody biomass as a residue or a waste is not verifiable after its initial processing by foresters.

One commenter asked that the final regulations clarify whether the LCA will recognize treatment of residue materials as distinct from waste. The commenter further recommended that forestry and logging residues should be defined as

''materials generated by some other process, where the alternative fate is decomposition or burning without energy recovery.'' The commenter suggested that such materials should not be designated as residues if their most likely alternative fate is decay because it is less carbon intensive than burning the materials for electricity.

One commenter recommended that trees harvested for the forest biomass industry that come from land harvested entirely (or almost entirely) to satisfy wood pellet or bioenergy demand not be designated as byproducts. The commenter stated that because the trees would not have been harvested but for demand from the forest biomass industry, they are therefore the primary economic driver of the harvest and thus not a byproduct. The commenter further recommended that the final regulations clarify what it means for a material to be the primary economic driver of a process.

The Treasury Department and the IRS also received a comment about the designation of materials used by a WERP facility. A commenter recommended that the final regulations treat such waste heat as a waste product.

The Treasury Department and the IRS appreciate these commenters' feedback and have taken it into consideration. Because technical and fact-specific suggestions regarding designation or emissions accounting for a particular feedstock must be evaluated in the context of an LCA, the suitability of these recommendations requires further consideration of their application to specific cases and these recommendations are not included in these final regulations at this time.

The Treasury Department and the IRS have also determined that distinguishing between residues and wastes in the final regulations is unnecessary. The principles for categorizing and evaluating the GHG emissions of materials that are provided in these final regulations require an assessment of their associated uses or removal or disposal processes, as applicable, and associated GHG emissions. This requirement mitigates the need to address a distinction between residues and wastes as a residue may be categorized within one of the categories defined earlier.

The Treasury Department and the IRS have further determined that further clarification of the term ''the primary economic driver of the process'' within the previously described definitions is not necessary in the final regulations because this concept provides sufficient clarity in conducting an LCA.

3. LCA Modeling Topics

a. Certain Issues Related to LCA Baselines and Modeling

The preamble to the proposed regulations posed twelve questions related to factors that must be considered to assess the net GHG emissions associated with the production of electricity by a C&G Facility in the context of the section 45Y and 48E credits. This list included questions on six subtopics, including about: (1) the creation and maintenance of LCA baselines; (2) existing models and data sources that could be used for modeling; (3) how to account for incentives created by the section 45Y and 48E credits; (4) how to establish feedstock categories; (5) how to assess shocks; and (6) how to account for variation and uncertainty in models. Responses to comments received about the creation and maintenance of LCA baselines can be found in section VIII.C.2.c. of this Summary of Comments and Explanation of Revisions. Responses to comments received about how to account for incentives created by the section 45Y and 48E credits can be found in section VIII.D.2. of this Summary of Comments and Explanation of Revisions. This section contains responses to the comments received on the other four sub-topics listed earlier.

i. Feedstock Categorization

The preamble to the proposed regulations requested comment on feedstock classification and posed a series of questions. The Treasury Department and the IRS received a number of comments in response to these questions. One comment expressed support generally for the idea of differentiating between subcategories of feedstock in the LCA, and another comment recommended subcategorizing feedstocks to the greatest extent possible.

The Treasury Department received a number of comments on the topic of whether to subcategorize biomass feedstocks to differentiate between feedstock that is waste and feedstock that is not. Several commenters expressed support for this idea, while several others expressed opposition to it. *See* section VIII.D.2. of this Summary of Comments and Explanation of Revisions for further discussion of categorizing some feedstock as waste.

The Treasury Department and the IRS received comments that provided a range of suggestions regarding how best to categorize woody biomass feedstocks. A few opposed subcategorization of woody biomass feedstocks. One commenter recommended that forest biomass feedstocks be considered one type or category of facility to avoid unduly burdensome complex analysis. Another who opposed subcategorizing feedstock altogether urged that, in the event that forest biomass feedstocks are subcategorized, the Treasury Department require reliable, verifiable bases for each sub-categorization as a means of reducing uncertainty. Several commenters endorsed the idea of creating subcategories of woody biomass feedstock and provided various recommendations about how to do so. One commenter recommended that trees be categorized based upon species and upon management practices such as clear cutting or thinning to most accurately capture ''carbon debt payback times.'' Another recommended that woody biomass forest feedstock be categorized based on use, with at least five categories, including saw timber, low-grade roundwood or pulpwood, forestry or harvesting residues, sawmill and other woody industry residues, and post-consumer waste wood. A different commenter suggested creating feedstock categories that are further divided by the feedstock's potential alternative fates.

Several commenters provided information or recommendations on how blends of fuels or feedstocks should be treated in the LCA or the annual publication of emissions rates. One commenter suggested that precaution is warranted to ensure that facilities using a blend of fuels are not deemed to have a net GHG emissions rate of not greater than zero if they do in fact have a positive net GHG emissions rate. Another commenter recommended that the LCA accommodate site specific feedstock use, which may include mixed feedstocks or blending with RNG. Finally, one commenter stated that there are several options for providing an emissions rate to facilities that use a mix of feedstocks. This commenter further stated that the Secretary could provide a formula by which taxpayers can use the published emissions rates in the Annual Table to calculate their facility's rate; that all facilities using a blend of fuels could be required to obtain an emissions rate via the provisional emissions rate (PER) process; or that facilities using multiple fuels could be deemed to be multiple separate facilities for the purposes of the credit and a rate calculated for each facility.

The Treasury Department and the IRS, appreciate these recommendations and have taken them into consideration. However, given the diversity of fuel and feedstock blends that may be evaluated for the purposes of the section 45Y and

48E credits, incorporating specific requirements suggested by these commenters in the text of the final regulations would be inappropriate as a generally applicable rule. Therefore, the commenters' recommendations will not be included in the text of the final regulations.

ii. Shocks

In the preamble to the proposed regulations, the Treasury Department and the IRS posed several questions about the treatment of shocks in modeling. One such question solicited comment regarding what factors should be considered to determine the appropriate scale(s) of feedstock demand changes or other shocks to evaluate the extent to which the production, processing, and use of the feedstocks used for electricity production results in net greenhouse gas emissions. One commenter recommended that the scale of demand be assessed in the context of what types of feedstocks are most likely to be used, which the commenter recommends projecting based on current practice.

In the preamble to the proposed regulations, the Treasury Department and the IRS further requested comment on whether shocks should reflect a small incremental increase in the use of the feedstock to reflect the marginal impact or a large increase to reflect the average effect of all potential users. One commenter recommended that both approaches be used to provide a comprehensive understanding of the potential impacts of the change.

Another commenter suggested that incremental increases may not accurately reflect the consequences of a policy because large demand shocks can have qualitatively different effects than incremental shocks. This commenter further stated that a shock that reflects all users can be a poor tool in cases in which local markets are important. This commenter recommended estimating regional factors before averaging to find the effect on all users and suggested that model testing be similarly applied to evaluate differences between marginal increases in feedstock demand and absolute demand provided in the region.

In the preamble to the proposed regulations, the Treasury Department and the IRS also requested comment on what the general increment of the shock could be and whether it should be specified as an absolute or relative increase. One commenter suggested that when demand is not pre-determined, scenario modeling could be used to evaluate potential effects. The commenter recommended complementing this analysis with a series of marginal model runs to evaluate how an increase in demand impacts model results.

Finally, in the preamble to the proposed regulations, the Treasury Department and the IRS requested comment on what factors should be considered to determine whether shocks for different feedstocks should be implemented in isolation (separate model runs), in aggregate (for example, as an across-the-board increase in biomass usage endogenously allocated by the model across feedstocks), or something in between (for example, separately model agriculture-derived and forest-derived feedstocks, but endogenously allocate within each category). A commenter recommended that similar feedstocks that offer comparable results in model testing be implemented in aggregate. Another commenter suggested that in a regulatory framework, it is likely most appropriate to model at the asset level, such as by modeling a shock applied to the surrounding landscape based on anticipated demand for feedstock of a new bioenergy investment.

The Treasury Department and the IRS appreciate these recommendations and have taken them into consideration. However, given the complexity of modeling shocks in the LCA and the diversity of fuels and feedstocks that may be evaluated for the purposes of the section 45Y and 48E credits, incorporating the specific requirements suggested by these commenters in the final regulations would be inappropriate as a generally applicable rule. Therefore, the commenters' recommendations will not be included in the final regulations.

iii. Variation and Uncertainty in Models

In the preamble to the proposed regulations, the Treasury Department and the IRS posed a number of questions about the treatment of variation and uncertainty in evaluating model estimates. Commenters provided a range of recommendations in response to these questions. Some suggested that modeling multiple outcomes is an important factor in reducing the uncertainty of modeled GHG emissions changes. One commenter further recommended that Treasury be transparent about the assumptions made when modeling, ensure that biomass feedstock utilization assumptions are backed by robust traceability and a supply chain of custody to ensure that the biomass modeled in the LCA is the biomass transported across the supply chain, and use conservative estimates. Another commenter recommended a similarly precautionary approach in situations in which a given assumption could ''fully flip'' an outcome from being calculated as a net climate benefit to being calculated as a net climate harm.

One commenter noted their support for the use of consequential modeling, stating that their recommendation is ''in part'' because land sector modeling is frequently subject to large uncertainties that are better addressed by effective policy design than by embedding quantified impacts within the regulatory framework. The commenter stated that this is especially true when applying complex econometric modeling to scenarios relying on large temporal and spatial boundaries.

Another commenter similarly noted that longer assessment horizons increase uncertainties and asserted that using an assessment horizon that constrains the compounding effects of uncertainties is an essential component to limit uncertainty. This commenter further recommended against the use of economic models, stating that they generate unacceptable levels of uncertainty.

The Treasury Department and the IRS appreciate these recommendations and have taken them into consideration. However, given the complexity of considering variation and uncertainty in evaluating model estimates and the diversity of fuels and feedstocks that may be evaluated for the purposes of the section 45Y and 48E credits, incorporating the specific requirements suggested by these commenters in these final regulations would be inappropriate as a generally applicable rule. Therefore, although the considerations that commenters raise—such as the importance of verification and the uncertainty inherent to modeling—have been incorporated in concept in other aspects of the LCA and substantiation requirements, the commenters' specific recommendations will not be included in these final regulations.

b. Recommended Models and Modeling Sources

i. Recommended LCA Models

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment regarding what existing model or suite of models are capable of completing an LCA consistent with the section 45Y(b)(2)(B) and proposed § 1.45Y–5(d) and (e) and asked for additional information regarding suggested models. Commenters provided a wide range of views. Several commenters requested a consistent and technology-neutral approach be adopted for LCA assessment of all renewable energy

technology and from all feedstocks. Another commenter emphasized that whatever model is employed, it is critical that it reflects current peer reviewed literature and is well supported by available data and science.

Most commenters strongly advocated for the use of a version of the GREET model to complete an LCA consistent with requirements of the section 45Y and 48E credits. Several commenters noted that the GREET model is thorough, widely accepted, and the ideal model to be used for tax incentives in the IRA. These commenters further asserted that allowing the GREET model as the assessment tool for the section 45Y and 48E credits (in addition to the section 40B and 45V credits) would further bring all the emission calculations required under the IRA tax credit provisions under a single verification regime, which could be controlled by U.S. Federal agencies responsible for implementing the IRA 2022 tax incentives. A commenter emphasized that methodological consistency between IRA tax credits is important to avoid unintended market effects, particularly if credited products under sections 45Y and 48E, 40B, and 45V have overlapping accounting boundaries (for example, RNG lifecycle emissions are relevant under all four). Notably, most commenters overwhelmingly supported the use of the GREET model for the emissions assessment required by sections 45Y and 48E without specifying a specific version of the GREET model.

While supporting the use of the GREET model, a commenter noted that the GREET model is still an approximation of reality and must be regularly updated to reflect real-world trends and the latest research. Several commenters recommended that the Treasury Department and the IRS leverage both the existing GREET model and EPA modeling to inform feedstock-specific GHG emissions rates and associated avoided emissions.

Other commenters specifically requested that the former ANL–GREET model, (now referred to as the R&D GREET model) be used. Specially, these commenters asserted that the Treasury Department and the IRS adopt the 2023 R&D GREET model (or a successor) for emissions assessments for the section 45Y and 48E credits. These commenters note that this would assist the Treasury Department and the IRS in timely providing a model and allow for efficiencies going forward as the R&D GREET model is already regularly updated. These commenters also assert that using the R&D GREET model (or a successor) will make the LCA process clearer, more certain, and more effective, consistent with congressional intent to encourage the deployment of zero-emission technologies. Other commenters suggested the use of the R&D GREET model because it takes methane leakage and counterfactual assumptions into account. A commenter noted that using the R&D GREET model will reduce the prospect of relying on the PERs process because the R&D GREET model allows for site-specific RNG carbon intensity scores. Another commenter noted that the R&D GREET model is another publicly available model which has incorporated a process model for estimating emissions from landfills. However, the commenter noted that the current version of the GREET R&D model needs several updates and modifications to properly reflect the latest peer-reviewed information.

Several commenters opposed the use of the GREET model. A commenter noted that the GREET model lags deployment and so favors longer established technologies like wind and solar to the detriment of technologies such as biomass gasification with CCS. This commenter noted that relying on the GREET model would certainly disadvantage and perhaps disqualify new technologies that are the most carbon-negative, while simultaneously favoring projects which would use a fuel such as municipal solid waste, which is not climate friendly, yet is considered by the model to be carbon-negative. This commenter also asserted that such a perverse incentive is not a desired outcome and yet is possible with the application of a static model to a dynamic industry deploying novel and first-of-kind technologies. Other commenters opposed the use of the GREET model by asserting that the GREET model underestimates avoided methane emissions from diverting waste from a landfill. The Treasury Department and the IRS do not believe that the R&D GREET model is the appropriate model for determining GHG emissions rates for the section 45Y and 48E credits because it does not conform to the principles and requirements for LCA analysis provided in this final regulation.

Several commenters suggested the use of alternate models for a specific type of feedstock. For municipal solid waste (referred to as MSW), several commenters recommended the use of the MSW–DST and the EPA's WARM models, which are publicly available waste management-focused lifecycle models. The MSW–DST is an LCA model tailored directly for the waste sector that has been used by the DOE's National Renewable Energy Laboratory (NREL) for previous analyses. The WARM model is provided by the EPA and specifically built to allow high-level comparisons of potential greenhouse gas emissions reductions, energy savings, and economic impacts when considering different materials management practices.

A commenter expressed concern that both the MSW–DST and the WARM models require further refinements to ensure they are accurately quantifying the GHG emissions outcomes associated with diverting post-recycled waste from landfills to waste-to energy (WTE) facilities. The commenter noted that these models are not equipped to model emissions for other energy generation technologies and acknowledges that the use of these models for wastes, while potentially using the GREET model to evaluate other technologies, could pose challenges.

For biomass, several commenters recommended the use of the California Biomass Residue Emissions Characterization (C–BREC) model. These commenters note that the C–BREC model provides a robust LCA for forest residues used for electricity generation, which enables detailed and transparent accounting for GHG and air pollutant emissions and evaluates emissions across different project profiles, including the reference fate of unutilized biomass. The commenter noted that although the C–BREC model results show that the emissions associated with wildfire risk are significant for biomass residues left in the forest, the wildfire probability factors used in the model are outdated and the real risk is much higher. Therefore, the commenter asserts that C–BREC likely underestimates the actual risk of wildfires in California, leading to potential underestimation of emissions from biomass residues left in forests.

Several commenters suggested models related to forest-related feedstocks. A commenter suggested the use of the published C–ROADS and En-ROADS models to calculate forest ecosystem and harvested carbon estimates. The commenter noted that these dynamic models represent the carbon cycle, budgets and stocks of GHGs, radiative forcing, and the heat balance of the Earth. The commenter also noted that both models are freely available and fully documented.

Another commenter supported the use of timber projection models like ATLAS (Aggregate Timberland Assessment System), which is managed and updated by the U.S. Forest Service, providing projections at regional and

national scales. This commenter noted that ATLAS models different timber yield scenarios, and their respective implications for carbon stocks.

Additionally, a commenter supported the use of the Landscape Carbon Factor Tool, developed by the American Forest Foundation, to calculate net carbon stock changes in forest regions of variable sizes using the USFS Forest Inventory Assessment (FIA) data. The commenter noted that this tool can provide important data on the current state of carbon stocks in a sourcing area that can be used to inform a full consequential LCA, which will also predict future changes in carbon stocks. The commenter pointed out that this tool could be used as an initial screen to determine whether biomass will meet the ''not greater than zero'' emissions rate criterion provided that net forest stocks in the region of consideration are maintained or increased.

While no commenters suggested using the Forestry and Agricultural Sector Optimization Model with Greenhouse Gases (FASOM–GHG) Model to assess GHG emissions for purposes of the section 45Y and 48E credits, several commenters specifically asserted that the Treasury Department and the IRS should not adopt it for this purpose. These commenters noted that the FASOM–GHG model is not a credible source of estimates of wood harvest emissions due to a lack of global analysis, poor performance for this purpose, lack of reasonable cost data and contradiction with known estimates, and structural bias.

The Treasury Department and the IRS appreciate the thoughtful responses provided by commenters. After taking into account the wide variety of different mechanisms for generating electricity through combustion or gasification that would require an LCA, the Treasury Department and the IRS have determined that there is not a clear or obvious single model or models that would be appropriate for all situations. After consideration of these comments, the Treasury Department and the IRS will coordinate with Federal agency scientific and technical experts on the selection and development of a model or models to assess net GHG emissions for purposes of the section 45Y and 48E credits.

ii. Recommended Data Sources and Peer-Reviewed Studies

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comments regarding what data sources and peer-reviewed studies provide information on different feedstock production systems that would be most important to consider for gathering data for LCA modeling. The Treasury Department and the IRS also noted that these sources and studies should provide information on the feedstock production process (ideally, beginning with the extraction or generation of the feedstock and ending at the electrical meter) and on markets related to the feedstock production process.

The commenters recommended a wide range of data sets to provide information on different feedstock production systems. A commenter noted that feedstock production systems vary by industry and should be assessed on an industry-by-industry basis. However, the same commenter also noted that the same principles can be used to make decisions on feedstock production system irrespective of the industry.

For biomass, a commenter recommended the use of forest inventories that characterize the stocks of carbon in different forests. This commenter noted the USDA Forest Service's Forest Inventory and Analysis (FIA) Program as an open-source, nationally consistent inventory of forest resources that is regularly updated. Further, the commenter noted that the FIA database provides comprehensive information on forest stand characteristics, growth rates, and carbon stocks across different regions of the United States. It employs direct measurements from a network of permanent sample plots, offering high-quality, empirical data at both regional and national scales.

For MSW, several commenters noted that the EPA should be referenced as a primary source of information on the physical properties of MSW and specifically pointed to the EPA's emission factor database, AP–42: A Compilation of Emissions Factors from Stationary Sources (AP–42), based on data from 40 landfills, U.S. EPA Landfill Gas Emission Model (LandGEM) default L0 for inventory purposes. Additionally, a commenter noted that the importance of data reported from the combustion of MSW at existing WTE facilities to the EPA's GHGRP. These commenters asserted that given the extensive monitoring employed at WTE facilities, they can serve as a critical source of lifecycle data, including for biogenic carbon fraction and total carbon content both for WTE emissions and to serve as a possible resource for data on process inputs used for the baseline scenario of landfilling.

The Treasury Department and the IRS appreciate the data sources provided by commenters. Given the extensive range of feedstocks and types of facilities, and the fact that no data source seems to address all use cases, the Treasury Department and the IRS are continuing to evaluate and consider the utility of the data sources identified by commenters. The Treasury Department and the IRS will coordinate with Federal agency scientific and technical experts on the use of data sets in the development of a model or models to assess GHG emissions for purposes of the section 45Y and 48E credits.

E. Treatment of Specific Types of Facilities and Feedstocks

1. Combined Heat and Power (CHP) Property

Section 45Y(g)(2)(A) provides that the kWh of electricity produced by a taxpayer at a qualified facility includes any production in the form of useful thermal energy by any CHP property within such facility, and the amount of GHGs emitted into the atmosphere by such facility in the production of such useful thermal energy will be included for purposes of determining the GHG emissions rate for such facility. The inclusion of thermal energy production-related emissions in an LCA for a CHP property introduces additional considerations, such as how to set an appropriate baseline for useful energy production-related emissions and what rules should govern the attribution of emissions for thermal energy production. In the preamble to the proposed regulations, the Treasury Department and the IRS indicated an intention to clarify the principles for assessing the emissions related to the generation of useful thermal energy by a CHP property in an LCA in the final regulations for the section 45Y and 48E credits and posed a number of questions.

Several commenters requested that CHP property be categorized as non-C&G Facilities. A commenter requested that CHP property that derives its energy from facilities on the ''categorically non-C&G'' list should also be included on that list. However, the statute does not alter the definition of a ''qualified facility'' for CHP property, and the Treasury Department and the IRS therefore do not have the authority to treat CHP property that produce electricity through combustion or gasification any differently from other facilities (that is, the same rules for classifying facilities and determining emissions rates apply). However, the Treasury Department and the IRS note that certain types of CHP facilities may meet the definition of a Non-C&G Facility if they do not produce electricity and heat through combustion.

Under the statute, to determine the amount of GHGs emitted by a C&G CHP property, the LCA must include the net GHG emissions emitted by that facility in the production of useful thermal energy. For purposes of an LCA for a CHP property, the Treasury Department and the IRS asked what principles should govern how GHG emissions from the production of useful thermal energy are calculated. In response, several commenters advocated for the use of an output-based standard for emissions calculation for a CHP property. An output-based standard is based on emissions per unit of energy generated rather than amount of fuel used, which is addressed in an input-based standard. Commenters asserted that an output-based standard is appropriate to govern an LCA for a CHP property because it produces two useful outputs (electrical and thermal energy) that are each fully credited under this analysis.

Additionally, several commenters recommended that the final regulations adopt LCA principles similar to those incorporated by the 2023 R&D GREET model (or a successor), which includes inputs for ''equivalent electric efficiency using fuel allocated to power generation'' and ''overall plant conversion efficiency.'' These commenters supported this recommendation by noting that this LCA approach would incorporate principles similar to the LCA principles used for the section 40B and 45V credits. A commenter noted that an LCA for natural gas-fired CHP property should account for lower emission gas supplies, or use assumptions for project-specific leakage rates, to encourage suppliers to reduce methane leakages. The Treasury Department and the IRS appreciate this feedback and will consider these recommendations as LCA development for CHP property continues.

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment regarding what principles should be used to determine the baseline for useful thermal energy production by a CHP property. In response, several commenters noted that fossil fuel displacement should be the baseline for an LCA for a CHP property. The commenters asserted that to quantify the GHG emissions savings of a CHP property, the emissions from the CHP property should be subtracted from the fuel use that would normally occur without the CHP property in place—normally generating heat from an onsite natural gas boiler and using power from offsite generation powering the grid. The commenters suggested establishing a baseline emissions profile and then quantifying expected GHG emission reductions and providing methods for accounting for the displacement of marginal grid resources to account for energy efficiency improvements. To support this recommendation, the commenters generally cited common LCA practice, ISO guidance, and the plain language of the CAA for calculating GHG emissions.

A commenter recommended that an LCA assess GHG emissions from the production of useful thermal energy in a CHP property by using a baseline emissions rate composed of (i) an electric-only plant using the same prime mover design (make/model of the steam turbine, combustion turbine or reciprocating engine plant) producing the same net quantity of electricity generation as produced in the CHP property; and (ii) a natural gas boiler producing the same net quantity of useful thermal energy produced in the CHP property. The GHG emissions from the production of useful thermal energy in the CHP property would then be calculated by subtracting the emissions of the CHP property (based on LCA emissions per unit of fuel consumed) and the net generation of electrical and thermal energy (net of energy produced and used within the facility before energy is exported from the facility) from the baseline emissions.

Similarly, a commenter noted that following the GHG Protocol for Project Accounting, the typical baseline for C&G projects would include the current fate of the residue, the current emissions associated with the grid where the project would be located, and the current energy source for thermal energy when looking at a CHP property. The commenter recommended that an LCA is conducted for the baseline, and an LCA is conducted for the proposed project. The difference between these two is the ''net'' GHG emissions rate for the project.

Additionally, several commenters supported the adoption of displacement principles by noting that biologic carbon (such as wood) would enter the atmosphere regardless of whether it is combusted or through the ecological process of decomposition once a tree dies. Conversely, these commenters noted that fossil fuels are sources of geologic carbon that would otherwise not enter the atmosphere if not for their combustion. Therefore, the commenters asserted that wood utilized for cogeneration releases no additional net carbon to this cycle and can even reduce emissions when used as a substitute for fossil fuels.

While supporting the adoption of displacement principles in an LCA, several commenters also advocated for the final regulations to give credit for avoided GHG emissions from the alternative fate of the biomass which include being piled and burned with uncontrolled criteria pollutants and GHG emissions; masticated and left on-site, increasing fuels for future fires; or transported long distances to available disposal sites, incurring high costs and associated emissions. These commenters also noted that an LCA must credit emissions offsets by biomass generated energy when compared to the emissions from alternative replacement power. These commenters noted that if these two considerations are allowed, utilization of woody biomass will easily be shown to be carbon neutral or likely negative, with net GHG emissions at an acceptable level. The issues raised by these comments are addressed in section VIII.C. of this Summary of Comments and Explanation of Revisions.

Section 45Y(g)(2)(A) provides a special rule for CHP property, which explicitly includes any production in the form of useful thermal energy in the calculation of the credit as well as the amount of GHG emissions from the facility in the production of such useful thermal energy. After consideration of the comments, the Treasury Department and the IRS have determined that the best reading of section 45Y(g)(2)(A) is that thermal energy produced by a CHP property is accounted for with the electricity produced by the facility in assessing the GHG emissions from the facility. As a result, the baseline for GHG emissions from thermal energy produced by a CHP property are zero, which is consistent with LCA accounting for electricity and provides a consistent baseline between electrical and thermal energy. Even though it is a departure from some of the LCA methods typically used within the CHP industry, this treatment is an option within LCA accounting methodology that is consistent with the principles and requirements for an LCA used to determine a GHG emissions rate for purposes of sections 45Y and 48E.

Additionally, the preamble to the proposed regulations noted that there may be scenarios in which a facility generates electricity that is used (i) by the electricity generation facility in the production of electricity; or (ii) in the production of fuel ultimately consumed by that facility to generate electricity. For example, a wastewater treatment plant's post-processing materials are digested to produce biogas; this biogas is then used in a CHP property that

produces electricity; and this electricity is consumed by the wastewater treatment facility. The Treasury Department and the IRS requested comment on what principles should be used to determine how GHG emissions from the consumption of electricity in the production of electricity or in the production of the fuel consumed by the facility are calculated. In response, a commenter noted they were not aware of any circumstances in which any CHP property host would consume electricity from the CHP property for the sole or primary purpose of generating electricity. The commenter also noted that generally facilities hosting CHP property use the electricity and thermal energy onsite to meet the needs of host facility or export that energy via the grid or district energy system respectively. The commenter asserted that to the extent such facilities support the production of useful biogas from the wastewater stream that can be used for future fuel for the CHP property, the Treasury Department and the IRS should not craft rules that would discourage productive use of byproducts as fuel.

The Treasury Department and the IRS confirm that the rules provided in these final regulations are not intended to encourage or discourage certain fuels or feedstocks for electricity production but to outline LCA principles such that LCAs of C&G Facilities, including CHP property, result in impartial and robust assessments of net GHG emissions across feedstocks, fuels, and facility types to determine eligibility.

The preamble to the proposed regulations similarly noted that there may be scenarios in which a facility self-consumes thermal energy that it produces, for example, if a facility generates steam as a byproduct that is used (a) by the facility to turn a turbine that generates electricity or (b) to clean or compress fuel ultimately consumed by that facility to generate electricity. The Treasury Department and the IRS requested comment regarding what principles should be used be used to determine GHG emissions from the self-consumption of thermal energy by the CHP property. In response, a commenter proposed that facilities should not be assessed based on the purposes for which the useful energy is used, including both electricity and the heat in the case of a CHP property. Proposed § 1.45Y–5(d)(2)(ii) provided that the ending boundary ''for electricity that is transmitted to the grid or electricity that is used on-site is the meter at the point of production of the C&G Facility'' therefore the use of the electricity does not impact the LCA assessment as it is outside of the LCA system boundary. *See* section VIII.C. of this Summary of Comments and Explanation of Revisions for additional discussion of comments pertaining to the LCA ending boundary.

The anticipated future baseline scenario as described in § 1.45Y–5(d)(2)(iii) will not be impacted by whether the electricity is sold to the grid or used onsite. Therefore, whether the electricity generated from any type of facility, including a CHP property, is supplementing or replacing an existing power source onsite or grid electricity for the host facility (for example, a wastewater treatment plant) will not impact the LCA of the generating facility.

2. Biomass

The Treasury Department and the IRS received a number of comments pertaining to the use of biomass as a feedstock in the production of electricity. While these comments and their responses are addressed throughout this Summary of Comments and Explanation of Revisions, the following paragraphs address comments regarding the substantiation of eligibility for the section 45Y and 48E credits for taxpayers whose C&G Facility uses biomass as a feedstock.

In the preamble to the proposed regulations, the Treasury Department and the IRS requested comment on the types of documentation that taxpayers should be required to maintain to substantiate eligibility for the section 45Y and 48E credits. Specifically, comment was requested on the types of documentation or substantiation a taxpayer should maintain to establish that an input in the supply chain of a fuel or feedstock used for electricity production has the energy attributes or other relevant characteristics that were taken into account in determining a GHG emissions rate; what existing systems, industry standards, or practices may be used to substantiate that a facility's operations and supply chain for such inputs resulted in a GHG emissions rate that is not greater than zero; how to develop such tracking and verification systems if they do not currently exist and how long development of such systems may take; and what supply chain tracing systems or verification bodies address fuels or feedstocks that may be commonly used by facilities that may be eligible for the section 45Y and 48E credits.

The Treasury Department and the IRS received a number of comments about whether taxpayers should be required to maintain documentation or provide third-party verification of fuels or feedstocks in order for their qualified biomass facility to be eligible for the section 45Y and 48E credits. While some noted the importance of oversight and independent means of verification to properly substantiate that inputs to fuel or feedstock have the energy attributes or other relevant characteristics that were taken into account in determining a GHG rate, others disagreed. Some commenters requested that taxpayers whose qualified facilities have less than one megawatt of capacity not be required to maintain or provide any documentation to be eligible for the section 45Y and 48E credits. These commenters further recommended that taxpayers be required only to self-attest to the volume of biogenic feedstock received under a given category for that year, total generation, and percentage of fuel usage, similar to the procedure that currently exists for biomass facilities participating in the California Bioenergy Market Adjusting Tariff (BioMAT).

Other commenters suggested verification bodies or tools for use in confirming the GHG emissions rate of qualified biomass facilities. One commenter suggested a tool in development that they have commissioned to calculate net carbon stock changes in forest regions. Other commenters suggested existing third-party certifications, such as those provided by the Sustainable Forestry Initiative (SFI), the Forest Stewardship Council (FSC), the Sustainable Biomass Program (SBP), and the International Sustainability and Carbon Certification System (ISCC). However, some commenters critiqued the design of these certifications, asserting that they provide inadequate monitoring and enforcement.

The Treasury Department and the IRS appreciate the information shared by commenters on these matters and have taken it into consideration. Woody biomass can pose unique issues warranting verification because wood sourced from different types and parts of trees may have very different LCA profiles but appear uniform after processing and upon delivery to an electricity production facility. The Treasury Department and the IRS intend to provide additional information in future guidance about how taxpayers should substantiate compliance with the statute's requirements. *See* section VIII.J. of this Summary of Comments and Explanation of Revisions for more information about substantiation. To ensure that C&G Facilities that utilize biomass feedstocks meet the statutory requirement of a net GHG emissions rate not greater than zero, the Treasury Department and the IRS anticipate that

it may be appropriate to require or encourage taxpayers to maintain third-party certification that verifies that these facilities meet the criteria that the LCA has found are necessary for a facility to meet this statutory requirement.

3. Waste-to-Energy (WTE) Facilities

The Treasury Department and the IRS received many comments pertaining to the use of WTE facilities in the production of electricity. While these comments and their responses are addressed throughout this preamble, including in section VIII.C. (LCA Requirements), the following paragraphs address comments regarding the eligibility for the section 45Y and 48E credits for taxpayers that use WTE facilities (such as landfills and waste incinerators) in the production of electricity.

Commenters have sharply divergent views regarding the eligibility of WTE facilities for the section 45Y and 48E credits. Many commenters requested that the production of electricity from WTE facilities be specifically excluded from qualifying for the credits. To support this view, several commenters noted that WTE facilities are significant emitters of GHG emissions, and as it was clearly not the intent of Congress to allow GHG producing industries to be eligible for the credits, WTE facilities should not be eligible. These commenters also asserted that WTE facilities should not be eligible for the credits because WTE facilities are disproportionately located in low-income and marginalized communities and can endanger a community's health.

Conversely, several commenters strongly advocated for the eligibility of WTE facilities for the section 45Y and 48E credits. These commenters noted that WTE facilities would have traditionally fit into the category of landfill or trash facilities once eligible for the section 45 credit and therefore, should be eligible for the section 45Y and 48E credits. Several commenters requested that WTE facilities be included as Non-C&G Facilities on the Annual Table that will be published by the Treasury Department and the IRS.

The Treasury Department and the IRS appreciate the input shared by commenters and have taken it into consideration. Because WTE facilities produce electricity through combustion, they are C&G Facilities, and whether a WTE facility is eligible for the section 45Y or 48E credits must be assessed through an LCA. Accordingly, categorically excluding or including WTE facilities as eligible for the section 45Y and 48E credits is not appropriate unless and until their eligibility has been assessed and confirmed through an LCA that satisfies all the requirements of section 45Y(b)(2)(B) and these final regulations. The final regulations will therefore not reflect these commenters' suggestions.

4. Use of Natural Gas Alternatives

The Treasury Department and the IRS announced in the preamble to the proposed regulations an intent to provide final regulations addressing electricity production that uses biogas, RNG, and fugitive sources of methane (collectively, natural gas alternatives), for purposes of the section 45Y and 48E credits. The assessment of GHG emissions with respect to such natural gas alternatives presents a complex set of technical questions. Thus, the preamble to the proposed regulations described various rules related to the use of natural gas alternatives in the production of electricity that the Treasury Department and the IRS were considering for inclusion in these final regulations. The preamble to the proposed regulations also included detailed comment requests about various aspects of the use of natural gas alternatives to inform the development of these final rules.

The Treasury Department and the IRS received many comments regarding the treatment of natural gas alternatives. While specific recommendations are addressed later in this section, commenters broadly emphasized the importance and complexity of establishing appropriate alternative fates for these feedstocks. For example, some commenters noted that it is critical for the Treasury Department and the IRS to provide clear rules to enable RNG to be used in the production of clean electricity. Other commenters warned that failure to specify appropriate guardrails in this area could lead to incorrect emissions assessments and substantial claims under sections 45Y and 48E for C&G Facilities that in fact have net rates of GHG emissions that are greater than zero, which would undermine the purpose of sections 45Y and 48E.

The Treasury Department and the IRS agree with commenters that the determination of alternative fates for natural gas alternatives is both complex and important for accurately determining eligibility under sections 45Y and 48E. GHG emissions rates for C&G Facilities generally must be determined consistent with section 45Y(b)(2)(B) and the rules provided in § 1.45Y–5(d) and (f). Within this statutory and regulatory framework, the Treasury Department and the IRS have determined that specifically addressing the assessment of alternative fates for natural gas alternatives will help ensure accurate lifecycle GHG emissions determinations and prevent improper credit claims, advance sound tax administration, and increase certainty for taxpayers. Therefore, § 1.45Y–5(e)(3) applies the rules in § 1.45Y–5(d) and (f) to establish alternative fates for natural gas alternatives from certain sources that are used by a C&G Facility in the production of electricity. In assessing the alternative fates for certain sources of natural gas alternatives that may be used by a C&G Facility in the production of electricity, as provided in § 1.45Y–5(e)(3), the Treasury Department and the IRS consulted extensively with interagency technical experts, including technical experts from the National Laboratories, to ensure that the requirements of the section 45Y and 48E credits, as well as the rules in § 1.45Y–5(d) and (f), were applied consistent with sound scientific principles.

The use of natural gas alternatives and the assessment of lifecycle GHG emissions (as defined in section 42 U.S.C. 7545(o)(1)(H)) associated with such use is relevant beyond the section 45Y and 48E credits. For example, for purposes of the section 45V credit, § 1.45V–4(f)(3) establishes alternative fates for certain natural gas alternatives used in the production of hydrogen. The Treasury Department and the IRS have concluded that it will provide taxpayer certainty and advance sound tax administration to require that alternative fates for natural gas alternatives be addressed consistently across sections 45V, 45Y, and 48E, to the extent possible consistent with the requirements of each statute and incorporating consideration of comments.

After careful consideration of the numerous comments submitted in response to the proposed regulations' specific requests for comment, the final regulations provide rules in § 1.45Y–5(e) related to the use of natural gas alternatives in the production of electricity and the assessment of GHG emissions with respect to natural gas alternatives. Rather than provide rules that would specify a single, generic alternative fate for all natural gas alternatives (for example, capture and flaring), the Treasury Department and the IRS have considered the technical characteristics of different sources of natural gas alternatives and sought to apply the approach most appropriate for each type of source to provide an administrable and robust alternative fate for each sector.

a. Definitions

i. Biogas

The preamble to the proposed regulations did not define the term ''biogas,'' but, in the interest of completeness and clarity, § 1.45Y–5(e)(2)(i) clarifies that the term ''biogas'' means gas containing methane that results from the decomposition of organic matter under anaerobic conditions.

ii. Coal Mine Methane

The preamble to the proposed regulations did not offer a definition of the term ''coal mine methane,'' but, in the interest of completeness and clarity, § 1.45Y–5(e)(2)(ii) provides that the term ''coal mine methane'' means methane that is stored within coal seams and is liberated as a result of current or past mining activities. ''Liberated'' coal mine methane (CMM) can be released intentionally by the mine for safety purposes, such as through mine degasification boreholes or underground mine ventilation systems, or it may leak out of the mine through vents, fissures, or boreholes. For the purpose of these regulations, the term ''coal mine methane'' does not include methane removed from virgin coal seams (for example, coal bed methane).

iii. Fugitive Methane

The preamble to the proposed regulations would have defined the term ''fugitive methane'' to mean the release of methane through, for example, equipment leaks, or venting during the extraction, processing, transformation, and delivery of fossil fuels to the point of final use, such as CMM. Commenters noted that this definition was broad but did not recommend alternatives. The proposed definition is adopted in these final regulations without substantive change in § 1.45Y–5(e)(2)(iii). One commenter asserted that under no circumstances should methane from oil and gas operations be treated as fugitive methane because methane from oil and gas operations should be attributed the emissions profile of oil and natural gas production. The Treasury Department and IRS understand this concern and note that the baseline and alternative fates relevant to certain sources of fugitive methane are further discussed at sections VIII.E.4.c.i.C. and E. of this Summary of Comments and Explanation of Revisions.

iv. Renewable Natural Gas

The preamble to the proposed regulations would have defined the term ''renewable natural gas'' to mean ''biogas that has been upgraded to be equivalent in nature to fossil natural gas.'' Some commenters suggested that the term ''renewable'' is misleading in this context because the production and use of such gas results in significant adverse impacts on public health and welfare. Although the Treasury Department and the IRS recognize these concerns, § 1.45Y–5(e)(2)(iv) does not adopt the suggested change in terminology because the term ''renewable natural gas'' is sufficiently clear, is a commonly used term in other regulatory programs and in commerce, and is unlikely to result in confusion. The term ''renewable natural gas'' and its proposed definition is therefore adopted without substantive change.

b. Considerations Regarding GHG Emissions Assessments of the Production of Electricity Using Methane From Natural Gas Alternatives

The preamble to the proposed regulations explained that the rules provided in the final regulations regarding natural gas alternatives would apply to all natural gas alternatives used for purposes of sections 45Y and 48E. The preamble to the proposed regulations described and requested comment on several provisions the Treasury Department and the IRS were considering adopting in the final regulations to address the risk of significant indirect emissions and induced emissions from the use of natural gas alternatives in the production of electricity. This risk of significant indirect emissions and induced emissions can arise when natural gas alternatives are diverted from another productive use. In these situations, such productive uses may be backfilled with a different source that is not a natural gas alternative, such as fossil natural gas, which could result in associated emissions. For example, a facility that previously used its biogas for heat may opt to import fossil natural gas to satisfy its on-site energy needs. There is also a risk of significant indirect emissions, induced emissions, or inappropriate claims of the section 45Y and 48E credits with respect to facilities that do not meet the statutory emissions requirements, if the incentives provided by sections 45Y and 48E result in the creation of new or expanded sources of methane or other GHGs that otherwise would not have existed, or the creation of additional methane that would not have been created or would have remained sequestered. Section 1.45Y–5(e)(3)(i) implements section 45Y(b)(2)(B), which, by reference to 42 U.S.C. 7545(o)(1)(H) requires consideration of direct and significant indirect emissions in the determination of the net rate of lifecycle GHG emissions into the atmosphere by a C&G Facility in the production of electricity.

i. GHG Emissions Associated With the Use of Natural Gas Alternatives

The accurate assessment of GHG emissions is vital to determining eligibility under sections 45Y and 48E. GHG emissions assessments that underestimate the emissions associated with the production of electricity would mean that the section 45Y and 48E credits could be claimed for a facility even if its GHG emissions rates in fact exceed the zero-emissions eligibility threshold established by Congress. Because the Treasury Department and the IRS lack authority under sections 45Y and 48E to allow a facility that produces electricity with a GHG emissions rate (or, in the case of section 48E, an anticipated rate) that is greater than zero to be a qualified facility under section 45Y(b) and section 48E(b), guardrails are needed in the final regulations to address the risk of such credit claims.

The preamble to the proposed regulations requested comments on the LCA considerations for methane derived from natural gas alternatives. To account for direct and significant indirect emissions, these considerations include, among other things, appropriate alternative fate scenarios and the assessment of current feedstock management practices. After consideration of the comments received, the final regulations address aspects of the GHG emissions analysis for natural gas alternatives used in the production of electricity. The following sections of this Summary of Comments and Explanation of Revisions address first productive use and general alternative fate assumptions ranging from venting to responsible avoidance of methane.

The Treasury Department and the IRS agree with commenters who assert that accurately measuring GHG emissions rates for facilities that rely on methane from natural gas alternatives to produce electricity requires taking into account a wide range of factors to establish the alternative fate against which the use of methane to produce electricity should be assessed. Consistent with the reference to 42 U.S.C. 7545(o)(1)(H), the Treasury Department and the IRS interpret section 45Y(b)(2)(B) as requiring any LCA of a C&G Facility to address direct and significant indirect emissions. For a facility using methane as a fuel or feedstock for the production of electricity, that means accounting for direct and significant indirect emissions associated with the methane including

emissions resulting from the diversion of methane from an alternative productive use or from the expansion of existing sources or creation of new sources of natural gas alternatives. Consideration of such emissions is required under the principles for included emissions specified in § 1.45Y–5(d)(2)(v).

ii. First Productive Use

The preamble to the proposed regulations provided that the Treasury Department and the IRS intended to require that in order for natural gas alternatives to receive an emissions value consistent with that gas (and not fossil natural gas), the natural gas alternative used in the production of electricity must originate from the first productive use of the relevant methane. The preamble to the proposed regulations further noted that for any specific source, productive use would generally be defined as any valuable application of the relevant methane (for example, providing heat or cooling, generating electricity, or upgrading to RNG) and productive use would specifically exclude venting to the atmosphere or capture and flaring. The preamble to the proposed regulations further proposed to define ''first productive use'' as the time when a producer of the relevant methane first begins using or selling it for productive use in the same taxable year as (or after) the relevant electricity-generating facility was placed in service. Under this proposal, RNG produced from any source of methane, where the methane had been productively used in a taxable year prior to the taxable year in which the relevant electricity-generating facility was placed in service, would not have received an emission value consistent with biogas-based RNG, but would instead have received a value consistent with fossil natural gas. This proposal was intended to address emissions associated with the diversion of natural gas alternatives from other productive uses and the risk of emissions associated with the creation of new or expansion of existing sources of natural gas alternatives.

The preamble to the proposed regulations noted that, for existing biogas or fugitive methane sources that typically productively use or sell a portion of the biogas and flare or vent the remainder, the flared or vented portion may be eligible for first productive use, provided the flaring or venting volume can be adequately demonstrated and verified. The Treasury Department and the IRS requested comment on these and other potential conditions on the use of natural gas alternatives in the production of electricity.

After full consideration of the comments and as further explained elsewhere in this section, these final regulations do not impose a first productive use requirement. Although a first productive use requirement could effectively address important considerations in the determination of a GHG emissions rate, the Treasury Department and the IRS acknowledge that the requirement may be difficult for taxpayers to substantiate and to independently verify. Establishing compliance with a first productive use requirement could involve taxpayers needing to obtain detailed, often unavailable, historical documentation of the operations of the methane source, including historical production levels, material changes in waste source composition and volume, use of capture equipment and capture rates, sales or uses of captured methane, and waste management practices.

Moreover, challenges in the administration of a first productive use requirement raise questions about the practical ability of a first productive use requirement to address the risk of direct or significant indirect emissions effectively. Instead of a first productive use requirement, for determining GHG emissions rates associated with the use of natural gas alternatives, the more appropriate approach is to take the likelihood of alternative productive use into account in assessing the alternative fate of such gas.

The Treasury Department and the IRS received many comments addressing the first productive use requirement. Many commenters questioned the legal and technical basis of a first productive use requirement. Several commenters asserted that a first productive use requirement is not authorized by statute, overly restricts otherwise eligible biogas and RNG feedstocks that could support clean electricity production and ignores the fact that there are numerous reasons an existing biogas facility may switch productive uses, including, but not limited to, the expiration of existing contracts, like power purchase agreements. Other commenters asserted that there is no evidence that using RNG to generate electricity will result in the induced emissions that appear to underlie the first productive use requirement.

Several commenters argued that industry data suggests that domestic production of biogas and RNG can support both new electricity production and current end uses like compressed natural gas (CNG) transportation vehicles; thus, within the timeframe within which the section 45Y and 48E credits will be available there is ample capacity to serve demand in many sectors, without causing induced emissions. Similarly, several commenters stated that much of the RNG produced in the United States is used in the transportation sector for compliance with the RFS and/or state clean fuel programs like the California Low Carbon Fuel Standard (LCFS). Further, these commenters suggested that since these programs drive deployment of a specific amount of compliant fuels, if an existing RNG supplier leaves these transportation markets to supply RNG as a feedstock to an electricity-generating facility, the prior end use of such RNG will be backfilled with other compliant fuels (for example, those that meet the RFS's GHG requirements).

In response to these comments, the Treasury Department and the IRS acknowledge that these existing transportation fuel programs, chiefly the RFS and California's LCFS, have been the primary drivers for deployment of RNG domestically. The Treasury Department and the IRS agree that the existence of these programs mitigates the risk that RNG currently produced for such programs will be redirected to electricity production. Despite this, there still remains a risk that RNG (or biogas) could be redirected to electricity production from other current uses. Additionally, because RNG currently comprises the vast majority of cellulosic biofuel credits generated under the RFS program, it is not necessarily the case that RNG previously used in this program would be backfilled with other compliant fuels should insufficient RNG be available for use as U.S. transportation fuel. As discussed previously, however, these final regulations do not impose a first productive use requirement at this time, but instead take an alternate approach to addressing these concerns.

Several commenters suggested the Treasury Department adopt a mid-program 5-year ''check-in'' to evaluate whether electricity produced using RNG is leading to unintended increases in emissions. Facilities that have achieved commercial operation during this period could qualify as ''additional'' for purposes of tax credit eligibility. Several commenters suggested that a robust assessment of any induced emissions associated with redirecting RNG from its prior use would demonstrate that such consideration would not result in an increase in the emissions rate and, therefore, such emissions need not be considered due to the speculative nature of the initial premise. One commenter

noted that a potential alternative is to add an indirect emission charge equal to the emissions associated with the extraction, processing, and delivery of fossil natural gas to backfill the prior demand for such gas.

In response to these comments, the Treasury Department and the IRS acknowledge that the first productive use requirement, which is not required as part of these final regulations due to the difficulties in proving and verifying first productive use, would address two aspects of lifecycle GHG emissions assessments, both of which must be considered under section 45Y(b)(2)(B). First, a first productive use requirement would mitigate the risk of emissions associated with the diversion of natural gas alternatives from a productive use other than the production of electricity. Although methane from natural gas alternatives could be used for different productive uses, the potential emissions associated with changes in use are nonetheless relevant in the determination of a GHG emissions rate. Second, a first productive use requirement aids in the determination of the appropriate alternative fate of natural gas alternatives used in the production of electricity. Comments questioning a first productive use requirement because of a lack of evidence of induced emissions arising from shifts in behavior due to the availability of the section 45Y and 48E credits are not dispositive. Section 45Y(b)(2)(B) does not require empirical evidence of direct and significant indirect emissions associated with a newly available incentive like the section 45Y and 48E credits before the likelihood of such emissions may be considered, and such a restriction would systematically underestimate such emissions. As further explained elsewhere in this section, it is necessary for a GHG emissions assessment that is consistent with the statutory definition of lifecycle GHG emissions in 45Y(b)(2)(B) to reflect the emissions effects that can be reasonably expected to occur based on current or future market trends and drivers, inclusive of incentives and regulation.

Many commenters raised concerns about the effect a first productive use requirement would have on deployment of RNG production technologies and suggested it could also have other undesirable effects on the market for certain methane sources. Several comments suggested the first productive use rule limits RNG pathways by creating a de facto strict additionality requirement that is unnecessary. Several commenters stated that the first productive use requirement is overly burdensome and will unnecessarily curtail methane abatement at scale.

Several commenters argued that the proposed ''first productive use'' requirement would cause a significant value discrepancy for new projects, creating a market distortion, greater risk of stranded gas for existing projects, added complexity, and higher prices for end-consumers. Several commenters argued that adding a first productive use rule creates potential unintended consequences of RNG plants sitting idle if the deployment of a facility does not coincide with the RNG plant completion dates.

Assuming the implementation of the first productive use requirement, many comments requested modifications, changes to, or transitional relief to the first productive use requirement outlined in the preamble to the proposed regulations. One commenter recommended the first productive use requirement be satisfied by any use that is more productive than the prior use. This commenter suggested that the first productive use rule may be overly restrictive and that it could be beneficial to relax the first productive use requirement, so long as the new use of the RNG delivers overall lower net emissions than its original fate. One commenter suggested there should be no restrictions on RNG; however, if a first productive use rule is implemented, then it should apply a look-back period of 36 months. Several commenters stated the first productive use requirement should be eliminated or modified as it relates to production using CMM. Several comments recommended that each individual borehole for CMM be seen as additional and as a first productive use of supply due to each of them being a unique investment decision requiring incremental capital expenditure to mitigate leaking methane. Several commenters asserted that if the first productive use requirement is adopted, it must be applied to each methane source—that is, at the digester or lagoon-level for RNG and borehole-level for CMM so as to reflect how investment decisions are made. Several commenters noted that once a low-carbon gas source is accepted as meeting a first productive use requirement (if adopted), it should not be exclusively tied to a particular electricity-generating facility.

For the reasons previously discussed, these final regulations do not impose a first productive use requirement, and so modifications, changes, and transitional relief are not necessary. The Treasury Department and the IRS will continue to consider the recommendations raised by these comments in evaluating whether imposing a first productive use requirement, with potential modifications, may be appropriate in future guidance under sections 45Y and 48E.

Many commenters supported imposing a first productive use requirement and some recommended additional guardrails. One commenter asserted that the proposed first productive use rule would help direct biomethane that is otherwise vented (or, in some cases, flared) to electricity generation, rather than creating an additional demand for methane by taking from other sources that may meet that demand through dirtier sources of energy. According to the commenter, a first productive use requirement is important to avoid significant indirect emissions associated with electricity generation from biomethane. The commenter noted that avoiding significant indirect emissions is especially important for agricultural methane emissions, which have risen over the last few decades despite overall declines in national methane emissions. Several commenters supported the proposed regulations and argued that enforcing the first productive use rule and narrowly tailoring the definition of first productive use are critical to prevent the significant amount of RNG production today shifting to electricity generation. The commenters posited that diversion of currently produced and used RNG to electricity generation would be backfilled with fossil natural gas and contended that this is especially true for existing RNG heat applications and CNG-powered vehicles. One commenter stated that the proposed rule requiring the first productive use be matched to the same taxable year as (or after) the electricity-generating facility is placed in service would help to limit any diversion of biogas or RNG from other pre-existing uses, which might otherwise increase overall emissions. Several comments supported prohibiting crediting biomethane or fugitive methane that has previously been put to productive use and stated that a first productive use requirement would ensure emissions reductions claimed under the section 45Y and 48E credits are indeed additional to the climate system overall. The Treasury Department and the IRS agree with many of the observations made in these comments. While these final regulations do not adopt a first productive use requirement for the reasons stated earlier in this Summary of Comments and Explanation of Revisions, the Treasury Department and the IRS have considered these observations regarding

alternative productive use of natural gas alternatives when establishing the alternative fates.

c. Alternative Fates

Section 1.45Y–5(d)(2)(vii) clarifies that an LCA of a C&G Facility may consider alternative fates and account for avoided emissions, including for the fuels and feedstocks consumed in the fuel and feedstock supply chain and at the electricity generating facility.

These final regulations establish general requirements for lifecycle GHG emissions determinations for facilities that use methane derived from natural gas alternatives to produce electricity, requiring such determinations to consider the alternative fates of that methane, including avoided emissions and alternative productive uses of that methane; the risk that the availability of tax credits creates incentives to produce additional methane or otherwise induces additional emissions; and observable trends and anticipated changes in waste management and disposal practices over time as they are applicable to methane generation and uses. The emissions risks that would have been addressed by a first productive use requirement are addressed in the development of the appropriate alternative fates for certain sources of natural gas alternatives, thereby reflecting an accurate assessment of GHG emissions pursuant to section 45Y(b)(2)(B). The factors considered in establishing the appropriate alternative fate are interrelated and must account for other aspects of these final regulations. For example, because these final regulations do not impose a first productive use requirement, there may be a greater likelihood that the appropriate alternative fate for certain sources of natural gas alternatives should be productive use.

As previously discussed, analytical decisions regarding the alternative fate of natural gas alternatives are critical in the assessment of their carbon intensity. Commenters suggested a range of broadly applicable alternative fate assumptions for methane from natural gas alternatives. Recommendations included venting, flaring, productive use, and responsible avoidance of waste-stream-generated methane. Rather than adopting a single alternative fate for all natural gas alternatives, these final regulations instead address specific considerations for each major source of natural gas alternatives. This section of this Summary of Comments and Explanation of Revisions addresses comments recommending broadly applicable alternative fates, while comments addressing alternative fates for specific sources of methane are discussed in section VIII.E.4.c.i. of this Summary of Comments and Explanation of Revisions.

Several commenters stated that it is only appropriate to compare alternative fates against a suite of alternative best practices. The commenters noted that only comparing utilization emissions against a limited scope of alternatives may exclude practices that offer the greatest potential climate and environmental justice benefits. For example, one commenter asserted that any methane that can be captured should be assigned a baseline counterfactual of capture and flare, which would acknowledge the cost of methane pollution and other economic and regulatory factors already driving abatement. Several commenters suggested that the assessment of an alternative fate should consider practices that offer the best climate and environmental justice benefits. The Treasury Department and the IRS understand these comments but emphasize that an alternative fate must reflect the appropriate assumptions that are relevant to estimating emissions impacts that would have occurred in the absence of the implementation of policy.

One commenter stated that specificity should be critical in designating alternative fates because, for example, while RNG, biogas, or fugitive methane may be chemically the same, they may have very different emissions. Several commenters stated that any alternative fate must assume that relevant laws would have been followed if the tax credits did not exist. For example, according to one commenter, emissions should not be based on a venting alternative fate, if venting would have been illegal.

Commenters supported and opposed a venting alternative fate (that is, assuming the methane in question would have been released directly to the atmosphere rather than flared or productively used) for a range of reasons that are discussed further in the discussion of specific sources of natural gas alternatives that follow. In response to these commenters, the Treasury Department and the IRS note that venting is not an appropriate alternative fate to apply across all sources of natural gas alternatives, because it does not account for the prevalence of flaring and productive use, nor does it address the risk of induced emissions due to the incentives provided by the section 45Y and 48E credits. The Treasury Department and the IRS also anticipate that a venting baseline would become increasingly inappropriate over time, due to ongoing and anticipated changes in regulations and operational practices. The section 45Y and 48E credits are available for facilities that begin construction before these credits are phased out under sections 45Y(d) and 48E(e). These final regulations also permit taxpayers to rely on the Annual Table that was in effect when a facility began construction or a PER determined with respect to a facility for the duration of the facility's 10-year credit period, provided the facility continues to operate as a type of facility that is described in the Annual Table or in the facility's emissions value request. Therefore, consistent with the requirement in § 1.45Y–5(d)(2)(iii) to apply a future anticipated baseline, § 1.45Y–5(e)(3) provides that the GHG emissions rate of a C&G Facility that uses methane derived from biogas, RNG, or CMM (or any hydrogen derived from methane from these sources) as a fuel or feedstock to produce electricity must take into account anticipated changes in waste disposal practices or use of that methane over the relevant timeframe.

The Treasury Department and the IRS expect venting prohibitions to expand in future years, as local, state, and Federal policy restrictions on venting are becoming increasingly common. While the policy landscape for specific methane sources is discussed later in this section, a range of current and prospective state policies limiting venting of different RNG sources or encouraging more responsible methane management practices indicates the trajectory of state action in this area. For example, California, Colorado, Maryland, Michigan, Oregon, and Washington have all recently taken or imminently plan to take action to restrict venting and require more responsible methane management practices, in some cases beyond the Federal standards currently in place.

As discussed in more detail regarding specific sources of natural gas alternatives, there are significant voluntary Federal incentives to encourage responsible methane management practices. There is also evidence of ongoing growth in methane capture through proliferation of landfill gas capture and anaerobic digesters. For example, as shown in updated project database files from EPA's Landfill Methane Outreach Program (LMOP), as of September 2024 there are 1,245 landfills with operational gas collection and control systems, as compared to

1,187 in 2014.[8] Additionally, LMOP data shows growth in the number of landfill gas energy projects upgrading landfill gas to RNG. As of September 2024, there are 110 operational RNG projects (as compared to 63 projects in 2019) and 102 planned or under construction.[9] In addition, as subsequently discussed, there has been rapid growth in the construction of animal waste digesters, largely as a result of policy incentives, with data from AgSTAR showing an additional 172 operational anaerobic digesters accepting livestock manure in 2024 relative to 2019 (267 digesters).[10] AgSTAR data also demonstrates rapid growth in RNG projects (including pipeline injection and CNG for vehicle fuel or other uses), with 191 RNG projects in 2024 compared to 32 in 2019, and only 8 in 2017.[11] As of 2023, CNG has surpassed CHP property as the most common end use of biogas from manure-based anaerobic digestion systems in AgSTAR.[12] In light of all these trends, a methane venting baseline across all natural gas alternatives is inaccurate today, and, over time, the assumptions and inputs will likely become increasingly erroneous as regulations, markets, and resource management practices evolve during the period over which the section 45Y and 48E credits are available. This supports the use of reasonably conservative alternative fates in the face of uncertainty to provide greater assurance that facilities will comply with the statutory emissions requirements.

The Treasury Department and the IRS also agree that conservative approaches to assessing alternative fates of natural gas alternatives may be an appropriate response to challenges in documenting and verifying alternative fates applicable to specific sources of natural gas alternatives in order to better ensure compliance with the statutory emissions requirements of sections 45Y and 48E. However, such conservative approaches should consider the distinct characteristics of each source or type of source, to the extent reasonably practicable. Thus, although a capturing and flaring alternative fate may be generally appropriate for some categories of sources of natural gas alternatives, it is not appropriate for all sources of natural gas alternatives.

Some commenters suggested that the alternative fate assumption for all methane derived from waste streams should be alternative productive use. As explained subsequently, the Treasury Department and the IRS have concluded that the significant and, in some cases, growing rates of productive use of methane from certain waste streams is an important consideration in establishing alternative fate assumptions for measuring GHG emissions rates. Because not all methane from waste streams is used productively, however, applying an alternative fate of productive use as a general rule for natural gas alternatives would understate the potential emissions benefits of using such gas in the production of electricity in some contexts. The final regulations, therefore do not adopt these comments.

Some commenters suggested that the alternative fate assumption for all waste stream-generated methane should be responsible avoidance of such methane production by applying practices that minimize its production. These commenters highlighted the risk that incentives created by the section 45Y and 48E credits would lead to the production of more methane than would have otherwise occurred. The Treasury Department and the IRS agree that this is an important consideration that must be addressed pursuant to § 1.45Y–5(d)(2)(v)(A) and (B).

For new methane that would not have been produced in the absence of the section 45Y and 48E credits, use of such methane for electricity production must not be reflected as avoided methane emissions in an LCA for a C&G Facility. For example, for certain waste streams, the volumes of waste-stream-generated methane produced by a certain practice can be affected by operator actions, such as a change in manure management practices from land disposal to lagoon disposal, or heating an anaerobic digester to increase the amount of methane produced. Moreover, in some cases, the cost of generating additional methane may be small compared to the value of the section 45Y and 48E credits.

The availability of the section 45Y and 48E credits may lead to generation of methane in the form of natural gas alternatives for the purpose of supplying feedstocks or fuel that would be used to produce electricity by a facility seeking to claim a credit under sections 45Y and 48E. In those instances, the appropriate alternative fate is that the methane generated from waste streams, or increments of it, would not have been created in the first place or that it would have remained sequestered. In such scenarios, it would be inappropriate to credit electricity production with avoided emissions because the analysis must address methane leakage and combustion emissions that otherwise would not have occurred, and crediting these scenarios with avoided emissions would likely result in allowing a section 45Y or 48E credit with respect to a facility that is ineligible for the credit based on the statutory emissions requirements. This is a particularly important consideration for certain types of methane-producing practices and materials, and for determining the appropriateness of alternative fates that can result in highly negative GHG emissions rate estimates if emissions from additional methane generation are not accounted for, which would create potentially large incentives for additional waste production, potentially resulting in highly inaccurate lifecycle GHG emissions assessments.

In light of the substantial venting and flaring of methane that currently occurs, an alternative fate of avoidance would in many instances understate the emissions benefits of capturing such gas and using it to produce electricity. To meet statutory requirements, however, incentives for methane creation must be considered in the determination of a GHG emissions rate.

It is not practicable for the Treasury Department and the IRS to ascertain which specific waste-stream-generated methane would not exist absent the incentives provided by the section 45Y and 48E credits, nor is it practicable to precisely estimate the market-mediated emissions of such an incentive effect. To ensure that these emissions are accounted for, as is required under the statute, the Treasury Department and the IRS have concluded that the most administrable and appropriate way to take into account the economic incentives for additional waste production is in the establishment of the alternative fates that generally apply to particular feedstocks. Specifically, in settings where a significant but non-identifiable share of methane from some sources could be produced in response to incentives provided by the section 45Y and 48E credits or other programs, alternative fate assumptions that result in highly negative emissions estimates are likely to be inaccurate and understate the real-world GHG emissions. The final regulations require that determinations of alternative fates for methane derived from biogas, RNG, or fugitive methane consider the risk that the availability of tax credits creates

[8] LMOP Landfill and Project Database, U.S. Environmental Protection Agency, available at *https://www.epa.gov/lmop/lmop-landfill-and-project-database* (last updated Sept. 20, 2024).

[9] *Id.*

[10] *AgSTAR Data and Trends, Biogas Data and Trends,* U.S. Environmental Protection Agency, available at *https://www.epa.gov/agstar/agstar-data-and-trends#biogasfacts* (last updated Nov. 27, 2024).

[11] *Id.*

[12] *Id.*

incentives to produce additional methane.

i. Alternative Fate Considerations for Methane From Certain Sources

Informed by the considerations discussed previously, § 1.45Y–5(e)(3)(ii) through (vi) specifically address the alternative fate considerations for methane from landfill gas, wastewater, CMM, animal waste sources, and fugitive methane other than CMM. The following sections of this Summary of Comments and Explanation of Revisions address these specific sources of natural gas alternatives in further detail. These final regulations have developed alternative fates on a sector-by-sector basis because determining and validating alternative fates on an entity-by-entity basis would not be practicable. As discussed previously, identifying an appropriate alternative fate for specific sources of natural gas alternatives would depend not only on the specific facts and circumstances (for example, whether methane from the source was already being productively used), but would also require an entity-by-entity assessment of the applicability of alternative fate scenarios with many complex factors potentially relevant to that assessment (for example, financial incentives absent the section 45Y and 48E credits, regulatory considerations, or trends in waste management or disposal practices). It would be highly burdensome for taxpayers to demonstrate, and impractical to confirm as a matter of tax administration, that a specific methane source had certain historic practices and whether in the future that source would have had a certain disposition other than the one that actually occurred. Quantities of methane from an individual source could even have different alternative fates. For example, assuming a situation where, absent tax incentives, a source capturing and using methane would have produced less methane and vented it, the alternative fate for that amount of methane (venting) would differ dramatically from the alternative fate of the additional methane produced due to the tax incentive (no methane produced or emitted). Given these significant administrative challenges, alternative fates are assessed and applied on a sector-by-sector basis in these final regulations.

A. Alternative Fate Considerations for Methane From Landfill Gas

A number of commenters highlighted competing considerations in determining the appropriate alternative fate for methane from landfill gas. Several commenters stated that venting is the correct alternative fate for landfill gas. Several commenters stated that a venting alternative fate is not appropriate where relevant laws and regulations require a landfill to capture biogas. Several commenters stated that capture and flare is the correct alternative fate for methane and that, in the case of landfills, the uncaptured portion of methane gas should be part of the lifecycle analysis. One commenter specified the appropriate alternative fate is flaring at a 95–98 percent destruction efficiency. Another commenter noted the GREET model does not currently include fugitive methane emissions at a landfill in the LCA, even though fugitive methane emissions can negate the climate and environmental benefits of biomethane projects. One commenter stated that landfills do not deliberately generate additional biogas in order to qualify for a tax credit.

The Treasury Department and the IRS note that regulations increasingly require flaring of landfill gas, and anticipated changes in regulatory requirements and operational practice are an important consideration in determining appropriate alternative fates. The EPA currently regulates emissions (in the form of landfill gas using non-methane organic compound (NMOC) emissions as a surrogate) from landfills under section 111 of the CAA; EPA regulations under the Solid Waste Disposal Act (commonly known as the Resource Conservation and Recovery Act, or RCRA) mandate certain landfill management practices that also affect methane emissions from landfills. As noted later, several states have adopted additional more stringent requirements for landfill methane emissions. Also, the EPA has announced that it intends to update and strengthen its existing landfill regulations under section 111 of the CAA in 2025 (the current rules for landfill gas emissions were finalized in 2016).[13] Pursuant to the EPA's regulatory plan, the EPA plans to revisit the rule to understand how new technologies and approaches could be incorporated into updated New Source Performance Standards (NSPS) and Emissions Guidelines to reduce emissions from municipal solid waste landfills and to protect the environment and the health of people that live nearby.[14]

In particular, certain landfills are subject to NSPS (40 CFR part 60, subpart XXX) and Emissions Guidelines (40 CFR part 60, subpart Cf) under section 111 of the CAA (collectively, NSPS/EG Rules). The listed regulated pollutant under these regulations is ''landfill gas.'' The EPA has also promulgated National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR part 63, subpart AAAA) in 2020 that regulate the emissions of Hazardous Air Pollutants (HAP) from landfills. The NESHAP regulates HAP emissions by requiring landfills that exceed the size and NMOC emission thresholds to install and operate a landfill gas collection and control system (GCCS). As in the NSPS/EG, the GCCS is required to include a control device capable of reducing NMOC emissions by 98 percent. This system will also reduce emissions of methane since methane makes up approximately 50 percent of the landfill gas.

The EPA's current CAA section 111 NSPS provides emissions control requirements for new (since 2014) municipal solid waste landfills. 40 CFR part 60, subparts WWW and XXX. The section 111 emissions guidelines (EG) cover existing (pre-2014) municipal solid waste landfills through requirements that are adopted by states through state plans, or by the EPA in the event a state does not submit an approvable plan. 40 CFR part 60, subpart Cf. Both new and existing landfills that exceed specified size and emissions thresholds must install landfill gas GCCS and use, sell, or flare (combust) the gas. The EPA estimated that 846 landfills would be required to collect and control landfill gas under these regulations by 2025.[15] In addition, landfills covered by these regulations and that have GCCS installed must conduct quarterly surface monitoring for leaks. In the states with more stringent state requirements, the requirements

[13] *Non-regulatory Public Docket: Municipal Solid Waste Landfills,* U.S. Environmental Protection Agency, available at *https://www.epa.gov/stationary-sources-air-pollution/non-regulatory-public-docket-municipal-solid-waste-landfills* (last updated Dec. 9, 2024); Press Release, The White House, *Fact Sheet: Biden-Harris Administration Announces New Actions to Detect and Reduce Climate Super Pollutants* (Jul. 23, 2024), available at *https://www.whitehouse.gov/briefing-room/statements-releases/2024/07/23/fact-sheet-biden-harris-administration-announces-new-actions-to-detect-and-reduce-climate-super-pollutants;* Keaton Peters, *Is the EPA About to get Serious About Methane Pollution from Landfills?,* Canary Media (Jul. 10, 2024), available at *https://www.canarymedia.com/articles/methane/is-the-epa-about-to-get-serious-about-methane-pollution-from-landfills.*

[14] Reconsideration of Standards of Performance and Emissions Guidelines for Municipal Solid Waste Landfills (RIN 2060–AU24) available at *https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202404&RIN=2060-AU24.*

[15] U.S. Environmental Protection Agency, *Final Updates to Performance Standards for New, Modified and Reconstructed Landfills, and Updated to Emission Guidelines for Existing Landfills: Fact Sheet* (Sept. 2016), available at *https://www.epa.gov/sites/default/files/2016-09/documents/landfills-final-nsps-eg-factsheet.pdf.*

commonly apply to smaller landfills, landfills with lower emissions levels, and/or apply more stringent emissions control measures compared to the Federal requirements. A number of other landfills that are not subject to emissions control regulations nevertheless have installed landfill GCCS and are either flaring, combusting the gas for energy generation, or upgrading it and injecting it in the pipeline system for sale.[16] The LMOP tracks voluntary GCCS installation based on available data reported by program partners. As of 2024, at least 450 landfills operate a GCCS without being required by regulation. Many of the landfills that are not currently regulated or voluntarily collecting gas may be required to collect and control landfill gas emissions during the timeframe in which the section 45Y and 48E credits are available, as additional regulation is expected at both the Federal and state level.[17]

Given that landfill gas collection and use or flaring is widespread, as it is required by regulation for an increasing number of landfills and often supported by GHG credit programs when it is not otherwise required, an assumption that absent the section 45Y and 48E credits the typical practice would be uncontrolled venting is not supportable. The Treasury Department and the IRS have determined that since collection and flaring is required by law for the largest sources of landfill gas, and is increasingly being required for smaller sources as well, collection and flaring is the most appropriate alternative fate assumption for the sector as a whole given its prevalence. Although a flaring alternative fate will result in an underestimate of lifecycle GHG emissions for landfills with current productive use, the fact that there are some landfills where capture and flaring or productive use is not yet occurring, in combination with the prevalence of flaring, makes a flaring alternative fate the most robust approach for the sector as a whole. Section 1.45Y–5(e)(3)(ii) of the final regulations provides that, for purposes of determining the GHG emissions rate of a C&G Facility (as defined in § 1.45Y–5(b)(4)) that produces electricity through combustion or gasification using methane derived from landfill sources as a fuel or feedstock, the alternative fate of such gas must be flaring.

B. Alternative Fate Considerations for Methane From Wastewater

Several commenters stated that the R&D GREET 2023 model provides a reasonable baseline assumption that should be applied for all wastewater sludge projects. These commenters noted that a digester would be present on site and the biogas would be flared or consumed on site, and this should inform the baseline in establishing the alternative fate of the methane. Another commenter stated that it would be incorrect to presume both that most wastewater treatment plants have operational biogas/anaerobic digester systems and that operational biogas systems are flaring their gas. The commenter further asserted that, based on the American Biogas Council's database of wastewater facilities maintained under a memorandum of understanding with the Water Environment Federation, the vast majority of operational digester systems at wastewater plants are using such biogas to produce renewable electricity, RNG, or heat, which, according to the commenter, offsets fossil fuel use and its related emissions.

National-level data on anaerobic digestion at wastewater treatment plants and the use of biogas produced is limited. There are more than 16,000 wastewater treatment plants in the U.S. While most wastewater treatment plants in the U.S. serve small populations and do not process sufficiently large wastewater flows to justify the installation of anaerobic digesters, which are capital-intensive, anaerobic digesters are very prevalent among the smaller number of large wastewater treatment facilities that process the large majority of wastewater: the largest 8 percent of facilities (1,132 facilities that each handle greater than 5 million gallons per day) process 77 percent of total national wastewater flow, according to Argonne National Laboratory.[18] Among the 1,100 generally large wastewater treatment plants that have anaerobic digesters, 860 have the equipment to use their biogas on site, according to the U.S. Department of Energy Alternative Fuels Data Center.[19] Additionally, nearly all biogas-producing wastewater treatment plants surveyed in 2018 reported flaring at least some of their biogas, based on the Nationwide Survey of WRRF Biosolids Programs released in 2022.[20] Venting practices are not reported in any national datasets, although vents are required to prevent over-pressurization events in biogas storage systems and local regulators may require facilities to track and report venting events. Some facilities combust biogas to heat their digesters and some also take advantage of the additional heat availability for on-site biosolids drying.

Given that use or flaring of methane from wastewater is generally applied to the majority of wastewater generated domestically, an assumption that absent the section 45Y and 48E credits the typical practice would be uncontrolled venting is not supportable. Section 1.45Y–5(e)(3)(iii) of the final regulations therefore provides that, for purposes of determining the GHG emissions rate of a C&G Facility (as defined in § 1.45Y–5(b)(4)) that produces electricity through combustion or gasification using methane derived from wastewater sources as a fuel or feedstock, the alternative fate of such gas must be flaring of gas not used to heat the anaerobic digester.

For the large majority of biogas from wastewater treatment plants, this is either consistent with current practice or modestly overestimates avoided emissions in cases where the portion of biogas not needed to satisfy on-site heat requirements would otherwise have been productively used. Although a flaring alternative fate for this additional biogas will result in an over-estimate of avoided GHG emissions for wastewater treatment plans with current productive use beyond satisfying on-site heat demands, this potential overestimation of GHG emissions avoidance is counterbalanced by the existence of wastewater treatment plants where capture and flaring or productive use is not yet occurring, thus making the specified alternative fate the most appropriate approach for the sector as a whole.

C. Alternative Fate Considerations for Coal Mine Methane

The Treasury Department and the IRS recognize that fossil sources of fugitive methane can be utilized for the production of electricity. Many commenters specifically noted the feasibility of producing electricity from

[16] *Landfill Methane Outreach Program (LMOP),* U.S. Environmental Protection Agency, available at *https://www.epa.gov/lmop* (last updated Dec. 5, 2024).

[17] In addition to upcoming EPA regulations, additional states are also contemplating regulations. *See, for example, Landfill Methane Reductions in Colorado,* Colorado Department of Public Health and Environment, available at *https://cdphe.colorado.gov/landfill-methane-reductions-in-colorado;* New York Department of Environmental Conservation et al., *Methane Reduction Plan* (May 2017), available at *https://extapps.dec.ny.gov/docs/administration_pdf/mrpfinal.pdf.*

[18] Ha, Miae, et al. ''Opportunities for Recovering Resources from Municipal Wastewater.'', Jul. 2022. *https://doi.org/10.2172/1876441.*

[19] See *https://afdc.energy.gov/fuels/natural-gas-renewable.*

[20] National Biosolids Data Project, Nationwide Survey of WRRF Biosolids Programs *https://www.biosolidsdata.org/downloads/nationwide-wrrf-survey-cleaned-data-spreadsheet.*

CMM and identified venting as a common alternative fate. One commenter noted concerns associated with allowing for the use of fugitive methane from sources such as coal mines until robust lifecycle analysis, verifiability, incrementality, and other principles related to the emissions impacts of this gas are demonstrated. Another commenter recommended that the emissions associated with coal mine methane be determined consistent with the GREET model maintained by Argonne National Laboratory.

Drainage gas is the subset of CMM that is most likely to be used for electricity generation, due to its high methane content. Drainage systems are a mechanism of recovering methane from underground mines to maintain safe operating conditions.[21] These systems are typically installed when ventilation systems are insufficient to maintain underground methane concentrations within permissible limits. Unlike drainage gas, ventilation gas is typically dilute in methane content and therefore is not widely used for electricity production.

Based on consultation with interagency experts, the Treasury Department and the IRS understand that the EPA's GHGRP is the only national public database with historical information provided annually by large active underground mines regarding their treatment of drainage gas. Review of data submitted by coal mines to GHGRP under 40 CFR part 98, subpart FF, indicates that, while the majority of ventilation gas liberated by coal mines over the past decade has been vented, the majority of drainage gas has been productively used or flared. Mine practices have fluctuated, with some mines transitioning from predominantly venting drainage gas to predominantly using or destroying such gas. Factors that can affect the extent to which a mine vents, flares, and/or productively uses such gas in a given year include the amount of methane required by onsite equipment (for example, engines); proximity to offsite infrastructure (for example, pipelines); and the lucrativeness of programs incentivizing the capture of CMM. Incentives for CMM destruction and utilization that are currently available include state offset programs, state renewable portfolio standards, and voluntary offsets, some of which specifically do not allow for pipeline injection.

[21] Active underground mines that liberate more than 36,500,000 actual cubic feet of methane per year report annually to GHGRP on whether their drainage gas is vented or destroyed.

There is considerable uncertainty associated with establishing the appropriate alternative fate scenarios for CMM for the period over which a facility may be able to claim the section 45Y and 48E credits. Coal mines that are currently injecting CMM into pipelines may transition to flaring if natural gas prices fall, or may exercise flaring at future boreholes if those boreholes are distant from existing pipeline infrastructure. Mines that are currently predominantly venting may transition to productive use if pipeline infrastructure is built in their vicinity. A flaring baseline is therefore the most appropriate approach for CMM sourced from drainage systems given the uncertainty with respect to these emissions in particular in the United States, and reduces the risk of inappropriately attributing extremely negative lifecycle emissions rates to the capture of CMM which would have already been captured and productively used.

Accordingly, § 1.45Y–5(e)(3)(iv) of these final regulations provides that for purposes of determining the GHG emissions rate of a C&G Facility (as defined in § 1.45Y–5(b)(4)) that produces electricity through combustion or gasification using coal mine methane that is drainage gas as a fuel or feedstock, the alternative fate of such gas must be flaring. This alternative fate accounts for the uncertainties associated with future practices, as previously described, while recognizing that most drainage gas is destroyed today.

D. Alternative Fate Considerations for Animal Waste

Commenters suggested a variety of alternative fate assumptions for purposes of estimating GHG emissions for biogas derived from animal waste sources, including venting, alternative productive use, and responsible waste management, with some commenters recommending a single alternative fate for biogas produced from these sources and others recommending differentiated alternative fates. There is no national database that tracks farm-level methane emissions, capture, and usage in the agricultural sector. Additionally, there are no nationally applicable reporting requirements for animal waste management practices at livestock and poultry farms, which differ substantially on a farm-to-farm basis, and state-level animal waste management reporting requirements vary. Therefore, lack of data and heterogeneity of animal waste management practices are limiting factors in establishing a single specific alternative fate for methane generated from animal waste.

Many commenters highlighted competing considerations in determining the appropriate alternative fate for methane derived from animal waste. Several commenters recommended that the R&D GREET 2023 model be used to calculate the avoided emissions from anerobic digestion and the associated biogas using site-specific baseline manure management practices. The commenters suggested that the correct alternative fates could be entered into the model manure management categories and practices to accurately quantify baseline emissions prevented by a biogas project. Several commenters suggested that for biogas produced from livestock manure, the alternative fate should be that methane would continue venting from manure handling facilities until such time as that venting is no longer permissible by law or regulation. The consequence of the commenters' suggestion is that any biogas utilized would be associated with avoided GHG emissions. The commenters noted that this alternative fate is similar to what the commenters assert is appropriate for the landfill gas industry, where once regulations are in place requiring landfill gas to be captured and destroyed, then flaring becomes the appropriate alternative fate. One commenter noted that although the primary precedent for crediting avoided methane emissions is the California LCFS's treatment of biomethane from manure lagoons, this precedent is not appropriate for purposes of the section 45Y and 48E credits. The commenter stated that the avoided GHG emissions calculation was specifically incorporated within the LCFS as a means of subsidizing investments in anaerobic digesters to address pollution from California's dairies rather than as a reflection of the best available science.

Determining the appropriate alternative fate and emissions intensity for biogas produced from animal waste sources presents several challenges. First, the emissions intensity of biogas produced from animal waste can vary widely based on the specific waste practices used by individual producers. These practices are not comprehensively tracked and, in many cases, would be extremely difficult to effectively verify. Different waste disposal practices produce very different quantities of methane per unit of manure, as methane generation is much higher in wet anaerobic conditions. As one example, the EPA's GHG Inventory data indicates that uncovered anaerobic lagoons produce roughly one hundred times the amount

of methane as daily spread. Even among farms credited with methane venting counterfactuals under the California LCFS, the resulting GHG emissions intensities for biogas vary widely depending on specific practices. Factors impacting the emissions intensity calculations for that program include, but are not limited to, the type of animals producing waste for the digester, type(s) of feed provided for the animals, the digester technology, and ambient conditions at the digester. As discussed further later in this section, none of these practices are comprehensively tracked or reported at a national level. Commenters also noted the further uncertainty and variation introduced by a range of leakage rates from operations capturing and upgrading manure-derived methane, including the high likelihood that there are ''super emitter'' sources (consistent with the patterns seen in other fugitive methane streams). This could introduce additional uncertainty and risk of over crediting in measuring a GHG emissions rate.

Second, there is substantial and growing alternative productive use of methane from animal waste. There are 400 operational animal waste anaerobic digesters in the U.S. and 73 additional digesters under construction as of 2024, according to the AgSTAR Digester Database. Based on data from the AgSTAR Digester Database regarding the number of livestock (by head) feeding anaerobic digesters as of 2024, it is estimated that the waste from roughly 8 percent of dairy cattle and 2 percent of swine (by head) is currently sent to anaerobic digesters and these numbers increase to 10 percent and 3 percent, respectively, if digesters currently under construction are included.[22] The percentage of waste being sent to anaerobic digesters has been rising rapidly since 2019, with 400 operational projects and 73 under construction, and with the majority of new projects upgrading their biogas to RNG, due, in part, to incentives provided by the RFS, LCFS, and a California grant program. The digesters listed as newly operational and under construction as of 2023–2024 in the AgSTAR database represent a 28 percent increase in the dairy cattle waste and 50 percent increase in swine waste (by head) sent to anaerobic digesters relative to 2022 levels. While there has been some variation in the profitability of installing anaerobic digesters as credit values have fluctuated,[23] the financial incentives provided by the RFS and LCFS programs appear to be sufficient to incentivize some installations of anaerobic digesters at existing lagoons, which reduces emissions without any additional incentive from the section 45Y and 48E credits. There are also other possible sources of revenue from anaerobic digester systems including tipping fees from local food production, or the sale of secondary products such as digestate-based fertilizer or phosphorus pellets.

Complementing these incentives are a range of other voluntary programs that encourage capture and productive use of methane emissions from animal waste. For example, USDA is leveraging its authority under a variety of existing programs to encourage farmers and ranchers to install or upgrade equipment and adopt new practices that improve manure management and can substantially reduce methane emissions. One such program, AgSTAR, is a collaborative program sponsored by the EPA and USDA that promotes the use of biogas recovery systems, such as anaerobic digester systems, to reduce methane emissions from animal waste. Likewise, USDA Natural Resources Conservation Service programs—including the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP)—provide incentives for upgrading existing anaerobic lagoons, anaerobic digesters, and solid separators and covers to collect methane for use or destruction; install solid separators that reduce methane-producing slurries; and providing conservation assistance for transitions to alternative manure management systems, such as deep pits, composting, transitions to pasture, or other practices that have a lower GHG emissions profile. The Rural Energy for America Program (REAP) has offered more than $160 million in grants and loans to incentivize anaerobic digesters and biogas projects to control methane and biogas from dairy and other farms.

Given rapid recent and continuing growth and multiple existing incentive programs, it is reasonable to assume continued growth in the share of large dairies and concentrated animal feeding operations with anaerobic digesters, even absent an additional incentive under the section 45Y and 48E credits. Redirecting biogas that comes from these sources to electricity production will mean less displacement of natural gas elsewhere in the economy, and could therefore result in significant indirect emissions that must be taken into account under section 45Y(b)(2)(B).

Third, the magnitude of the incentive provided by the section 45Y and 48E credits itself creates a significant risk of additional waste production in response to the credit, with emissions that must be accounted for in the LCA. While some commenters noted that the EPA did not find that its RFS program's incentivization of anaerobic digesters had driven a proliferation of concentrated animal feeding operations or other large-scale animal agriculture, other commenters disagreed, stating that the availability of these credits may incentivize the operation of new or larger farming units and the deliberate production of methane. Commenters noted that, even with use of anaerobic digesters, GHG emissions may still result from leakage, use of digestate, and the need to use venting to accommodate fluctuating gas levels. Additional waste production could thus result in additional emissions; moreover, even if emissions from additional production are captured, crediting the additional waste with avoided emissions would result in inaccurate credit determinations.

For biogas produced from animal waste, there are several potential routes that may increase methane production:

- Shifting management practices for existing quantities of manure from land application to lagoon, thereby significantly increasing methane generation;
- On the margin, making new or expanded concentrated animal feeding operations (CAFOs) more profitable (whether by increasing the overall numbers of animals raised, or by consolidating smaller existing operations) and thereby inducing additional manure and methane generation; and

[22] Values were calculated using data from the AgSTAR Digester Database. *Livestock Anaerobic Digester Database,* U.S. Environmental Protection Agency, available at *https://www.epa.gov/agstar/livestock-anaerobic-digester-database* (last updated Oct. 1, 2024). The sum of dairy cattle reported as feeding operational digesters in the AgSTAR database as of June 2024 was calculated to be 1.55 million. The sum of swine reported as feeding operational digesters was calculated to be 1.68 million. The total values including under-construction digesters are 1.87 million dairy cattle and 2.08 million swine. Percentages are calculated by dividing these values by the most up-to-date data on dairy cattle and swine head: total dairy cattle head in 2022 (18.6 million) and swine head (73.4 million) as reported in the EPA GHG Inventory. *See also* U.S. Environmental Protection Agency, ''Inventory of U.S. Greenhouse Gas Emissions and Sinks,'' available at *https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks* (last updated November 22, 2024); U.S. Department of Energy, ''A Generic Counterfactual Greenhouse Gas Emission Factor for Life-Cycle Assessment of Manure-Derived Biogas and Renewable Natural Gas'' (2025), available at *www.energy.gov/45vresources.*

[23] *How Much Should Dairy Farms Get Paid for Trapping Methane?—Energy Institute Blog,* available at *https://energyathaas.wordpress.com/2024/10/14/how-much-should-dairy-farms-get-paid-for-trapping-methane/.*

• Using management practices at biodigesters to produce more methane than would have been produced otherwise (for example, increasing the temperature at an anaerobic digester).

To the extent producers adopt these practices in response to incentives created by the section 45Y and 48E credits, failure to take this into account could lead to allowing facilities that do not meet statutory GHG emissions requirements to be treated as qualified facilities under section 45Y and 48E. This would be a particular concern with a venting alternative fate because it would result in a significantly negative estimated GHG emissions rate, creating strong incentives to produce additional methane for use by facilities to claim the section 45Y and 48E credits inappropriately.

In light of these challenges, the Treasury Department and the IRS have determined that the most appropriate approach to determining the carbon intensity of biogas and ensuing RNG derived from animal waste is to use an alternative fate for the sector as a whole that is derived from the national average of all animal waste management practices. The rule provided in § 1.45Y–5(e)(3)(v) requires a best estimate of the nationwide average methane emissions from manure based on currently available data. As detailed in a technical analysis from the DOE,[24] this results in a carbon intensity score of -51 gCO_2e/MJ, where the MJ basis refers to the lower heating value of the methane contained in the biogas. This emissions attribute for the methane contained in biogas from animal waste can be subsequently used to calculate the carbon intensity of electricity and RNG by accounting for the GHG emissions associated with onsite electricity generation from biogas or for upgrading, transportation, and compressing into RNG.

As further explained in the DOE's analysis of animal waste sources, this carbon intensity of RNG derived from methane contained in biogas from animal waste has been calculated using a weighted average of U.S. manure management practices across manure from all types of livestock and poultry. Averaging over the full set of animal-waste management practices nationwide is an administrable way to take into account the range of existing waste management practices and represent emissions reductions that result from additional methane capture and use.[25] It is a reasonable and administrable representation of the carbon intensity of biogas from manure-based sources in light of the significant limitations of available data and verification mechanisms, the uncertainties associated with estimation of the GHG emissions, the benefits of different manure management systems, and the risks of perverse incentives At the same time, it provides taxpayers certainty and clarity regarding the carbon intensity of methane from certain animal waste sources.

The Treasury Department and the IRS considered alternative approaches suggested by commenters, in particular whether to provide differentiated alternative fates, for example based on a producer's prior waste management practices and methane production levels or the mix of animal types used to generate biogas. Differentiated alternative fates, however, is not feasible because it would not be administrable or practicable to set up a reporting and verification system to determine the prior practices and quantities of manure and biogas at each individual participating livestock and poultry operation that generates biogas. Such an approach would be infeasible given the large number of such operations and the lack of nationally applicable reporting requirements regarding numbers of animals or manure management practices by livestock and poultry operation (and wide variation in state reporting requirements). Additionally, 104 of the 473 digesters operational or under construction in the AgSTAR database report co-digesting their primary manure type with one or more other wastes, including other types of manure, food waste, agricultural residues, and dairy/food processor waste. These tracking and verification challenges are of particular concern because differences in waste disposal practices or specific waste sources can result in large differences in avoided emissions, meaning that highly specific prior waste management practices would need to be consistently reported and verified to support accurate differentiated alternative fates. In addition, as discussed previously, differentiated alternative fates that allow for highly negative emissions values raise concerns about incentives for additional waste production that could result in inappropriate claims of the section 45Y and 48E credits. The Treasury Department and the IRS will continue to monitor reporting and tracking systems and study the feasibility of introducing differentiated pathways in the future.

The Treasury Department and the IRS also considered whether the emissions values for RNG produced from animal waste should be adjusted to reflect the risk of additional waste production in response to the incentives provided by the section 45Y and 48E credits. The Treasury Department and IRS expect the modestly negative emissions values established in these rules will provide, at most, only modest incentives to generate new methane or other GHGs from animal waste. However, the Treasury Department and the IRS will continue to study this issue to determine whether adjustments are needed in the future.

E. Alternative Fate Considerations for Fugitive Methane From Fossil Fuel Activities Other Than Coal Mining

The Treasury Department and the IRS have considered the alternative fate of fugitive methane from fossil fuel activities other than coal mining, which are overwhelmingly comprised of oil and gas operations, and determined that the generally applicable alternative fate for fugitive methane from these activities is productive use.

While some commenters viewed the alternative fate of fugitive emissions to be venting, others noted the extensive existing regulatory requirements and additional incentives for avoiding fugitive emissions from oil and gas operations and argued that productive use is the appropriate alternative fate for this source of methane. Some commenters stated that any program that would incentivize the capture of fugitive methane from oil and gas sources would be ineffective and inefficient because of the combination of: (i) variable emissions, (ii) the technical challenge of measuring emissions, and (iii) the counterproductive incentives the baseline setting process would create. Another commenter stated that, to avoid double counting methane emissions abatement, the final regulations must explicitly state that fugitive sources of methane arising from oil and gas activities are to be treated equivalently to fossil methane.

The Treasury Department and the IRS note that EPA regulations under section 111 of the CAA seek to limit volatile organic compound (VOC) and methane emissions from oil and gas operations through a variety of requirements including performance standards as well as operational practices and leak detection and repair programs. *See* 40 CFR part 60, subparts OOOO, OOOOa, OOOOb, and OOOOc. For example,

[24] U.S. Department of Energy, ''A Generic Counterfactual Greenhouse Gas Emission Factor for Life-Cycle Assessment of Manure-Derived Biogas and Renewable Natural Gas'' (2025), available at *www.energy.gov/45vresources.*

[25] *Id.*

EPA's latest rules for new sources of VOC and methane emissions require use of zero emitting process controllers in most scenarios. EPA's previous rules allowed low bleed and intermittent bleed controllers, which emit pollutants to the atmosphere by discharging natural gas. EPA's new rules keep that gas in the system instead of allowing it to be released. EPA's new rules also phase out routine flaring of associated gas from most new oil wells, establish strong performance standards for emissions from storage tanks, include requirements for the efficiency of flares, and strengthen requirements for regular leak monitoring and the deadline for repairs at well sites. EPA's leak detection and repair program at well sites requires frequent monitoring of oil and gas equipment with approved technology and methods to look for leaks. If a leak is found, then it must be repaired quickly so that the equipment stops leaking fugitive emissions to the atmosphere. This program will reduce the amount of emissions coming from leaking components. EPA's rules also require owners and operators of new wells to use best management practices to minimize or eliminate venting of emissions from gas well liquids unloading.

As discussed in section VIII.4.c.i.A. of this Summary of Comments and Explanation of Revisions, while some of the compliance deadlines under each of the updated regulations under section 111 and updated reporting requirements in 40 CFR part 98, subpart W, have not yet passed, operators must plan for timely compliance with those requirements and must currently comply with other requirements such as the new source requirements under section 111. Thus, operators have significant incentives to make certain compliance investments now and are required to do so well within the period of the tax credit. In addition, the Bureau of Land Management and most oil and gas producing states also regulate the ''waste'' of gas through venting and flaring, and some, such as New Mexico and Colorado, have regulations equally or more stringent than EPA requirements in many respects.[26] As a consequence, the majority of the actions that an oil or gas operator could take to avoid fugitive emissions are already required by law or will be during the period in which the section 45Y and 48E credits will be available.

Given the extensive regulatory environment already in place requiring oil and gas operators to minimize GHG emissions from oil and gas operations, and the strong incentive and existing infrastructure to sell gas that is not lost through venting or flaring, the generally applicable alternative fate for fugitive emissions from fossil fuel activities other than coal mining is productive use. Accordingly, § 1.45Y–5(e)(3)(vi) provides that for purposes of determining the GHG emissions rate of a C&G Facility (as defined in § 1.45Y–5(b)(4)) that produces electricity through combustion or gasification using fugitive methane other than coal mine methane as a fuel or feedstock, such as fugitive methane from oil and gas operations, the alternative fate of such gas must be productive use, which would result in emissions equivalent to the carbon intensity of using fossil natural gas. For example, the production of methane from virgin coal seams, which is commonly referred to as ''coal bed methane'' (CBM), may be for the purpose of natural gas production or may result from pre-mining activities. Since it is typically of a comparable methane content as other natural gas sources, it is commonly sold for use. Nationwide, emissions that result from CBM extraction are currently reported to EPA's Greenhouse Gas Reporting Program under 40 CFR part 98, subpart W, which informs background estimates of upstream methane emissions for the natural gas supply chain. Accordingly, GHG emissions analyses conducted for purposes of sections 45Y and 48E would represent CBM with a carbon intensity that is equivalent to that of other sources of fossil natural gas.

d. Book-and-Claim

Book-and-claim accounting has been used in some contexts to track the attributes associated with the production of a unit of energy in a manner that prevents double counting. In such a system, producers of energy are required to acquire and retire corresponding attribute certificates through a book-and-claim system that can verify, generally in an electronic tracking system, that all applicable requirements are met. The preamble to the proposed regulations requested comment on whether book-and-claim accounting may be suitable for use in substantiating and verifying claims to the energy attributes of fuels and feedstocks used by a facility to generate electricity. Examples of the relevant fuels and feedstocks for which book-and-claim accounting may be considered include natural gas alternatives or other feedstocks such as hydrogen. The preamble to the proposed regulations further noted that the Treasury Department and the IRS are considering providing rules that may permit the use of book-and-claim accounting for the section 45Y and 48E credits in the final regulations if there are sufficient assurances that the energy attributes claimed under such system are verifiable and not susceptible to double counting. The preamble to the proposed regulations further noted that tracking and verification mechanisms for natural gas alternatives specific to the needs of the section 45Y and 48E credits are not yet available, and existing systems have limited capabilities for tracking and verifying pathways for natural gas alternatives, especially in the part of the production process before the methane has been reformed to RNG.

A wide range of comments arguing in favor of and against allowing the use of book-and-claim systems for natural gas alternatives were received in response to the proposed regulations. Several commenters discussed how book-and-claim systems were commonplace within the RNG industry. In addition, several commenters expressed concern about the ability of the RNG industry to take advantage of the section 45Y and 48E credits if a book-and-claim approach was not adopted. Several commenters stated that, because sources of natural gas alternatives are unevenly distributed throughout the United States and may not be located near prospective electricity-generating facilities, book-and-claim allows entities that do not have access to such sources to be eligible for the section 45Y and 48E credits. One commenter suggested that a mass balance model or an ''identity preservation'' model could be adopted if a book-and-claim system was disallowed.

Several commenters suggested that existing systems, such as the Midwest Renewable Energy Tracking Systems (M–RETS), the EPA's RFS, or the California LCFS, might have sufficient capabilities to enable book-and-claim accounting for purposes of the section 45Y and 48E credits. Other commenters argued that these systems do not have sufficient tracking capabilities and that the Treasury Department and the IRS should disallow book-and-claim given these limitations. Several commenters recommended that if a book-and-claim system were allowed, then such system should take measures to avoid double-counting of the same environmental attributes. Several commenters suggested that any tracking system should be able to allocate emissions based on different levels of gas blending from different feedstocks and enable the differentiation of carbon capture rates to

[26] *See,* for example, *Waste Prevention, Production Subject to Royalties, and Resource Conservation,* 89 FR 25378 (Apr. 10, 2024).

those different feedstock production pathways. Several commenters noted that any tracking system would not address the issue on which proposed regulations invited comment, such as ensuring that biomethane is not produced for the purpose of meeting demand for the biomethane market. In response to these comments, the Treasury Department and the IRS note that existing tracking and verification systems have limited capabilities for tracking and verifying RNG pathways and that there is no sufficiently accurate, nationally available, auditable and reliable third-party tracking system (or registry) in place today.

Several commenters suggested there was clear Congressional intent to allow book-and-claim. However, other commenters suggested that allowing the section 45Y and 48E credits solely on the basis of RNG certificates would be contrary to requirements of the statute. These commenters argued that the requirement to assess the emissions rates of the facility precludes the use of book-and-claim in the specific context of the section 45Y and 48E credits. These commenters asserted that the use of a book-and-claim system was not statutorily authorized because such use would not comply with the requirement of section 45Y(b)(2)(A) and (B) and section 48E(b)(3)(ii) to assess the emissions emitted by a facility in the production of electricity. Commenters also argued that the result of allowing book-and-claim would be to allow facilities to claim the credits with no meaningful change in operations, contrary to the intended purpose of the section 45Y and 48E credits.

In response to these comments, the Treasury Department and the IRS have examined whether book-and-claim accounting is permissible under the statutes. As further explained later in this section, the final regulations do not permit the use of book-and-claim accounting for purposes of the section 45Y and 48E credits because the use of book-and-claim accounting would conflict with the statutory directive to assess the GHG emissions specific to a facility.

Congress set the statutory boundaries for determining greenhouse gas emissions rates for the section 45Y and 48E credits in section 45Y(b)(2). Section 45Y(b)(2)(A) defines ''greenhouse gas emissions rate'' as ''the amount of greenhouse gases emitted into the atmosphere by a facility in the production of electricity, expressed as grams of CO2e per kWh.'' This general rule for determining emissions rates requires an analysis of the emissions associated with a facility's production of electricity. Section 45Y(b)(2)(B) clarifies that for facilities that produce electricity through combustion or gasification, the GHG emissions rate for such facilities is equal to ''the net rate of greenhouse gases emitted into the atmosphere by such facility (taking into account lifecycle greenhouse gas emissions, as described in 42 U.S.C. 7545(o)(1)(H) in the production of electricity, expressed as grams of CO2e per kWh.'' Section 45Y(b)(2)(C) provides the rules for specifying a GHG emissions rate for a particular facility. Section 45Y(b)(2)(C)(i) requires the Secretary to annually publish a table (Annual Table) that sets forth the GHG emissions rates ''for types or categories of facilities.'' Taxpayers must use this Annual Table to determine the GHG emissions rate of any facility for which the Annual Table provides a rate. Section 45Y(b)(2)(C)(ii) provides that if the Annual Table does not provide a rate for a facility, the taxpayer that owns such facility may petition the Secretary for a provisional emissions rate. Finally, section 45Y(b)(2)(D) requires the amount of GHGs emitted into the atmosphere ''by a facility in the production of electricity'' to not include any qualified carbon dioxide that is captured by the taxpayer and sequestered pursuant to certain requirements. Taken together, these statutory rules provide the framework to assess the GHG emissions of a facility based on the facility's operations.

Sections 45Y(b)(2)(C) and (f) provide the Secretary authority to specify and clarify how GHG emissions rates are determined within this framework. Section 45Y(b)(2)(C) directs the Secretary to publish an Annual Table or consider petitions for provisional emissions rates. Section 45Y(f) directs the Secretary to ''issue guidance regarding implementation of [section 45Y], including calculation of greenhouse gas emission rates for qualified facilities and determination of clean electricity production credits under this [section 45Y].'' To establish the GHG emissions rates as directed by the statute, the Secretary must first establish a process to calculate these rates. Because of this broad statutory mandate, the emissions rate determination process must account for the varied production methods that are currently viable or those that may be devised in the future, the idiosyncrasies of each facility's electricity-generating process, and scientific advancements and uncertainty associated with lifecycle analysis.

Upon consideration of the comments submitted regarding book-and-claim, the Treasury Department and the IRS have determined that the statute requires a facility's eligibility for the section 45Y and 48E credits to be determined by the electricity-generating operations undertaken by the facility itself to produce electricity and that book-and-claim, by its nature, cannot establish what fuel or feedstock is physically used within a facility to produce electricity or the actual fundamental transformations of energy that are used to produce a facility's input energy source. Sections 45Y(b)(1)(A) and 48E(b)(3)(A)(iii) provide that ''qualified facility'' means a facility that is owned by the taxpayer and is used for the generation of electricity, placed in service after December 31, 2024, and for which the GHG emissions rate or, for purposes of section 48E, the anticipated GHG emissions rate, is not greater than zero.

For both the determination of whether a facility produces electricity through combustion or gasification and the determination of the emissions associated with a facility's production of electricity, Congress directed the Secretary to assess the activities of a given facility in the course of electricity production, rather than, for example, the process used to produce the electricity. The use of book-and-claim could misrepresent the activities taking place in the facility or the actual fundamental transformations of energy that are used to produce a facility's input energy source, resulting in inaccurate determinations both with respect to whether the facility is producing electricity through combustion and gasification and with respect to the emissions associated with the facility's production of electricity.

Book-and-claim accounting may appropriately be used in contexts other than the section 45Y and 48E credits to substantiate claims to the energy attributes of certain fuels and feedstocks. However, such claims do not necessarily correspond to the actual physical use of the relevant fuels and feedstocks. For example, where fuel is delivered through a common pipeline, the acquisition and retirement of certificates representing the attributes a particular fuel or feedstock may not (and are in fact unlikely to) reflect the physical delivery of fuel or feedstock with those attributes and its use by a facility in the production of electricity. In addition, the statutory authorization for credits other than the section 45Y and 48E credits may provide broader authority to support the use of a book-and-claim system, but the Treasury Department and the IRS agree with the commenters that such authority is not

available with respect to the section 45Y and 48E credits.

Whether a facility produces electricity through combustion or gasification is an inherently factual question that requires an assessment of (i) a facility's operations that produce electricity and (ii) the operations that produced the fuel, if any, used by that facility in the production of electricity. The emissions assessment for a facility that produces electricity through the combustion of a particular set of fuels must be based on the fuels in fact used by the facility, as well as any emissions from the full lifecycle of those fuels through the point of electricity production. The acquisition and retirement of certificates representing the attributes of certain types of fuel on behalf of this facility would have no bearing on which fuels it in fact used to produce electricity or the operations or feedstocks used to produce such fuel. As a result, permitting a facility to use book-and-claim accounting for this purpose could result in treating a facility that produced electricity through combustion or gasification as if it did not do so. For example, a hydrogen fuel cell that produces electricity using hydrogen produced entirely by steam methane reforming would be considered under the final regulations to have produced electricity through combustion or gasification. If the fuel or feedstock used by such facility were allowed to be determined using book-and-claim accounting, that facility could acquire and retire the attributes of hydrogen produced through electrolysis to be classified as a facility that did not produce electricity through combustion or gasification even though its operations did not support such a determination. This result would be inappropriate because section 45Y(b)(2)(B) requires consideration of the actual operations at a facility to produce electricity and the actual fundamental transformations of energy that are used to produce the facility's input energy source. The final regulations, therefore, cannot permit book-and-claim accounting in determining whether a facility produces electricity through combustion or gasification.

For the reasons explained previously, book-and-claim accounting also cannot establish the characteristics of the fuels used in a specific facility to produce electricity. Both sections 45Y(b)(2)(A) and (B) require an assessment of the greenhouse gases emitted into the atmosphere by the facility. The statute thus requires this inquiry to be based on the facility's actual operations and the emissions associated with it, both of which could be misrepresented by book-and-claim accounting. The final regulations, therefore, also cannot permit book-and-claim accounting in determining the amount of greenhouse gases emitted into the atmosphere by a facility in the production of electricity.

Thus, after consideration of the comments, §§ 1.45Y–5(e)(4) and 1.48E–5(e) of these final regulations do not permit the use of a book-and-claim accounting system to determine or claim the energy attributes of biogas, RNG, coal mine methane, any other methane used in the production of electricity, or any other input or feedstock. A facility that produces electricity through the combustion of RNG, for example, may substantiate its use of RNG by having a direct connection to an RNG source or records establishing exclusive, physical delivery of the RNG from that source to the facility for use in generating electricity. Because book-and-claim accounting of RNG energy attributes is not permitted for purposes of section 48E, such substantiation must address the actual anticipated operations of the qualified facility.

F. Carbon Capture and Sequestration

Section 45Y(b)(2)(D) provides that for purposes of section 45Y(b), the amount of GHGs emitted into the atmosphere by a facility in the production of electricity does not include any qualified carbon dioxide that is captured by the taxpayer and (i) pursuant to any regulations established under section 45Q(f)(2), disposed of by the taxpayer in secure geological storage, or (ii) utilized by the taxpayer in a manner described in paragraph (5) of such section. The Treasury Department and the IRS interpret this statutory language to mean that, for the calculation of the GHG emissions rate, the GHG emissions of a qualified facility in the production of electricity must be reduced by the amount of qualified carbon dioxide that is captured by the taxpayer at the qualified facility, and disposed of in secure geological storage; used in an enhanced oil and gas recovery (EOR) project and then disposed of in secure geological storage; or utilized (as defined in section 45Q(f)(5)).

Proposed § 1.45Y–5(e) provided that for purposes of paragraphs (c) and (d) of the section, a GHG emissions rate for a Non-C&G Facility or C&G Facility must exclude any qualified carbon dioxide (as defined in section 45Y(c)(3)) that is produced in such facility's production of electricity, captured by the taxpayer, and pursuant to any regulations established under section 45Q(f)(2), disposed of by the taxpayer in secure geological storage, or utilized by the taxpayer in a manner described in section 45Q(f)(5) and any regulations established under such section. Several commenters requested that the final regulations more closely track the statutory language with respect to treatment of qualified carbon dioxide within the meaning of section 45Q by changing the language in proposed § 1.45Y–5(e) from ''must exclude'' to ''shall not include.'' The Treasury Department and the IRS acknowledge that the proposed regulatory text created ambiguity and have revised the final rule accordingly.

Additionally, in the preamble to the proposed regulations, the Treasury Department and the IRS requested comments regarding what requirements should apply to substantiate and verify that carbon dioxide that is captured by the taxpayer is (a) disposed of by the taxpayer in secure geological storage pursuant to any regulations established under section 45Q(f)(2), disposed of by the taxpayer in secure geological sequestration, or (b) utilized by the taxpayer in a manner described in section 45Q(f)(5). Commenters almost universally recommended adopting the requirements for substantiation and verification of CCS provided by regulations and Internal Revenue Bulletin guidance under section 45Q, referred to collectively as ''the section 45Q rules.'' The commenters cited support for adopting the requirements for substantiation and verification provided by the section 45Q rules because they provide taxpayer certainty, particularly as industry has already adopted these procedures. Other commenters supported adopting the rules because these commenters view the rules as appropriately stringent.

Several commenters provided specific recommendations regarding the adoption of requirements for substantiation and verification provided by the section 45Q rules. The commenters requested that the final regulations adopt the requirements for secure geological storage provided under § 1.45Q–3, which include allowing the taxpayer to contract with a third party for secure geological storage activities consistent with the requirements under § 1.45Q–1(h)(2) and providing documentation to verify secure geological storage in accordance with 40 CFR part 98, subparts RR and VV (GHGRP), and the CSA/ANSI ISO 27916:2016 pathway. Several commenters also requested that the final regulations adopt the utilization requirements provided under § 1.45Q–4, including providing a written LCA report in conformity with ISO 14040:2006 and 14044:2006, third-party

independent review, and technical review by the DOE. Commenters also recommended imposing reporting requirements consistent with those imposed on taxpayers that claim the section 45Q credit on IRS Form 8933. Other commenters asserted that verification and substantiation requirements must include detailed records of the CCS process, third-party verification, and compliance with GHGRP reporting standards.

Several commenters recommended the adoption of a less stringent version of the requirements for substantiation and verification provided by the section 45Q rules. A commenter recommended that taxpayers not be required to obtain pre-approval of LCA reports, which is required for utilization under the section 45Q regulations and Notice 2024–60, 2024–34 I.R.B. 515. Instead, the commenter suggested that the final regulations provide an option for taxpayers that claim the section 45Y or 48E credits for capturing and utilizing carbon dioxide to use different LCA parameters than currently apply under the section 45Q rules. Another commenter requested that in addition to procedures provided by the section 45Q rules, that the final regulation provide that taxpayers may use other workable methods and protocols for verifying secure geological storage. After consideration of the comments, the Treasury Department and the IRS have determined that based on the explicit statutory direction in section 45Y(b)(2)(D) to rely upon the regulations established under section 45Q(f)(2) for secure geological storage and the reference to the requirements for utilization provided in section 45Q(f)(5), the final regulations adopt the requirements for substantiation and verification provided by regulations and Internal Revenue Bulletin guidance under section 45Q.

The Treasury Department and the IRS also asked whether it would be appropriate to limit the carbon dioxide that may be considered as qualified carbon dioxide (as defined under section 45Y(e)(3)), and thus excluded under section 45Y(b)(2)(D), to carbon dioxide that has been reported to the EPA's GHGRP, and if so, which GHGRP subpart or subparts should be used. Several commenters supported limiting the qualified carbon dioxide excluded from the GHG emissions of a qualified facility based on the amount of qualified carbon dioxide reported by the taxpayer to the GHGRP. A commenter also recommended that 40 CFR part 98, subpart RR (GHGRP), be used to verify secure geological storage.

Another commenter asserted that the GHGRP procedures are not stringent enough to be the basis for excluding qualified carbon dioxide from the GHG emissions rate of a qualified facility for purposes of the section 45Y or 48E credits. This commenter noted that the current methodology for the GHGRP does not accurately track emissions to conduct LCAs and determine emissions from C&G Facilities. The commenter also noted that measurements of carbon dioxide that is captured, sequestered, or injected into an EOR project are based on volumetric and mass flow-related mathematical and engineering calculations once a quarter, whereas calculations within the GHGRP assume that operations and measurement are consistent, excluding any considerations of site-specific equipment, operations, or malfunctions. The commenter asserted that this assumption may lead to inaccurate reporting to the GHGRP.

After consideration of the comments, the final regulations at § 1.45Y–5(e)(2) provide that the requirements for substantiation and verification of carbon capture and sequestration provided by regulations and Internal Revenue Bulletin guidance under section 45Q must be satisfied for qualified carbon dioxide to be taken into account to compute the GHG emissions rate of a qualified facility. Further, all taxpayers must comply with applicable GHGRP requirements under 40 CFR part 98, subpart PP (for carbon capture), subpart RR (for geological storage), and subpart RR or VV (for geological storage through enhanced oil recovery). In addition to the section 45Q rules, taxpayers using the ISO 27916 standard for EOR must report information to GHGRP under 40 CFR part 98, subpart VV. Additionally, a taxpayer claiming the section 45Y credit while conducting carbon capture and sequestration must also include their applicable GHGRP ID number(s) on any applicable IRS Form when claiming the section 45Y credit, with the exception of taxpayers claiming the section 45Y credit by performing carbon capture and utilization. The GHGRP does not provide a reporting mechanism for utilization.

In the preamble to the proposed regulations, the Treasury Department and the IRS provided an example in which carbon dioxide that was captured and sequestered as required by section 45Y(e)(3) subsequently escapes into the atmosphere after such carbon dioxide was taken into account by a taxpayer that claimed a section 45Y or 48E credit. The Treasury Department and the IRS asked what enforcement mechanisms or regulatory regimes should be used to identify when such emissions leakages have occurred. The Treasury Department and the IRS also requested comment regarding how such emissions leakages should be taken into account in determining compliance with the GHG emissions rate requirements under sections 45Y and 48E.

Several commenters endorsed using recapture concepts from the section 45Q rules to address instances in which qualified carbon dioxide taken into account for the section 45Y or 48E credits later leaks. Other commenters recommended that for cases in which captured and sequestered carbon dioxide subsequently escapes into the atmosphere, enforcement mechanisms should include regular monitoring and reporting requirements outlined in 40 CFR part 98, subpart RR, or CSA/ANSI ISO 27916:2019, as referenced in § 1.45Q–5(c). A commenter noted that stricter standards of measurement and reporting, and accounting for leakages are required to accurately determine if a facility's carbon capture and sequestration adequately accounts for leaked emissions. Another commenter suggested that for purposes of the section 45Y and 48E credits, treatment of emissions leakages must be adjusted from the section 45Q rules to require recalculation of the emissions rate of the qualified facility if the recalculated GHG emissions rate exceeds the required threshold.

After consideration of the comments the Treasury Department and the IRS have determined that the provisions of the section 45Q rules will apply to qualified carbon dioxide taken into account by a taxpayer for purposes of the section 45Y or 48E credits. These provisions include rules and standards for quantifying, certifying, and verifying when metric tons of qualified carbon dioxide have leaked into the atmosphere.

Further, the Treasury Department and the IRS also asked whether the existing recapture provisions under section 45Q are sufficient to address emissions leakages. Several commenters recommended that the final regulations incorporate the recapture requirements provided under § 1.45Q–5 to address captured and sequestered carbon oxide that later escapes into the atmosphere when a taxpayer has taken that carbon dioxide into account for purpose of the section 45Y or 48E credits. The section 45Q rules provide for a 3-year recapture period using a LIFO method and provide that for each year during the recapture period the amount of qualified carbon dioxide that is injected into secure geological storage is netted against the amount of qualified carbon

dioxide that may leak from such secure geological storage.

A commenter noted that the mechanics of attributing leakage events across years must be adapted for the section 45Y and 48E credits, with the effect of disqualifying a facility for the credit in years for which the recalculated GHG emissions rate exceeds the threshold. While most commenters endorsed adopting the concepts of the section 45Q recapture rule to the section 45Y and 48E credits, a commenter requested that the recapture rules not apply to taxpayers that use carbon capture and utilization to claim the section 45Y or 48E credits. The Treasury Department and the IRS have determined that the provisions of the section 45Q rules will apply to qualified carbon dioxide taken into account by a taxpayer for purposes of the section 45Y or 48E credits. These provisions include rules and standards for quantifying, certifying, and verifying when metric tons of qualified carbon dioxide have leaked into the atmosphere.

In the preamble to the proposed regulations, the Treasury Department and the IRS also requested comment regarding whether carbon capture and sequestration that occurs in the production of fuel that is used by a facility to produce electricity should be taken into account under proposed § 1.45Y–5(e) and section 45Y(e)(3) and, if so, how should such use of carbon capture and sequestration be assessed in an LCA. Several commenters asserted that fuel production is within the boundaries of an LCA for a C&G Facility and the determination of the GHG emissions rates for the qualified facility, and therefore, emissions captured and sequestered in the production of fuel for the qualified facility should be taken into account. Additionally, several commenters recommended that for carbon capture and sequestration occurring in the production of fuel used by a qualified facility to produce electricity, the LCA should account for emissions from the entire carbon capture and sequestration process, including capture, purification, compression, transportation, and injection because these processes all require energy input and will potentially result in further fugitive emissions and leaks. These commenters noted that a contrary approach would ignore a large portion of GHG emissions in the LCA. As a result, the commenters assert that the GHG emissions from these stages should be included in determining the net GHG emissions rate of a C&G Facility.

Other commenters asserted that if carbon capture and sequestration occurs in the production of a fuel used as a feedstock for a qualified facility, such emissions should be excluded from the GHG emissions of the qualified facility. A commenter noted that where fuel is produced from a process that involves carbon capture and sequestration (such as natural gas steam methane reforming, or gasification of biomass), the entity producing that fuel would claim any carbon removal credits. Therefore, the commenter asserted that the carbon dioxide captured and sequestered from the production of the fuel should not be accounted for by the qualified facility that uses such the fuel to produce electricity.

After consideration of the comments, the Treasury Department and the IRS have determined that for purposes of determining a net GHG emissions rate of a qualified facility, the section 45Q rules will apply *only* to qualified carbon dioxide subject to CCS at such qualified facility *during* the production of electricity. While the section 45Q rules are applicable to a taxpayer that uses CCS at a qualified facility during the production of electricity, there currently is no known administrable method to apply those provisions to third parties that produce fuel used by a qualified facility. Accordingly, the final regulations do not adopt the commenters' recommendation that CCS that occurs in the production of fuel that is used by a qualified facility to produce electricity should be taken into account for purpose of determining the net GHG emissions rate of such qualified facility.

G. Annual Publication of Emissions Rates

Proposed § 1.45Y–5(f)(1) provided that, as required by section 45Y(b)(2)(C)(i), the Secretary will annually publish a table that sets forth the GHG emissions rates for types or categories of facilities (Annual Table), which a taxpayer must use for purposes of section 45Y. Proposed § 1.45Y–5(f)(1) further provided that, except as provided in proposed § 1.45Y–5(h), a taxpayer that owns a facility that is described in the Annual Table on the first day of the taxpayer's taxable year in which the section 45Y or section 48E credit is determined with respect to such facility must use the Annual Table as of such date to determine an emissions rate for such facility for such taxable year.

Types or categories of facilities must be added or removed from the Annual Table consistent with, for Non-C&G Facilities, a technical assessment of the fundamental energy transformation into electricity as provided in proposed § 1.45Y–5(c)(1)(ii), and, for C&G Facilities, an LCA that complies with proposed § 1.45Y–5(d) and (e). Proposed § 1.45Y–5(f)(2) also provided that in connection with the publication of the Annual Table, the Secretary must publish an accompanying expert analysis that addresses any types or categories of facilities added or removed from the Annual Table since its last publication. Such analysis must be prepared by one or more of the National Laboratories, in consultation with other Federal agency experts, such as experts from DOE, the Treasury Department, the United States Department of Agriculture (USDA), and the EPA, as appropriate, and must address whether the addition or removal of types or categories of facilities from the Annual Table complies with section 45Y(b)(2)(A) and (B) (which refers to the definition of lifecycle GHG emissions in 42 U.S.C. 7545(o)(1)(H)) of the Code and proposed § 1.45Y–5. The Treasury Department and the IRS view the requirement to publish an expert analysis prepared by the National Laboratories of changes to the Annual Table as essential to ensuring public accountability and adherence to sound scientific principles. This requirement would also ensure that the Secretary has a robust record to inform any changes to the Annual Table.

The Treasury Department and the IRS intend to include in the Annual Table the types or categories of facilities that are described in the final regulations as having a GHG emissions rate that is not greater than zero. To provide clarity and certainty to taxpayers regarding eligibility, the Treasury Department and the IRS may also include in the Annual Table the types or categories of facilities that have a GHG emissions rate that is greater than zero and therefore do not meet the definition of a qualified facility. The Treasury Department and the IRS intend to publish the first Annual Table after the publication of the final regulations. Until the first publication of the Annual Table, taxpayers may treat the types or categories of facilities that are listed in proposed § 1.45Y–5(c)(2)(i) through (viii) as being described in an Annual Table as having a GHG emissions rate that is not greater than zero. Further, any types or categories of facilities that are added or removed from this list in the first publication of the Annual Table or any changes to emissions determinations for any types or categories of facilities in the Annual Table must be accompanied by the publication of an expert analysis of such

change as provided in proposed § 1.45Y–5(f)(2). If there are no changes to the Annual Table in a given taxable year, the Treasury Department and the IRS intend to notify taxpayers accordingly.

Commenters provided multiple perspectives on the substance and form of the Annual Table. Commenters noted that the Treasury Department and the IRS are required to publish an Annual Table that includes ''the GHG emissions rates for types or categories of facilities.'' Some commenters stated that the Annual Table should include the emissions rates of components used in different C&G technologies, that would be consistent for all facilities under specific conditions. Other commenters stated that the Treasury Department and the IRS should either not list the facility type in the Annual Table or should be conservative about the criteria listed for facilities with zero or negative emissions.

As noted earlier in this section of this Summary of Comments and Explanation of Revisions, section 45Y(b)(2)(C)(i) requires the Secretary to annually publish a table that sets forth the GHG emissions rates for types or categories of facilities. In order to promote taxpayer certainty and fulfill the requirements of the statute, the Annual Table should include sufficient information about what types or categories of facilities meet the GHG emissions rate requirements in sections 45Y and 48E. The Treasury Department and the IRS therefore do not adopt commenters' suggestions that the Annual Table should not include specific facility types.

From a technical perspective, many taxpayer situations cannot be covered in the Annual Table in a way that would be consistent with the statutory requirements for determining GHG emissions rates, as specific factual circumstances will impact the outcomes of this analysis. In order to avoid false precision, the Treasury Department and the IRS have determined that the Annual Table should capture whether a particular type or category of facility has a GHG emissions rate of less than or equal to zero or a rate that is greater than zero. These determinations will be made consistent with the requirements of sections 45Y and 48E and these final regulations.

Some commenters requested that the publication of the Annual Table be expedited to release the first Annual Table at the same time as the final regulations. Commenters also suggested that, for types or categories of facilities that are listed as having a GHG emissions rate that is less than or equal to zero in the final regulations, publication of the Annual Table or a PER certification is unnecessary for those facilities to meet the emissions rate requirement.

Given the time and effort necessary to conduct emissions analysis that meets the requirements of the statute and these final regulations, the Treasury Department and the IRS cannot commit to a specific timeline for publication of the first Annual Table at this time. However, as noted earlier in this section of this Summary of Comments and Explanation of Revisions, taxpayers may treat the types or categories of facilities that are listed in these final regulations as having an emissions rate that is less than equal to zero or an emissions rate of greater than zero in accordance with the rules provided in the final regulations.

Commenters also raised concerns regarding consistency between the approach to the Annual Table and the PER process. Some commenters stated that the Treasury Department should take a conservative approach to the evaluation of any petitions for C&G Facility types not listed in the Annual Table. The Treasury Department and the IRS have adopted an approach that harmonizes the technical requirements for the Annual Table and the PER process. For example, for purposes of determining the net GHG emissions rate for a C&G Facility under sections 45Y and 48E, any LCA must meet the requirements of the statutes, including taking into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H) and these final regulations.

Commenters supported the proposed regulations' approach to updating the Annual Table, including the requirement to produce analysis led by one or more of the National Laboratories, in consultation with other Federal agency experts, and the requirement to publish that analysis. The Treasury Department and the IRS agree that such an approach is essential to ensuring public accountability and adherence to sound scientific principles and adopt the approach as proposed in the final regulations.

H. Provisional Emissions Rates

1. In General

For purposes of section 45Y, proposed § 1.45Y–5(g) provided the rules applicable to provisional emissions rates. Proposed § 1.45Y–5(g)(1) provided that, in the case of any facility that is of a type or category for which an emissions rate has not been established by the Secretary under proposed § 1.45Y–5(g), a taxpayer that owns such facility may file a petition with the Secretary for the determination of the emissions rate with respect to such facility (Provisional Emissions Rate or PER).

For purposes of section 48E, proposed § 1.48E–5(g) provided the rules applicable to provisional emissions rates. Proposed § 1.48E–5(g)(1) provided that, in the case of any facility that is of a type or category for which an emissions rate has not been established by the Secretary under proposed § 1.48E–5(g), a taxpayer that owns such facility may file a petition with the Secretary for the determination of the emissions rate with respect to such facility (Provisional Emissions Rate or PER). The proposed rule is adopted without change.

2. Rate Not Established

Proposed § 1.45Y–5(g)(2) provided that an emissions rate has not been established by the Secretary for a facility for purposes of section 45Y(b)(2)(C)(ii) if such facility is not described in the Annual Table. If a taxpayer's request for an emissions value pursuant to proposed § 1.45Y–5(g)(5) is pending at the time such facility is or becomes described in the Annual Table, the taxpayer's request for an emissions value will be automatically denied.

Proposed § 1.48E–5(g)(2) provided that an emissions rate has not been established by the Secretary for a facility for purposes of sections 45Y(b)(2)(C)(ii) and 48E(b)(3)(B)(ii) if such facility is not described in the Annual Table. If a taxpayer's request for an emissions value pursuant to proposed § 1.48E–5(g)(5) is pending at the time such facility is or becomes described in the Annual Table, the taxpayer's request for an emissions value will be automatically denied.

3. Process for Filing a PER Petition

Proposed § 1.45Y–5(g)(3) provided the process for filing a PER petition. Proposed § 1.45Y–5(g)(3) provided that to file a PER petition with the Secretary, a taxpayer must submit a PER petition by attaching it to the taxpayer's Federal income tax return or Federal return, as appropriate, for the first taxable year in which the taxpayer claims the section 45Y credit with respect to the facility to which the PER petition applies. A PER petition must contain an emissions value and, if provided by DOE, the associated DOE letter. An emissions value may be obtained from DOE or by using the LCA model designated in proposed § 1.45Y–5(g)(6).

An emissions value obtained from DOE will be based on an analytical

assessment of the emissions rate associated with the facility, performed by one or more National Laboratories, in consultation with Federal agency and other experts as appropriate, consistent with proposed § 1.45Y–5. A taxpayer would be required to retain in its books and records the request to DOE for an emissions value, including any information provided by the taxpayer to DOE pursuant to the emissions value request process provided in proposed § 1.45Y–5(g)(5).

Alternatively, an emissions value can be determined by the taxpayer for a facility using the most recent version of an LCA model or models, as of the time the PER petition is filed, that have been designated by the Secretary for such use under proposed § 1.45Y–5(g)(6). If an emissions value is determined using the designated model, a taxpayer is required to provide to the IRS information to support its determination of the emissions value in the form and manner prescribed in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter. A taxpayer may not request an emissions value from DOE for a facility for which an emissions value can be determined by using the most recent version of an LCA model or models that have been designated by the Secretary for such use under proposed § 1.45Y–5(g)(6).

Proposed § 1.48E–5(g)(3) provided the process for filing a PER petition. Proposed § 1.48E–5(g)(3) provided that to file a PER petition with the Secretary, a taxpayer must submit a PER petition by attaching it to the taxpayer's Federal income tax return or Federal return, as appropriate, for the first taxable year in which the taxpayer claims the section 48E credit with respect to the facility to which the PER petition applies. A PER petition must contain an emissions value and, if provided by DOE, the associated DOE letter. An emissions value may be obtained from DOE or by using the LCA model designated in proposed § 1.48E–5(g)(6).

An emission value obtained from DOE will be based on an analytical assessment of the emissions rate associated with the facility, performed by one or more National Laboratories, in consultation with other Federal agency experts as appropriate, consistent with proposed § 1.48E–5. A taxpayer would be required to retain in its books and records the request to DOE for an emissions value, including any information provided by the taxpayer to DOE pursuant to the emissions value request process provided in proposed § 1.48E–5(g)(5).

Alternatively, an emissions value can be determined by the taxpayer for a facility using the most recent version of an LCA model or models, as of the time the PER petition is filed, that have been designated by the Secretary for such use under proposed § 1.48E–5(g)(6). If an emissions value is determined using the designated model, a taxpayer is required to provide to the IRS information to support its determination of the emissions value in the form and manner prescribed in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter. A taxpayer may not request an emissions value from DOE for a facility for which an emissions value can be determined by using the most recent version of an LCA model or models that have been designated by the Secretary for such use under proposed § 1.48E–5(g)(6).

A commenter supported the process provided in the proposed regulations for filing a PER petition and for permitting taxpayers to determine an emissions value during the PER process based on the most recent approved LCA model. However, the commenter cautioned that a self-certification option would be effective only to the extent that LCA models are approved for clean-electricity technologies for which an emissions rate is not available in the Annual Table. This commenter recommended that the Treasury Department and the IRS approve LCA models expeditiously and ensure that the LCA models take avoided emissions into account based on technologies like fuel cells. Another commenter suggested clarifying whether facilities with standardized configurations and equipment could rely upon a single PER, rather than having to independently apply for a PER. The commenter emphasized that a single PER could just as easily be applied to separate facilities, provided that material characteristics are sufficiently similar.

The Treasury Department and the IRS developed the PER process in consultation with the DOE and other agencies. The procedures developed for the PER process will designate an LCA model or models that are consistent with the requirements of sections 45Y and 48E and these regulations for use under § 1.45Y–5(g)(6). The Treasury Department and the IRS decline to permit taxpayers to rely upon a single PER for separate facilities, because, as a commenter recognized, whether a single PER could be applicable to separate facilities would depend on the facts and circumstances. Accordingly, to ensure that the taxpayer has a PER determination applicable to each qualified facility, the taxpayer must submit a request for a PER determination for each separate facility.

With respect to the Annual Table and the PER process, a commenter requested that the Treasury Department develop or design an incentive for those investors willing to invest in technological innovations that could improve on average results likely set forth in the Annual Table. The Treasury Department and the IRS decline to address this request because the addition of extra-statutory incentives is outside the scope of these final regulations.

4. PER Determination

Proposed § 1.45Y–5(g)(4) provided that, upon the IRS's acceptance of the taxpayer's Federal income tax return or Federal return, as appropriate, containing a PER petition, the emissions value of the facility specified on such petition will be deemed accepted. Such PER petition must be submitted to the IRS in the first taxable year in which the taxpayer claims the section 45Y credit with respect to the facility to which the PER petition applies. A taxpayer would be able to rely upon an emissions value provided by DOE for purposes of calculating and claiming a section 45Y credit, provided that any information, representations, or other data provided to DOE in support of the request for an emissions value accurately reflect the facility's operations in each year the taxpayer seeks to rely on that emissions value. If applicable, a taxpayer may rely upon an emissions value determined for a facility using the most recent version of the LCA model or models that, as of the time the PER petition is filed, have been designated by the Secretary for such use under proposed § 1.45Y–5(g)(6), provided that any information, representations, or other data used to obtain such emissions value remain accurate. The IRS's deemed acceptance of an emissions value is the Secretary's determination of the PER. The taxpayer must still comply with all applicable requirements for the section 45Y credit and any information, representations, or other data supporting an emissions value are subject to later examination by the IRS.

Proposed § 1.48E–5(g)(4) provided that, upon the IRS's acceptance of the taxpayer's Federal income tax return or Federal return, as appropriate, containing a PER petition, the emissions value of the facility specified on such petition will be deemed accepted. A taxpayer would be able to rely upon an emissions value provided by DOE for purposes of calculating and claiming a

section 48E credit, provided that any information, representations, or other data provided to DOE in support of the request for an emissions value are accurate. If applicable, a taxpayer may rely upon an emissions value determined for a facility using the most recent version of the LCA model or models that, as of the time the PER petition is filed, have been designated by the Secretary for such use under proposed § 1.48E–5(g)(6), provided that any information, representations, or other data used to obtain such emissions value are accurate. The IRS's deemed acceptance of an emissions value is the Secretary's determination of the PER. The taxpayer must still comply with all applicable requirements for the section 48E credit and any information, representations, or other data supporting an emissions value are subject to later examination by the IRS.

A commenter suggested permitting joint evaluations of similar PER requests, as well as leveraging information submitted under prior evaluations, to promote a more streamlined process. The commenter requested that the Treasury Department and the IRS prioritize certainty and expediency and clarify the timing by which taxpayers can expect to receive an official assessment from the National Laboratories and other involved experts. An additional commenter stated that a delay in PER determinations would be hugely detrimental and disadvantage early entrants and innovative technologies. This commenter suggested that the Treasury Department, the IRS, and the DOE assess their collective capacities and resource needs to conduct analytical assessments for PER applications efficiently and expeditiously. The commenter also recommended that the Treasury Department direct the DOE to assess applications and determine a facility's emissions rate within six months of a taxpayer's submission of a PER application.

The Treasury Department and the IRS recognize the importance of certainty and expediency in evaluating PER requests and have consulted with DOE to develop the PER application process. These agencies expect to review PER applications within an appropriate timeframe. Therefore, the changes suggested by the comments are not adopted. The Treasury Department and the IRS will continue to consult with the DOE as appropriate to assist in the administration of these final regulations.

5. Emissions Value Request Process

Proposed § 1.45Y–5(g)(5) provided the rules applicable to the emissions value request process. Proposed § 1.45Y–5(g)(5) provided that an applicant that submits a request for an emissions value must follow the procedures specified by DOE to request and obtain such emissions value, and that emissions values will be determined consistent with the rules provided in proposed § 1.45Y–5. An applicant may request an emissions value from DOE only after a front-end engineering and design (FEED) study or similar indication of project maturity, as determined by DOE, such as the completion of a project specification and cost estimation sufficient to inform a final investment decision for the facility. DOE may decline to review applications that are non-responsive and those applications that relate to a facility that is described in the Annual Table (consistent with proposed § 1.45Y–5(g)(2)) or a facility that can determine an emissions value using a designated LCA model under proposed § 1.45Y–5(g)(6) (consistent with proposed § 1.45Y–5(g)(3)), or applications that are incomplete.

Proposed § 1.45Y–5(g)(5) also provided that applicants must follow DOE's guidance and procedures for requesting and obtaining an emissions value from DOE. DOE will publish guidance and procedures that applicants must follow to request and obtain an emissions value from DOE. DOE's guidance and procedure will include a process, under limited circumstances, for a taxpayer to request a revision to DOE's initial assessment of an emissions value on the basis of revised technical information or facility design and operation. The Treasury Department and the IRS anticipate that the emissions value request process will open after the publication of the final regulations.

Proposed § 1.48E–5(g)(5) provided the rules applicable to the emissions value request process. Proposed § 1.48E–5(g)(5) provided that an applicant that submits a request for an emissions value must follow the procedures specified by DOE to request and obtain such emissions value, and that emissions values will be determined consistent with the rules provided in proposed § 1.48E–5. An applicant may request an emissions value from DOE only after a FEED study or similar indication of project maturity, as determined by DOE, such as the completion of a project specification and cost estimation sufficient to inform a final investment decision for the facility. DOE may decline to review applications that are non-responsive and those applications that relate to a facility that is described in the Annual Table (consistent with proposed § 1.48E–5(g)(2)) or a facility that can determine an emissions value using a designated LCA model under proposed § 1.48E–5(g)(6) (consistent with proposed § 1.48E–5(g)(3)), or applications that are incomplete.

Proposed § 1.48E–5(g)(5) also provided that applicants must follow DOE's guidance and procedures for requesting and obtaining an emissions value from DOE. DOE will publish guidance and procedures that applicants must follow to request and obtain an emissions value from DOE. DOE's guidance and procedure will include a process, under limited circumstances, for a taxpayer to request a revision to DOE's initial assessment of an emissions value on the basis of revised technical information or facility design and operation. The Treasury Department and the IRS anticipate that the emissions value request process will open after the publication of the final regulations.

A commenter requested that the Treasury Department conservatively evaluate any petitions to assign an emissions rate for C&G facility types not listed in the Annual Table and to strive to be fully confident that operation of the facility would not lead to net lifecycle emissions.

The Treasury Department and the IRS have adopted an approach that harmonizes the technical requirements for the Annual Table and the PER process. For example, for purposes of determining the GHG emissions rate for a C&G Facility under sections 45Y and 48E, any LCA must meet the requirements of the statutes, including taking into account lifecycle GHG emissions as described in 42 U.S.C. 7545(o)(1)(H) and these final regulations.

Another commenter contended that completion of a FEED study is an inappropriate indicator of project maturity to request a PER. The commenter asserted that such a requirement could substantially delay projects and that a more logical approach would be for the DOE to determine a PER using a pre-FEED or feasibility study as a demonstration of project maturity. An additional commenter claimed that the cost and related timing of a FEED study may be prohibitive for distributed or small-scale facilities. The commenter asserted that in order to access project financing, project developers must know early in the development process that a facility will be eligible for the section 45Y or 48E credit. However, the commenter stated that, a FEED study cannot typically be completed until well after a project developer will need to have provided prospective financiers with

certainty about credit eligibility. The commenter noted that this disconnect could effectively prevent the development of clean energy production facilities that utilize pathways not already identified in the Annual Table.

As an alternative to requiring a FEED study, a commenter suggested accepting an LCA performed by a third-party, DOE-certified provider, conducted using the most current, approved GREET model, provided that the following criteria are satisfied: (i) the system is UL or CE certified, (ii) the total landed bill of materials (BOM) cost of the system is less than $20 million, and (iii) the system has less than 10 MW energy equivalent (thermal, total gas flow, or total electricity) in it. Similarly, a commenter asserted that FEED studies can cost up to $50 million and delay project development by 6–8 months and recommended considering projects at FEL–2 [27] of the project for PER applications.

Proposed § 1.45Y–5(g)(5) provided flexibility to taxpayers by permitting a taxpayer to request an emissions value from DOE after an indication of project maturity, as determined by DOE, such as a FEED study or the completion of a project specification and cost estimation sufficient to inform a final investment decision for the facility. As proposed, DOE has some discretion to determine appropriate project maturity indicators, if not a FEED study. However, a pre-FEED or feasibility study are not adequate indicators of project maturity as there exists too high of a likelihood that the final design of the qualified facility will differ from the pre-FEED or feasibility study and therefore would undermine the implementation of the statutory definition of a qualified facility. Accordingly, the proposed rule is adopted without change.

An applicant can request an emissions value from DOE only after a front-end FEED study or similar indication of project maturity, as determined by DOE, such as the completion of a project specification and cost estimation sufficient to inform a final investment decision for the facility. The DOE will publish more information about the process to receive an emissions value in forthcoming guidance.

[27] FEL–2, also known as the conceptual design or feasibility design phase of a project, may typically result in deliverables which include project schedule, preliminary design report, site layout, and similar. *See* Stage Gate Project Management, Mark Ludwigson, PDH Academy, *https://pdhacademy.com/wp-content/uploads/2024/01/524-Stage_Gate_Project_Management.pdf.*

6. LCA Model for Determining an Emissions Value for C&G Facilities

Proposed § 1.45Y–5(g)(6) provided that the Secretary may designate one or more LCA models for a taxpayer to determine an emissions value for C&G Facilities that are not described in the Annual Table. A model may only be designated if it complies with section 45Y(b)(2)(B) and proposed § 1.45Y–5(d) and (e). The Secretary may revoke the designation of an LCA model or models. In connection with the designation or revocation of a designation of an LCA model or models, the Secretary is required to publish an accompanying expert analysis of the model prepared by one or more of the National Laboratories, in consultation with other Federal agency experts as appropriate. Such analysis must address the model's compliance with section 45Y(b)(2)(B) and proposed § 1.45Y–5(d) and (e). The Treasury Department and the IRS view the requirement to publish an expert analysis prepared by the National Laboratories of the designation or revocation of designation of an LCA model or models as essential to ensuring public accountability and adherence to sound scientific principles. This requirement also ensures that the Secretary has a robust record to inform any designations or revocations of an LCA model or models.

The rules provided in proposed § 1.45Y–5(g)(6) regarding the designation of an LCA model or models for determining an emissions value for C&G Facilities apply for purposes of section 48E and proposed § 1.48E–5(g)(6).

7. Effect of PER

Proposed § 1.45Y–5(g)(7) provided that a taxpayer may use a PER determined by the Secretary to determine the section 45Y credit for the facility to which the PER applies, provided all other requirements of section 45Y are met. The Secretary's determination of a PER is not an examination or inspection of books of account for purposes of section 7605(b) of the Code and does not preclude or impede the IRS (under section 7605(b) or any administrative provisions adopted by the IRS) from later examining a return or inspecting books or records with respect to any taxable year for which the section 45Y credit is claimed. A PER determination does not signify that the IRS has determined that the requirements of section 45Y have been satisfied for any taxable year.

Proposed § 1.48E–5(g)(7) provided that a taxpayer may use a PER determined by the Secretary to determine the section 48E credit for the facility to which the PER applies, provided all other requirements of section 48E are met. The Secretary's determination of a PER is not an examination or inspection of books of account for purposes of section 7605(b) of the Code and does not preclude or impede the IRS (under section 7605(b) or any administrative provisions adopted by the IRS) from later examining a return or inspecting books or records with respect to any taxable year for which the section 48E credit is claimed. A PER determination does not signify that the IRS has determined that the requirements of section 48E have been satisfied for any taxable year.

8. Reliance on Annual Table or Provisional Emissions Rate

Proposed § 1.45Y–5(h) provided that taxpayers may rely on the Annual Table in effect as of the date a facility began construction or the provisional emissions rate that has been determined by the Secretary for the taxpayer's facility under proposed § 1.45Y–5(g)(4) to determine the facility's GHG emissions rate for that facility for any taxable year that is within the 10-year period described in section 45Y(b)(1)(B), provided that the facility continues to operate as a type of facility that is described in the Annual Table or the facility's emissions value request, as applicable, for the entire taxable year.

A commenter requested a safe harbor for taxpayers with ongoing transactions in the event of any changes to categories of facilities and corresponding GHG emissions rates listed on the Annual Table, with a clearly advertised cutoff date for the applicability of the prior iteration.

The proposed regulations provided a rule allowing for reliance on the Annual Table in effect as of the date a facility began construction in order to give sufficient taxpayer certainty for projects in development. Specifying that reliance on the Annual Table in effect based on the beginning of construction date provides a clear point in time that is already well understood for tax purposes. The commenter's recommendation requires a fact intensive analysis of an event or series of events that lack a definitive date certain for when a transaction becomes ''ongoing.'' Such a rule is not administrable for taxpayers and the IRS. Therefore, the proposed rule is adopted without change.

I. Determining Anticipated Greenhouse Gas Emissions Rate

Consistent with section 48E(b)(3)(A)(iii), proposed § 1.48E–5(h)

provided rules to determine an anticipated GHG emissions rate. As explained in the preamble to the proposed regulations, the Treasury Department and the IRS interpret the reference in section 48E(b)(3)(A)(iii) to an ''anticipated greenhouse gas emissions rate'' that is not greater than zero to require a reasonable expectation that a qualified facility will operate with a rate or net rate of greenhouse gas emissions that is not greater than zero over a specified period of time. Certain Non-C&G Facilities, such as the facilities described in § 1.45Y–5(c)(2), may have an anticipated greenhouse gas emissions rate that is not greater than zero based on the technology and practices they rely upon to generate electricity. For facilities that require the use of certain fuel sources, which may vary, or carbon capture and sequestration, to generate electricity with a greenhouse gas emissions rate that is not greater than zero, objective indicia that such facilities will use such fuel sources or operate such carbon capture equipment, as applicable, in a manner that results in a greenhouse gas emissions rate that is not greater than zero for at least 10 years beginning from the date the facility is placed in service are required to establish a reasonable expectation that the combination of fuel, type of facility, and practice will result in a greenhouse gas emissions rate that is not greater than zero.

The proposed regulations provided a non-exhaustive list of examples of objective indicia that may establish a reasonable expectation that a qualified facility will operate with an anticipated GHG emissions rate that is not greater than zero, including include co-location of the facility with a fuel source for which the combination of fuel, type of facility, and practice is reasonably expected to result in a GHG emissions rate that is not greater than zero; a 10-year contract to purchase fuels for which the combination of fuel, type of facility, and practice is reasonably expected to result in a GHG emissions rate that is not greater than zero; or a facility type that only accommodates one type of fuel or a small range of fuels for which the combination of fuel, type of facility, and practice is reasonably expected to result in a GHG emissions rate that is not greater than zero; or a 10-year contract for the capture, disposal, or utilization of qualified carbon dioxide from the facility for which the combination of fuel, type of facility, and practice is reasonably expected to result in a GHG emissions rate that is not greater than zero. These examples are adopted in the final regulations in § 1.48E–5(h)(2) with minor changes to clarify that such contracts must be binding written contracts and to more closely align the language used in the example pertaining to carbon capture and sequestration at proposed § 1.48E–5(h)(2)(iv) with that used for purposes of section 45Q and referenced in section 45Y(b)(2)(D).

The Treasury Department and the IRS requested comment on what evidence or substantiation taxpayers should be required to maintain to be able to establish an anticipated GHG emissions rate for a qualified facility. Two commenters recommended requiring that objective indicia take the form of physical features that make it more likely that the qualified facility will operate with a GHG emissions rate that is not greater than zero. In these commenters' view, if the objective indicia do not relate to physical features of the qualified facility, the qualified facility could be too easily repurposed in a way that results in a positive GHG emissions rate. Commenters provided examples of physical features such as evidence of carbon capture and sequestration equipment incorporated into the qualified facility or a direct pipeline connection from the qualified facility to a waste fuel or feedstock, as appropriate.

The Treasury Department and the IRS have determined that objective indicia need not always take the form of physical features. While in some cases physical features may provide objective indicia that a qualified facility will operate with a GHG emissions rate that is not greater than zero, such features are not relevant and therefore not required in all cases. Some qualified facilities may not have a physical feature that differentiates a facility with a GHG emissions rate that is not greater than zero from a comparable facility with a GHG emissions rate that is greater than zero. In such cases, the taxpayer must find another method of documenting its anticipated GHG emissions rate that is not greater than zero that provides a comparable level of substantiation as a physical feature. This could take the form of a long-term contract for fuel that would enable the facility to attain a GHG emissions rate that is not greater than zero, provided the contract imposes a binding obligation on the purchaser to compensate the seller for a sufficient volume of fuel to operate the entire facility for a substantial portion of the facility's lifetime, such as ten years. The Treasury Department and the IRS have determined that in some cases non-physical features that involve commitment to a third party, such as the aforementioned contract, can provide substantiation that a facility is reasonably expected to operate with a GHG emissions rate that is not greater than zero that is equivalent to the substantiation provided by a physical feature and relevant for a facts and circumstances analysis. Accordingly, the final regulations do not adopt the suggestion that objective indicia must take the form of physical features.

The Treasury Department and the IRS also recognize that in some cases, a facility may seek to establish that it will operate with a GHG emissions rate that is not greater than zero on the basis that it will continuously operate carbon capture and sequestration equipment during electricity production. The physical presence of the carbon capture equipment would not generally be sufficient objective indicia to substantiate that the facility will operate using that equipment. The final regulations therefore provide at § 1.48E–5(h)(2)(iv) that one form of objective indicia substantiating operation of such equipment may include a 10-year binding written contract for the permanent geological storage (including after injection into an EOR project) or utilization of qualified carbon dioxide from the facility for which the combination of fuel, type of facility, and practice is reasonably expected to result in a GHG emissions rate that is not greater than zero. The final regulations further provide an additional example of such objective indicia substantiating the operation of this equipment at § 1.48E–5(h)(2)(v). Such objective indicia may include a legally binding Federal or State air permit which requires, as a condition of the permit, that the facility operates in a manner for which the combination of fuel, type of facility, and practice is reasonably expected to result in a greenhouse gas emissions rate that is not greater than zero and that any captured carbon dioxide is permanently geologically stored and subjects the holder to civil or criminal penalties in the event the relevant permit requirements are breached. In the case of a facility which requires the operation of carbon capture and sequestration equipment to achieve a qualifying GHG emissions rate of not greater than zero, the Treasury Department and the IRS have currently identified that such a permit requirement would provide sufficient assurance that the objective indicia requirement is met with respect to the operation of the carbon capture and sequestration and expect that taxpayers seeking to substantiate in other ways

would need to substantiate with substantially similar objective indicia.

The preamble to the proposed regulations also requested comment on the appropriate period of time for which taxpayers should be required to be able to demonstrate that there is a reasonable expectation that a qualified facility will operate with a GHG emissions rate that is not greater than zero. Commenters provided a range of views on this topic. Several commenters suggested that taxpayers be required to demonstrate objective indicia that a qualified facility will operate with a GHG emissions rate that is not greater than zero for the lifetime of the qualified facility. Several other commenters recommended that this period be shorter, asserting that longer timelines, such as those beyond ten years, could prove burdensome, in part due to greater uncertainty over such time periods.

Because the Treasury Department and the IRS have determined that the examples of objective indicia that account for a GHG emissions rate over ten years are sufficient to show that the operation of a qualified facility could reasonably be expected to result in a GHG emissions rate that is not greater than zero, these final regulations will not adopt the suggestion that the lifetime of the facility is the appropriate period of time for which a taxpayer is required to be able to demonstrate such expectation. The Treasury Department and the IRS have determined that demonstrating a reasonable expectation that a qualified facility will operate with a GHG emissions rate that is not greater than zero for the lifetime of a qualified facility would, for some long-lived facilities, be extremely challenging, if not impossible. However, these final regulations require taxpayers claiming the section 48E credit to attest under penalty of perjury in a manner prescribed by the IRS in forms or instructions that the anticipated GHG emissions rate as determined under the statute and these final regulations is not greater than zero. A facility subject to legally binding State or Federal permit conditions requiring that the facility operate in a manner that would be incompatible with a greenhouse gas emissions rate of not greater than zero is not a facility for which the anticipated greenhouse gas emissions rate is not greater than zero.

J. Substantiation

Upon consideration of the comments and consultation with other Federal agency experts, the Treasury Department and the IRS have also determined that the proposed regulations would benefit from additional clarity regarding substantiation requirements. In particular, the Treasury Department and the IRS acknowledge commenters' concerns about verifying and substantiating the key characteristics that ensure a qualified facility has a GHG emissions rate not greater than zero. Accordingly, the final regulations make clear that substantiation requirements prescribed by the Secretary must include substantiation of the key parameters that would contribute to or impact the GHG emissions rates based on analytical assessments conducted by the National Laboratories, in consultation with other Federal agency experts as appropriate. The Treasury Department and the IRS will describe specific substantiation requirements for such facilities, including requirements for preparation or verification by an unrelated third party as appropriate, in future guidance. The Treasury Department and the IRS will require taxpayers to substantiate that the full electricity production process—including specific fuels or feedstocks used—is consistent with the taxpayer's claims and meets the specific criteria that the analytical assessment has found are necessary for it to meet the statutory requirement of a GHG emissions rate not greater than zero. Given feedback provided by commenters on biomass discussed in section VIII.E. of this Summary of Comments and Explanation of Revisions, the final regulations also specify that for C&G Facilities utilizing biomass feedstocks, taxpayers must substantiate that the source of such fuels or feedstocks used are consistent with the taxpayer's claims. Moreover, in response to comments and as discussed in section VIII.D. of this Summary of Comments and Explanation of Revisions, if a qualified facility uses feedstocks that do not have marketability, but which are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer will be required to maintain documentation substantiating the origin and original form of the feedstock. To ensure that C&G Facilities that utilize biomass feedstocks meet the statutory requirement of a net GHG emissions rate not greater than zero, the Treasury Department and the IRS anticipate that it may be appropriate to require or encourage taxpayers to maintain third-party certification that verifies that these facilities meet the criteria that the LCA has found are necessary for a facility to meet this statutory requirement.

Severability

If any provision in this rulemaking is held to be invalid or unenforceable facially, or as applied to any person or circumstance, it shall be severable from the remainder of this rulemaking, and shall not affect the remainder thereof, or the application of the provision to other persons not similarly situated or to other dissimilar circumstances.

Applicability Dates

These regulations apply to qualified facilities (and for §§ 1.48E–1 through 1.48E–4, ESTs) placed in service after December 31, 2024, and during taxable years ending on or after January 15, 2025.

Special Analyses

I. Regulatory Planning and Review—Economic Analysis

Pursuant to the Memorandum of Agreement, Review of Treasury Regulations under Executive Order 12866 (June 9, 2023), tax regulatory actions issued by the IRS are not subject to the requirements of section 6 of Executive Order 12866, as amended. Therefore, a regulatory impact assessment is not required.

II. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3501–3520) (PRA) generally requires that a Federal agency obtain the approval of the Office of Management and Budget (OMB) before collecting information from the public, whether such collection of information is mandatory, voluntary, or required to obtain or retain a benefit. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a valid OMB control number.

The collections of information in these final regulations contain recordkeeping and reporting requirements that are required to substantiate eligibility to claim a section 45Y or section 48E credit. These collections of information would generally be used by the IRS for tax compliance purposes and by taxpayers to facilitate proper reporting and compliance. The general recordkeeping requirements mentioned within these final regulations are considered general tax records under § 1.6001–1(e).

The recordkeeping requirements in these final regulations with respect to section 45Y include the requirement in § 1.45Y–5(h)(1) that taxpayers claiming the section 45Y credit must maintain in its books and records documentation regarding the design and operation of a facility that establishes that such facility

had a GHG emissions rate that is not greater than zero for the taxable year. Included in § 1.45Y–5(h)(2) are examples of documentation that sufficiently substantiates that a facility has a GHG emissions rate that is not greater than zero for the taxable year, which includes documentation, or a report prepared by an unrelated party that verifies that a facility had such an emissions rate. A facility described in § 1.45Y–5(c)(2) can maintain sufficient documentation to demonstrate a GHG emissions rate that is not greater than zero for the taxable year by showing that it is a type of facility described in § 1.45Y–5(c)(2). Section 1.45Y–5(h)(2) provides that for other types of facilities not described in § 1.45Y–5(c)(2), the taxpayer must demonstrate that the qualified facility meets the specific criteria that the analytical assessment prepared by the National Laboratories, in consultation with other Federal agency experts as appropriate, has found are necessary for a facility to meet the statutory requirement of a greenhouse gas emissions rate not greater than zero. Section 1.45Y–5(j)(2) provides that for C&G Facilities that utilize biomass feedstocks, the taxpayer must substantiate that the source of such fuels or feedstocks used are consistent with the taxpayer's claims. Section 1.45Y–5(j)(2) further provides that for the qualified facilities not described in § 1.45Y–5(c)(2), the Secretary may determine that other types of facilities can sufficiently substantiate a GHG emissions rate, as determined under this section, that is not greater than zero with certain documentation and will describe such facilities and documentation in IRS forms, instructions, or publications, or guidance published in the Internal Revenue Bulletin. For facilities that utilize unmarketable feedstocks that are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer will be required to maintain documentation substantiating the origin and original form of the feedstock. For PRA purposes, these general tax records are already approved by OMB under 1545–0074 for individuals, 1545–0123 for business entities, 1545–0092 for trust and estate filers, and 1545–0047 for tax-exempt organizations.

The recordkeeping requirements in these final regulations with respect to section 48E would include the requirement in § 1.48E–5(k)(1) that a taxpayer must maintain in its books and records documentation regarding the design and operation of a facility that establishes that such facility had an anticipated GHG emissions rate that is not greater than 10 grams of CO_2e per kWh during each year of the recapture period that applies for purposes of section 48E(g). Included in § 1.48E–5(k)(2) are examples of documentation that sufficiently substantiates that a facility has a GHG emissions rate that is not greater 10 grams of CO_2e per kWh during each year of the recapture period, which includes documentation, or a report prepared by an unrelated party that verifies that a facility had such an emissions rate. A facility described in § 1.45Y–5(c)(2) can maintain sufficient documentation to demonstrate a GHG emissions rate that is not greater than 10 grams of CO_2e per kWh by showing that it is a type of facility described in § 1.45Y–5(c)(2). The Secretary may determine that other types of facilities can sufficiently substantiate a GHG emissions rate that is not greater than 10 grams of CO_2e per kWh with certain documentation and will describe such facilities and documentation in IRS forms, instructions, or publications, or in guidance published in the Internal Revenue Bulletin. For such other types of facilities that utilize biomass feedstocks, the taxpayer must substantiate that the source of such fuels or feedstocks used are consistent with the taxpayer's claims. For all facilities that utilize unmarketable feedstocks that are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer will be required to maintain documentation substantiating the origin and original form of the feedstock. For PRA purposes, these general tax records are already approved by OMB under 1545–0074 for individuals, 1545–0123 for business entities, 1545–0092 for trust and estate filers, and 1545–0047 for tax-exempt organizations.

The reporting requirements in these final regulations are in §§ 1.45Y–5 and 1.48E–5, which provide the process for applicants to file a petition with the Secretary for a PER determination. To file a PER petition with the Secretary, a taxpayer must submit the PER petition attached to the taxpayer's Federal income tax return or Federal return, as appropriate, for the taxable year in which the taxpayer claims the section 45Y credit or the section 48E credit with respect to the facility to which the PER petition relates. A PER petition must contain an emissions value. If the applicant obtained an emissions value from DOE, the PER petition made to the IRS must include and emissions value letter from DOE. This emission value letter process will be approved by OMB. A taxpayer must retain in its books and records a copy of the taxpayer's request to DOE for an emissions value, including the supporting documentation provided to DOE with the request. Alternatively, if applicable, a PER petition may contain an emissions value determined for a facility using the most recent version of an LCA model, as of the time the PER petition is filed, that has been designated by the Secretary for such use. If an emissions value is determined using a designated model, a taxpayer is required to provide to the IRS information to support its determination of the emissions value in the form and manner prescribed in IRS forms, instructions, or publications, or guidance published in the Internal Revenue Bulletin. The burden for these requirements will be included within the forms and instructions applicable to sections 45Y and 48E.

For section 45Y, the burden for these requirements will be associated the form and instructions applicable to claiming this credit and will be approved by OMB, in accordance with 5 CFR 1320.10, under the following OMB control numbers: 1545–0074 for individuals/sole proprietors, 1545–0123 for business entities, 1545–0047 for tax-exempt organizations, and 1545–0092 for trust and estate filers.

For section 48E, the burden for these requirements will be associated with Form 3468, Investment Credit, and will be approved by OMB, in accordance with 5 CFR 1320.10, under the following OMB control numbers: 1545–0074 for individuals/sole proprietors, 1545–0123 for business entities, 1545–0047 for tax-exempt organizations, and 1545–0092 for trust and estate filers.

III. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) (RFA) imposes certain requirements with respect to Federal rules that are subject to the notice and comment requirements of section 553(b) of the Administrative Procedure Act (5 U.S.C. 551 *et seq.*) and that are likely to have a significant economic impact on a substantial number of small entities.

Unless an agency determines that a proposal is not likely to have a significant economic impact on a substantial number of small entities, section 604 of the RFA requires the agency to present a final regulatory flexibility analysis (FRFA) of the final regulations.

The Treasury Department and the IRS have not determined whether the final rule will likely have a significant economic impact on a substantial number of small entities. This

determination requires further study. However, because there is a possibility of significant economic impact on a substantial number of small entities, an IRFA is provided in these final regulations affected and the economic impact on small entities.

In addition, pursuant to section 7805(f), the proposed regulations preceding these final regulations were submitted to the Chief Counsel for the Office of Advocacy of the Small Business Administration for comment on its impact on small business, and no comments were received from the Chief Counsel for the Office of Advocacy of the Small Business Administration. However, the Small Business Administration's Office of Advocacy provided comments in response to the PWA proposed regulations, including proposed § 1.48E–3, which is finalized as modified by this Treasury decision. See section III.B. of the Special Analysis of the PWA final regulations for a discussion of those comments.

A. Need for and Objectives of the Rule

The final regulations provide greater clarity to taxpayers for purposes of claiming the section 45Y credit and section 48E credit. The final regulations provide necessary definitions rules regarding the determination of credit amounts and the procedure for requesting a provisional emissions rate. The final regulations provide greater clarity to taxpayers for purposes of claiming the section 45Y credit and the section 48E credit and encourage taxpayers to produce clean energy or invest in clean energy facilities and ESTs. Thus, the Treasury Department and the IRS intend and expect that the final regulations will deliver benefits across the economy that will beneficially impact various industries.

B. Affected Small Entities

The RFA directs agencies to provide a description of, and if feasible, an estimate of, the number of small entities that may be affected by the final regulations. The Small Business Administration's Office of Advocacy estimates in its 2023 Frequently Asked Questions that 99.9 percent of American businesses meet its definition of a small business. The applicability of these final regulations does not depend on the size of the business, as defined by the Small Business Administration.

As described more fully in the preamble to this final regulation and in this IRFA, the section 45Y credit and the section 48E credit incentivize the production of clean energy and the investment in clean energy facilities and energy storage facilities. Because the potential credit claimants can vary widely, it is difficult to estimate at this time the impact of these final regulations, if any, on small businesses.

The Treasury Department and the IRS expect to receive more information on the impact on small businesses once taxpayers start to claim the section 45Y credit or the section 48E credit using the guidance and procedures provided in these final regulations.

C. Impact of the Rules

The final regulations will allow taxpayers to plan investments and transactions based on the ability to claim the section 45Y production credit and/or the section 48E investment credit. The increased use of these credits will incentivize increased production and use of clean energy as well as the development of new methods and technologies for generating clean energy. The use of the credits will also incentivize additional investment in the facilities that produce and develop clean energy.

Because recordkeeping and reporting requirements relating to the section 45Y and 48E credits will not materially differ from the requirements relating to existing energy production and investment tax credits, the recordkeeping and reporting requirements should not materially increase for taxpayers that already claim existing credits. To claim the section 45Y credit or the section 48E credit, taxpayers will need to continue to execute the relevant form (or successor form, or pursuant to instructions and other guidance) and file such form with the taxpayer's timely filed return (including extensions) for the taxable year in which the property is placed in service.

Although the Treasury Department and the IRS do not have sufficient data to precisely determine the likely extent of the increased costs of compliance, the estimated burden of complying with the recordkeeping and reporting requirements are described in the Paperwork Reduction Act section of this preamble.

D. Alternatives Considered

The Treasury Department and the IRS considered alternatives to the final regulations. For example, the Treasury Department and the IRS considered whether to impose different rules for determining if a section 48E qualified facility had a recapture event, and how and when a taxpayer was required to notify the Secretary that the emissions rate at a qualified facility was greater than 10 grams of CO_2e per kWh. The final regulations were designed to minimize burdens on taxpayers while ensuring that the IRS has sufficient information to determine if a section 48E qualified facility's emissions rate exceeded the recapture threshold. The final regulations require that a taxpayer that claimed the section 48E credit to annually report to the IRS its GHG emissions rate in the form and manner prescribed in IRS forms or instructions or in guidance as published in the Internal Revenue Bulletin.

An additional example is that the Treasury Department and the IRS considered alternatives to how a taxpayer should compute any increase in capacity at a qualified facility that, for purposes of sections 45Y and 48E, was a qualified facility due to an increase in capacity. The final regulations were designed to provide a rule that was administrable for the IRS and taxpayers. The final regulations offer taxpayers the following options for measuring capacity increases: use of capacity measures from modified or amended facility operating licenses from FERC or NRC, or related reports prepared by FERC or NRC as part of the licensing process; measurement of nameplate capacity of the facility consistent with the definition of nameplate capacity provided in 40 CFR 96.202; or a measurement standard prescribed by the Secretary in guidance published in the Internal Revenue Bulletin.

E. Duplicative, Overlapping, or Conflicting Federal Rules

The final rules would not duplicate, overlap, or conflict with any relevant Federal rules. As discussed earlier, the regulations provide guidance relating to the section 45Y tax credit and the section 48E tax credit. The Treasury Department and the IRS invited input from interested members of the public about identifying and avoiding overlapping, duplicative, or conflicting requirements.

IV. Congressional Review Act

Pursuant to the Congressional Review Act (5 U.S.C. 801 *et seq.*), the Office of Information and Regulatory Affairs has determined that this rule meets the criteria set forth in 5 U.S.C. 804(2).

V. Immediate Effective Date

These final regulations have an effective date of January 15, 2025. To the extent that a good cause statement is necessary under any provision of law, the Treasury Department and the IRS find that there would be good cause to make this rule immediately effective upon publication in the **Federal Register**.

The IRA added the section 45Y and 48E credits to the Code, and provided that the section 45Y credit applies to facilities placed in service after December 31, 2024, and that the section 48E credit applies to property placed in service after December 31, 2024.

Following the enactment of the IRA and the addition of sections 45Y and 48E to the Code, the Treasury Department and the IRS published proposed regulations to provide certainty to taxpayers. In particular, as demonstrated by the wide variety of public comments in response to the proposed regulations, taxpayers and other stakeholders continue to express uncertainty regarding the proper application of the statutory rules under sections 45Y and 48E, and the need for timely final regulations, because the credits apply to facilities and property placed in service after December 31, 2024. Taxpayers have requested the certainty that these final regulations provide prior to making investment decisions that will affect such facilities and property. In addition, this uncertainty extends to the application of a number of important provisions in sections 45Y and 48E that require determinations to be made by the Secretary, in consultation with other Federal agency experts, that are intended to provide certainty for taxpayers embarking on highly capital intensive projects intended to qualify for the section 45Y and 48E credits. Certainty with respect to these provisions is essential given the January 1, 2025 statutory effective date, and so that taxpayers can accurately predict the economic return from making particular investments and make informed business decisions. In addition, while taxpayers have requested clarity regarding the specific requirements of these rules, the public already has been provided notice of the general contents of these rules and their proposed applicability to qualified facilities and energy storage technologies placed in service after December 31, 2024, and during taxable years ending on or after the date of publication of these final regulations. As provided in the IRA, sections 45Y and 48E replace existing production and investment tax credits for facilities placed in service after December 31, 2024. The statute and proposed rules, therefore, provide notice that the rules will apply to qualified facilities and energy storage technologies placed in service beginning in 2025, and provide notice of the qualification requirements being promulgated in this final rule. Moreover, section 45Y(f) directs the Secretary to issue guidance regarding the implementation of section 45Y not later than January 1, 2025. Section 48E(i) similarly directs the Secretary to issue guidance regarding implementation of section 48E not later than January 1, 2025.

Consistent with Executive Order 14008 (January 27, 2021) and commenters' request for finalized rules, the Treasury Department and the IRS have determined that an effective date of the final regulations as soon in time after the 45Y and 48E credits go into effect on January 1, 2025 as possible is appropriate to provide certainty to taxpayers seeking to place facilities and property in service after December 31, 2024, in order to claim the section 45Y and 48E credits. The final regulations provide needed rules on what the law requires for taxpayers to claim these credits. Accordingly, to the extent that a finding of good cause is necessary, the Treasury Department and the IRS have found good cause for the rules in this Treasury decision to take effect on January 15, 2025.

VI. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires that agencies assess anticipated costs and benefits and take certain other actions before issuing a final rule that includes any Federal mandate that may result in expenditures in any one year by a State, local, or Indian Tribal government, in the aggregate, or by the private sector, of $100 million (updated annually for inflation). This final rule does not include any Federal mandate that may result in expenditures by State, local, or Indian Tribal governments, or by the private sector in excess of that threshold.

VII. Executive Order 13132: Federalism

Executive Order 13132 (Federalism) prohibits an agency from publishing any rule that has federalism implications if the rule either imposes substantial, direct compliance costs on State and local governments, and is not required by statute, or preempts State law, unless the agency meets the consultation and funding requirements of section 6 of the Executive order. This final rule does not have federalism implications and does not impose substantial direct compliance costs on State and local governments or preempt State law within the meaning of the Executive order.

VIII. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments) prohibits an agency from publishing any rule that has Tribal implications if the rule either imposes substantial, direct compliance costs on Indian Tribal governments, and is not required by statute, or preempts Tribal law, unless the agency meets the consultation and funding requirements of section 5 of the Executive order. This final rule does not have substantial direct effects on one or more federally recognized Indian tribes and does not impose substantial direct compliance costs on Indian Tribal governments within the meaning of the Executive order.

Statement of Availability of IRS Documents

Guidance cited in this preamble is published in the Internal Revenue Bulletin and is available from the Superintendent of Documents, U.S. Government Publishing Office, Washington, DC 20402, or by visiting the IRS website at *https://www.irs.gov.*

Drafting Information

The principal authors of these final regulations are Maksim Berger, John M. Deininger, Martha M. Garcia, Boris Kukso, Nathaniel Kupferman, and Alexander Scott (Passthroughs and Special Industries). Other personnel from the Treasury Department, the DOE, the EPA, the USDA, and the IRS participated in the development of the final regulations.

List of Subjects in 26 CFR Part 1

Income taxes, Reporting and recordkeeping requirements.

Adoption of Amendments to the Regulations

Accordingly, the Treasury Department and the IRS amend 26 CFR part 1 as follows:

PART 1—INCOME TAXES

■ **Paragraph 1.** The authority citation for part 1 is amended by:
■ a. Adding entries in numerical order for §§ 1.45Y–1 and 1.45Y–2;
■ b. Revising the entry for § 1.45Y–3; and
■ c. Adding entries in numerical order for §§ 1.45Y–4 and 1.45Y–5 and 1.48E–1 through 1.48E–5.

The revision and additions read in part as follows:

Authority: 26 U.S.C. 7805 * * *

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Section 1.45Y–1 also issued under 26 U.S.C. 45Y(f).

Section 1.45Y–2 also issued under 26 U.S.C. 45Y(f).

Section 1.45Y–3 also issued under 26 U.S.C. 45Y(f).

Section 1.45Y–4 also issued under 26 U.S.C. 45Y(f).

Section 1.45Y–5 also issued under 26 U.S.C. 45Y(b) and (f).

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Section 1.48E–1 also issued under 26 U.S.C. 48E(i).

Section 1.48E–2 also issued under 26 U.S.C. 48E(i).

Section 1.48E–3 also issued under 26 U.S.C. 48E(i).

Section 1.48E–4 also issued under 26 U.S.C. 48E(i).

Section 1.48E–5 also issued under 26 U.S.C. 48E(i).

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■ **Par. 2.** Add an undesignated center heading immediately following § 1.37–3 to read as follows:

General Business Credits

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■ **Par. 3.** Sections 1.45Y–0 through 1.45Y–2 are added to read as follows:

Sec.

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§ 1.45Y–0 Table of contents.

This section lists the captions contained in §§ 1.45Y–1 through 1.45Y–5.

§ 1.45Y–1 Clean electricity production credit.

(a) *Overview*—(1) *In general.* For purposes of section 38 of the Internal Revenue Code (Code), the section 45Y credit (defined in paragraph (a)(9) of this section) is determined under section 45Y of the Code and the section 45Y regulations (defined in paragraph (a)(10) of this section). This paragraph (a) provides definitions of terms that, unless otherwise specified, apply for purposes of section 45Y, the section 45Y regulations, and any provision of the Code or this chapter that expressly refers to any provision of section 45Y or the section 45Y regulations. Paragraph (b) of this section provides rules for determining the amount of the section 45Y credit for any taxable year. Paragraph (c) of this section provides rules regarding the phase-out of the section 45Y credit. Paragraph (d) of this section provides rules regarding combined heat and power system (CHP) property. *See* § 1.45Y–2 for rules relating to qualified facilities for purposes of the section 45Y credit. *See* § 1.45Y–4 for rules of general application for the section 45Y credit. *See* § 1.45Y–5 for rules to determine greenhouse gas emissions rates for qualified facilities.

(2) *CHP property*—(i) *In general.* For purposes of section 45Y(g)(2)(B) and paragraph (d) of this section, the term *CHP property* means property comprising a system that uses the same energy source for the simultaneous or sequential generation of electrical power, mechanical shaft power, or both, in combination with the generation of steam or other forms of useful thermal energy (including for heating and cooling applications).

(ii) *Components excluded.* CHP property does not include property used to transport the energy source to the generating facility or to distribute energy produced by the facility.

(3) *Code.* The term *Code* means the Internal Revenue Code.

(4) *kWh.* The term *kWh* means kilowatt hours.

(5) *Metering device*—(i) *In general.* For purposes of section 45Y(a)(1)(A)(ii)(II), the term *metering device* means equipment that is owned and operated by an unrelated person (as defined in paragraph (a)(11) of this section) for energy revenue metering to measure and register the continuous summation of an electricity quantity with respect to time.

(ii) *Standards for maintaining and operating a metering device.* For purposes of section 45Y(a)(1)(A)(ii)(II) and this section, a metering device must—

(A) Be maintained in proper working order in accordance with the instructions of its manufacturer;

(B) Be certified as meeting generally accepted industry performance standards, such as the American National Standards Institute C12.1–2022 standard, or subsequent revisions;

(C) Be revenue grade with a +/ − 0.5 percent accuracy; and

(D) Be properly calibrated.

(iii) *Network equipment.* For purposes of operating the metering device, the unrelated person may share network equipment, such as spare fiber optic cable owned by the taxpayer that produces the electricity, and may co-locate network equipment in the taxpayer's facilities.

(iv) *Examples.* This paragraph (a)(5)(iv) provides examples illustrating the application of paragraph (a)(5) of this section.

(A) *Example 1. Qualified facility equipped with a metering device owned and operated by an unrelated person.* X owns a qualified facility equipped with a metering device that is owned and operated by Y, an unrelated person. The metering device meets the requirements of paragraphs (a)(5)(i) through (iii) of this section. X sells electricity produced at the qualified facility to Z, a related person during the taxable year. Because the qualified facility is equipped with a metering device that is owned and operated by an unrelated person and meets the requirements of paragraphs (a)(5)(i) through (iii), X may claim a section 45Y credit based on the electricity produced by X and sold to Z during the taxable year.

(B) *Example 2. Electricity produced by the taxpayer at a qualified facility sold, consumed, or stored by the taxpayer during the taxable year.* X owns a qualified facility equipped with a metering device that is owned and operated by an unrelated person, Y. The metering device meets the requirements of paragraphs (a)(5)(i) through (iii) of this section. Because the qualified facility is equipped with a metering device that is owned and operated by an unrelated person and the metering device meets the requirements of paragraphs (a)(5)(i) through (iii), X may sell electricity produced at the qualified facility during the taxable year to a related or unrelated person. X may also consume the electricity produced at the qualified facility during the taxable year onsite. Additionally, X may store the electricity produced at the qualified facility during the taxable year in energy storage technology owned by X. In any of these three situations, X may claim a section 45Y credit for the taxable year for the kWh of electricity produced at the qualified facility measured by the metering device and sold, consumed, or stored by X during the taxable year.

(6) *Qualified facility.* The term *qualified facility* for purposes of the section 45Y credit has the meaning provided in § 1.45Y–2(a).

(7) *Related person*—(i) *In general.* The term *related person* means a person that is related to another person if such persons would be treated as a single employer under the regulations in this chapter under section 52(b) of the Code.

(ii) *Member of a consolidated group.* In the case of a corporation that is a member of a consolidated group (as defined in § 1.1502–1(h)), such member will be treated as selling electricity to an unrelated person if such electricity is sold to an unrelated person by another member of such group.

(8) *Secretary.* The term *Secretary* means the Secretary of the Treasury or their delegate.

(9) *Section 45Y credit.* The term *section 45Y credit* means the clean electricity production credit determined under section 45Y of the Code and the section 45Y regulations.

(10) *Section 45Y regulations.* The term *section 45Y regulations* means this section and §§ 1.45Y–2 through 1.45Y–5.

(11) *Unrelated person.* For purposes of section 45Y(a), the term *unrelated person* means a person who is not a related person as defined in section 45Y(g)(4) and paragraph (a)(7) of this section. In the case of sales of electricity to an individual consumer, such sales will be treated as sales to an unrelated party for purposes of the section 45Y credit. For example, assume Taxpayer X produces electricity at a qualified facility and sells it to Consumer Y. Consumer Y is an individual consumer and is not subject to aggregation under the regulations at 26 CFR 1.52–1 prescribed under section 52(b). Therefore, Consumer Y is not treated as a single employer with Taxpayer X under section 52(b), and a sale to Consumer Y is treated as a sale to an unrelated person. The result is the same

if Consumer Y is an individual consumer who is a member of a cooperative or Indian tribe that owns or controls, directly or indirectly, Taxpayer X. The result is also the same if Consumer Y is an individual consumer who is a resident of a State or municipality that owns or controls, directly or indirectly, Taxpayer X.

(12) *Waste energy recovery property (WERP).* WERP is property that generates electricity solely from heat from buildings or equipment if the primary purpose of such building or equipment is not the generation of electricity. Examples of buildings or equipment the primary purpose of which is not the generation of electricity include, but are not limited to, manufacturing plants, medical care facilities, facilities on school campuses, and associated equipment.

(b) *Credit amount*—(1) *In general.* The section 45Y credit for any taxable year is an amount equal to the product of the kWh of electricity that is produced at a qualified facility and sold by the taxpayer to an unrelated person during the taxable year, multiplied by the applicable amount with respect to such qualified facility. In the case of a qualified facility equipped with a metering device (as defined in paragraph (a)(5) of this section) that is owned and operated by an unrelated person, the section 45Y credit for any taxable year is an amount equal to the product of the kWh of electricity that is produced, as measured by the metering device, at such qualified facility and sold, consumed, or stored by the taxpayer during the taxable year, multiplied by the applicable amount with respect to such qualified facility. Only one section 45Y credit can be claimed for each kWh of electricity produced by the taxpayer at a qualified facility. The credit amount may also be increased as provided in section 45Y(g)(11) and paragraph (b)(5) of this section in the case of a qualified facility that satisfies the domestic content requirements of section 45Y(g)(11)(B).

(2) *Applicable amount*—(i) *In general.* The term *applicable amount* means the base amount described in paragraph (b)(2)(ii) of this section or the alternative amount described in paragraph (b)(2)(iii) of this section. The applicable amount is subject to the inflation adjustment as provided in section 45Y(c)(1) and paragraph (b)(3) of this section. The applicable amount may also be increased as provided in section 45Y(g)(7) and paragraph (b)(4) of this section in the case of a qualified facility that is located in an energy community.

(ii) *Base amount.* Under section 45Y(a)(2)(A), in the case of any qualified facility that does not satisfy the requirements provided in section 45Y(a)(2)(B), the applicable amount is the *base amount,* which is 0.3 cents.

(iii) *Alternative amount.* Under section 45Y(a)(2)(B), in the case of any qualified facility that satisfies the prevailing wage and apprenticeship requirements provided in section 45Y(a)(2)(B), the applicable amount is the *alternative amount,* which is 1.5 cents.

(3) *Inflation adjustment*—(i) *In general.* Pursuant to section 45Y(c)(1), in the case of a calendar year beginning after 2024, the base amount and the alternative amount will each be adjusted by multiplying such amount by the inflation adjustment factor for the calendar year in which the sale, consumption, or storage of the electricity occurs. If the base amount as adjusted under this paragraph (b)(3)(i) is not a multiple of 0.05 cent, such amount will be rounded to the nearest multiple of 0.05 cent. If the alternative amount as adjusted under this paragraph (b)(3)(i) is not a multiple of 0.1 cent, such amount will be rounded to the nearest multiple of 0.1 cent.

(ii) *Annual computation.* Pursuant to section 45Y(c)(2), the inflation adjustment factor for each calendar year will be published in the **Federal Register** not later than April 1 of that calendar year. The base amount and the alternative amount, as adjusted under paragraph (b)(3)(i) of this section, will also be published in the **Federal Register** not later than April 1 of each calendar year.

(iii) *Inflation adjustment factor.* Under section 45Y(c)(3), the term *inflation adjustment factor* means, with respect to a calendar year, a fraction—

(A) The numerator of which is the GDP implicit price deflator for the preceding calendar year; and

(B) The denominator of which is the GDP implicit price deflator for the calendar year 1992.

(iv) *GDP implicit price deflator.* Under section 45Y(c)(3), the term *GDP implicit price deflator* means the most recent revision of the implicit price deflator for the gross domestic product as computed and published by the Department of Commerce before March 15 of the calendar year.

(4) *Energy communities increase in credit.* In the case of any qualified facility that is located in an energy community (as defined in section 45(b)(11)(B)), for purposes of determining the amount of the section 45Y credit with respect to any electricity produced by the taxpayer at such facility during the taxable year, the applicable amount will be increased by an amount equal to 10 percent of the applicable amount that would otherwise be in effect before application of this paragraph (b)(4). The 10 percent increase under this paragraph (b)(4) applies after the inflation adjustment under paragraph (b)(3) of this section.

(5) *Domestic content bonus credit amount.* In the case of any qualified facility that satisfies the requirements of section 45Y(g)(11)(B)(i) (domestic content requirement), for purposes of determining the amount of the section 45Y credit with respect to any electricity produced by the taxpayer at such facility during the taxable year, the amount of the credit otherwise determined under this paragraph (b), without application of paragraph (b)(4) of this section (related to energy communities), is increased by 10 percent.

(c) *Credit phase-out*—(1) *In general.* The amount of the section 45Y credit for any qualified facility, the construction of which begins during a calendar year provided in section 45Y(d)(2) and described in paragraph (c)(2) of this section, is equal to the product of—

(i) The amount of the credit determined under section 45Y(a) and described in paragraph (b) of this section, without regard to section 45Y(d) and this paragraph (c); multiplied by

(ii) The phase-out percentage provided under section 45Y(d)(2) and described in paragraph (c)(2) of this section.

(2) *Phase-out percentage.* The phase-out percentage described in this paragraph (c)(2) is equal to—

(i) For a facility the construction of which begins during the first calendar year following the applicable year, 100 percent;

(ii) For a facility the construction of which begins during the second calendar year following the applicable year, 75 percent;

(iii) For a facility the construction of which begins during the third calendar year following the applicable year, 50 percent; and

(iv) For a facility the construction of which begins during any calendar year subsequent to the calendar year described in paragraph (c)(2)(iii) of this section, 0 percent.

(3) *Applicable year.* For purposes of this paragraph (c), the term *applicable year* means the later of—

(i) The calendar year in which the Secretary makes the determination that the annual greenhouse gas emissions from the production of electricity in the United States are equal to or less than 25 percent of the annual greenhouse gas emissions from the production of

electricity in the United States for calendar year 2022; or

(ii) 2032.

(4) *Phase-out data.* For purposes of paragraph (c)(3)(i) of this section, the annual greenhouse gas emissions from the production of electricity in the United States for any calendar year must be assessed separately using both of the data sources described in paragraphs (c)(4)(i) and (ii) of this section:

(i) The U.S. Energy Information Administration's Electric Power Annual, summing the annual carbon dioxide emissions data from conventional power plants and combined heat and power plants and the Monthly Energy Review annual carbon dioxide emissions from the combustion of biomass to produce electricity in the Electric Power Sector; and

(ii) The U.S. Environmental Protection Agency (EPA) Inventory of U.S. Greenhouse Gas Emissions and Sinks (GHGI) annual electric power-related carbon dioxide, methane, and nitrous oxide emissions data including carbon dioxide emissions from the combustion of biomass to produce electricity.

(5) *Determination of phase-out.* For purposes of paragraph (c)(3)(i) of this section, the Secretary will determine that the annual greenhouse gas emissions from the production of electricity in the United States are equal to or less than 25 percent of the annual greenhouse gas emissions from the production of electricity in the United States for calendar year 2022 only if the annual greenhouse gas emissions from the production of electricity in the United States, as determined separately under both of the data sources described in paragraph (c)(4) of this section, are each equal to or less than 25 percent of the annual greenhouse gas emissions from the production of electricity in the United States for calendar year 2022. If a data source described in paragraph (c)(4) of this section becomes unavailable (for example, it is no longer published or does not provide the specified data), the Secretary must designate a similar data source to replace the unavailable data source.

(d) *Requirements for CHP property*—(1) *In general.* To be eligible for the section 45Y credit, a CHP property must produce at least 20 percent of its total useful energy in the form of useful thermal energy that is not used to produce electrical or mechanical power (or combination thereof), and at least 20 percent of its total useful energy in the form of electrical or mechanical power (or combination thereof). The energy efficiency percentage of CHP property must exceed 60 percent. These percentages are determined on a British thermal unit (Btu) basis.

(2) *Energy efficiency percentage.* The energy efficiency percentage of a CHP property is the fraction the numerator of which is the total useful electrical, thermal, and mechanical power produced by the system at normal operating rates, and expected to be consumed in its normal application, and the denominator of which is the lower heating value of the fuel sources for the system. In the case of a qualified facility using nuclear energy, which does not involve combustion, the denominator is the reactor's maximum power level in megawatts thermal listed on the Nuclear Regulatory Commission (NRC) operating license, converted to Btus using 3,412,140 Btus per hour per megawatt. For other qualified facilities not using combustion, additional methodologies may be prescribed by the Secretary in guidance published in the Internal Revenue Bulletin (see § 601.601 of this chapter).

(3) *Special rule for calculating electricity produced by CHP property*—(i) *In general.* For purposes of section 45Y(a) and paragraph (b) of this section, the kWh of electricity produced by a taxpayer at a qualified facility includes any production in the form of useful thermal energy by any CHP property within such facility, and the amount of greenhouse gases emitted into the atmosphere by such facility in the production of such useful thermal energy is included for purposes of determining the greenhouse gas emissions rate for such facility.

(ii) *Conversion from Btu to kWh*—(A) *In general.* For purposes of section 45Y(g)(2)(A)(i) and this paragraph (d)(3), the amount of kWh of electricity produced in the form of useful thermal energy is equal to the quotient of the total useful thermal energy produced by the CHP property within the qualified facility, divided by the heat rate for such facility.

(B) *Heat rate.* For purposes of this paragraph (d)(3), the term *heat rate* means the amount of energy used by the qualified facility to generate 1 kWh of electricity, expressed as Btus per net kWh generated. In calculating the heat rate of a qualified facility that includes CHP property that uses combustion, a taxpayer must use the annual average heat rate, defined as the total annual fuel consumption of the CHP property (in Btus, using the lower heating value of the fuel) during the taxable year for which the section 45Y credit is claimed, divided by the annual net electricity generation (in kWh) of the CHP property during such taxable year. In the case of a qualified facility using nuclear energy, which does not involve combustion, the facility's reactor's total annual thermal output (in Btus, using a conversion rate of 3,412,140 Btus per megawatt hour thermal) shall be used in place of the total annual fuel consumption of the CHP property. For other qualified facilities not using combustion, additional methodologies may be prescribed by the Secretary in guidance published in the Internal Revenue Bulletin (see § 601.601 of this chapter).

(e) *Applicability date.* This section applies to qualified facilities placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

§ 1.45Y–2 Qualified facility for purposes of section 45Y.

(a) *Qualified facility.* For purposes of the section 45Y credit (defined in § 1.45Y–1(a)(9)), the term *qualified facility* means a facility owned by the taxpayer that meets the requirements of paragraphs (a)(1) through (3) of this section:

(1) The facility is used for the generation of electricity, meaning that it is a net generator of electricity taking into account any electricity consumed by the facility;

(2) The facility is placed in service after December 31, 2024; and

(3) The facility has a greenhouse gas emissions rate of not greater than zero (as determined under rules provided in § 1.45Y–5).

(b) *Property included in qualified facility*—(1) *In general.* A qualified facility includes a unit of qualified facility (as defined in paragraph (b)(2) of this section) that meets the requirements of paragraph (b)(2). A qualified facility also includes property owned by the taxpayer that is an integral part (as defined in paragraph (b)(3) of this section) of the qualified facility. Any component of property that meets the requirements of this paragraph (b) is part of a qualified facility regardless of where such component of property is located. A qualified facility generally does not include equipment that is an addition or modification to an existing qualified facility. However, see § 1.45Y–4(c) for rules regarding the Incremental Production Rule and § 1.45Y–4(d) for rules regarding a retrofitted qualified facility (80/20 Rule).

(2) *Unit of qualified facility*—(i) *In general.* For purposes of the section 45Y credit, the unit of qualified facility includes all functionally interdependent components of property (as defined in paragraph (b)(2)(ii) of this section) owned by the taxpayer that are operated together and that can operate apart from

other property to produce electricity, or, in the case of CHP property, useful thermal energy and electricity. No provision of this section, § 1.45Y–1, or §§ 1.45Y–3 through 1.45Y–5 uses the term *unit* in respect of a qualified facility with any meaning other than that provided in this paragraph (b)(2)(i).

(ii) *Functionally interdependent.* Components of property are functionally interdependent if the placing in service of each of the components is dependent upon the placing in service of each of the other components to produce electricity.

(3) *Integral part*—(i) *In general.* For purposes of thesection 45Ycredit, a component of property owned by a taxpayer is an integral part of a qualified facility if it is used directly in the intended function of the qualified facility and is essential to the completeness of such function. Property that is an integral part of a qualified facility is part of the qualified facility.

(ii) *Power conditioning and transfer equipment.* Power conditioning equipment and transfer equipment are integral parts of a qualified facility. Power conditioning equipment includes, but is not limited to, transformers, inverters, and converters, which modify the characteristics of electricity or thermal energy into a form suitable for use, transmission, or distribution. Parts related to the functioning or protection of power conditioning equipment are also treated as power conditioning equipment and include, but are not limited to, switches, circuit breakers, arrestors, and hardware used to monitor, operate, and protect power conditioning equipment. Transfer equipment includes components of property that allow for the aggregation of electricity generated by a qualified facility and components of property that alter voltage to permit electricity to be transferred to a transmission or distribution line. Transfer equipment does not include transmission or distribution lines. Examples of transfer equipment include, but are not limited to, wires, cables, and combiner boxes that conduct electricity. Parts related to the functioning or protection of transfer equipment are also treated as transfer equipment and may include items such as current transformers used for metering, electrical interrupters (such as circuit breakers, fuses, and other switches), and hardware used to monitor, operate, and protect transfer equipment.

(iii) *Roads.* Roads that are integral to the intended function of the qualified facility such as onsite roads that are used to operate and maintain the qualified facility are integral parts of a qualified facility. Roads used primarily for access to the site, or roads used primarily for employee or visitor vehicles, are not integral to the intended function of the qualified facility and thus are not an integral part of a qualified facility.

(iv)*Fences.* Fencing is not an integral part of a qualified facility because it is not integral to the intended function of the qualified facility.

(v) *Buildings.* Generally, buildings are not integral parts of a qualified facility because they are not integral to the intended function of the qualified facility. However, the structures described in paragraphs (b)(3)(v)(A) and (B) of this section are not treated as buildings for this purpose and are an integral part of a qualified facility:

(A) A structure that is essentially an item of machinery or equipment; and

(B) A structure that houses components of property that are integral to the intended function of a qualified facility if the use of the structure is so closely related to the use of the components of property housed therein that the structure clearly can be expected to be replaced if the components of property it initially houses are replaced.

(vi) *Shared integral property.* Multiple qualified facilities (whether owned by one or more taxpayers), including qualified facilities with respect to which a taxpayer has claimed a credit under section 48E or another Federal income tax credit, may include shared property that may be considered an integral part of each qualified facility. In addition, a component of property that is shared by a qualified facility as defined in section 45Y(b) (45Y Qualified Facility) and a qualified facility as defined by section 48E(b)(3) (48E Qualified Facility) that is an integral part of both qualified facilities will not affect the eligibility of the 45Y Qualified Facility for the section 45Y credit or the 48E Qualified Facility for the section 48E credit (defined in § 1.48E–1(a)(10)).

(vii) *Examples.* This paragraph (b)(3)(vii) provides examples illustrating the rules of paragraphs (b)(3)(i) through (vi) of this section.

(A) *Example 1. Co-located qualified facilities owned by the same taxpayer that share integral property.* X constructs and owns a solar facility (Solar Facility) and nearby also constructs and owns a wind facility (Wind Facility) that are each a qualified facility. The Solar Facility and Wind Facility each connect to a shared transformer that steps up the electricity produced by each qualified facility to electrical grid voltage before it is transmitted to the electrical grid through an intertie. The fact that the Solar Facility and Wind Facility share property that is integral to both does not impact the ability of X to claim a section 45Y credit for both qualified facilities.

(B) *Example 2. Co-located qualified facilities owned by different taxpayers that share integral property.* X constructs and owns a solar facility (Solar Facility), and nearby Y constructs and owns a wind facility (Wind Facility) that are each a qualified facility. X's Solar Facility and Y's Wind Facility each connect to a shared transformer that steps up the electricity produced by both qualified facilities to electrical grid voltage before it is transmitted to the electrical grid through an intertie. The fact that the Solar Facility and Wind Facility share property that is integral to both does not impact the ability of X or Y to claim a section 45Y credit for the electricity produced by their respective qualified facilities.

(C) *Example 3. Co-located qualified facility and Energy Storage Technology (EST) owned by the same taxpayer that share integral property.* X constructs and owns a wind facility that is a qualified facility (Wind Facility) that is co-located with an EST (as defined in § 1.48E–2(g)) that X also constructed and owns. The Wind Facility and EST share transfer equipment that is integral to both. The fact that the Wind Facility and EST share property that is integral to both does not impact the ability of X to claim a section 45Y credit for the electricity produced by the Wind Facility or to claim a section 48E credit for the EST.

(D) *Example 4. Co-located wind qualified facility and Energy Storage Technology owned by different taxpayers that share integral property.* X constructs and owns a solar facility that is a qualified facility (Solar Facility) that is co-located with an EST (as defined in § 1.48E–2(g)) constructed and owned by Y. The Wind Facility and EST share transfer equipment that is integral to both. The fact that the Wind Facility and EST share property that is integral to both does not impact the ability of X to claim a section 45Y credit for the electricity produced by the Wind Facility or the ability of Y to claim a section 48E credit for the EST.

(E) *Example 5. Qualified facility with integral property owned by a different taxpayer.* X constructs and owns a hydropower production facility that is a qualified facility (Hydropower Facility). The Hydropower Facility connects to a dam owned by Y, a government entity, that is an integral part of the Hydropower Facility. The fact that X does not own the dam does not impact the ability of X to claim a section 45Y

credit for the production of electricity by the Hydropower Facility.

(c) *Coordination with other credits*—(1) *In general.* The term *qualified facility* (as defined in section 45Y(b) and paragraph (a) of this section) does not include any facility for which a credit determined under section 45, 45J, 45Q, 45U, 48, 48A, or 48E is allowed under section 38 of the Code for the taxable year or any prior taxable year. A taxpayer that directly owns a qualified facility (as defined in section 45Y(b)) that is eligible for both a section 45Y credit and a credit determined under one of section 45, 45J, 45Q, 45U, 48, 48A, or 48E is eligible for the section 45Y credit only if such other Federal income tax credit was not allowed with respect to the qualified facility. Nothing in this paragraph (c) precludes a taxpayer from claiming a section 45Y credit with respect to a qualified facility (as defined in section 45Y(b)) that is co-located with another facility for which a credit determined under section 45, 45J, 45Q, 45U, 48, 48A, or 48E is allowed under section 38 for the taxable year or any prior taxable year.

(2) *Allowed.* For purposes of paragraph (c)(1) of this section, the term *allowed* only includes credits that a taxpayer has claimed on a Federal income tax return or Federal return, as appropriate, and that the Internal Revenue Service (IRS) has not challenged in terms of the taxpayer's eligibility.

(3) *Examples.* This paragraph (c)(3) provides examples illustrating the rules of paragraph (c) of this section.

(i) *Example 1. Taxpayer claims a section 45Y credit on a solar farm and section 48E credit on co-located EST.* X owns a solar farm that is a qualifying facility (Solar Qualified Facility), and X owns a co-located EST (as defined in § 1.48E–2(g)) (Energy Storage). The Energy Storage is not part of the Solar Qualified Facility, and, therefore, X may claim the section 45Y credit based on the kWh of electricity produced by the Solar Qualified Facility, and X may also claim the section 48E credit based on its qualified investment in the Energy Storage.

(ii) *Example 2. Different taxpayers claim a section 45Y credit for a solar farm* and *a section 48E credit for co-located Energy Storage Technology.* X owns a solar farm that is a qualifying facility (Solar Qualified Facility), and Y owns a co-located EST (as defined in § 1.48E–2(g)) (Energy Storage). The Energy Storage is not part of the Solar Qualified Facility, and therefore, X may claim the section 45Y credit based on the kWh of electricity produced by the Solar Qualified Facility, and Y may claim the section 48E credit based on its qualified investment in the Energy Storage.

(iii) *Example 3. Taxpayer claiming another credit is not allowed a section 45Y credit.* X owns a wind facility that satisfies the requirements of a qualified facility as well as the requirements of a qualified facility as defined in § 1.48E–2(a). X claims a section 48E credit with respect to the wind facility. While a credit may be available with regard to the wind facility under section 45Y, because X has already claimed a section 48E credit with respect to the wind facility, a section 45Y credit is not allowed.

(iv) *Example 4. Interaction of section 45Y and section 45Q credits for single qualified facility.* X owns a qualified facility (Facility A) that includes carbon capture equipment, which is needed for the facility to meet the zero greenhouse gas requirement, so it is functionally interdependent to the production of electricity by Facility A. X used the carbon capture equipment to capture and utilize (as described in section 45Q(f)(5)) qualified carbon dioxide and claimed a section 45Q credit in a prior taxable year. As a result, X cannot claim a credit for its Facility A because a qualified facility does not include a facility for which a credit determined under section 45Q is allowed.

(v) *Example 5. Interaction of section 45Y and section 45Q credits for co-located qualified facilities.* Assume the same facts as in paragraph (c)(3)(iv) of this section (*Example 4*), except that X owns a co-located qualified facility (Facility B) that also includes carbon capture equipment, which is needed for the facility to meet the zero greenhouse gas requirement, so it is functionally interdependent to the production of electricity by Facility B. X used the carbon capture equipment to capture and utilize (as described in section 45Q(f)(5)) qualified carbon dioxide, but has not claimed a section 45Q credit with respect to Facility B. While X claimed a section 45Q credit in a prior taxable year for Facility A (*see* paragraph (c)(3)(iv) of this section (*Example 4*)), Facility B is not part of Facility A, and, therefore, X may claim the section 45Y credit for Facility B.

(d) *Applicability date.* This section applies to qualified facilities placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

■ **Par. 4.** Section 1.45Y–3 is revised to read as follows:

§ 1.45Y–3 Rules relating to the increased credit amount for prevailing wage and apprenticeship.

(a) *In general.* If any qualified facility satisfies the requirements in paragraph (b) of this section, the applicable amount used for calculating the amount of the credit for producing clean electricity determined under section 45Y(a) of the Internal Revenue Code is the alternative applicable amount described in section 45Y(a)(2)(B), subject to adjustment provided by section 45Y(c).

(b) *Qualified facility requirements.* A qualified facility satisfies the requirements of this paragraph (b), if it is described in paragraph (b)(1), (2), or (3) of this section:

(1) A qualified facility with a maximum net output of less than one megawatt (as measured in alternating current) determined based on the nameplate capacity as provided in paragraph (c) of this section (One Megawatt Exception);

(2) A qualified facility the construction of which began prior to January 29, 2023; or

(3) A qualified facility that meets the prevailing wage requirements of section 45(b)(7) and § 1.45–7, the apprenticeship requirements of section 45(b)(8) and § 1.45–8, and the recordkeeping and reporting requirements of § 1.45–12 with respect to the construction, alteration, or repair of a qualified facility within the meaning of section 45Y.

(c) *Nameplate capacity for purposes of the One Megawatt Exception*—(1) *In general.* For purposes of paragraph (b)(1) of this section, the determination of whether a qualified facility has a maximum net output of less than 1 megawatt (MW) of electrical energy (as measured in alternating current) is determined based on the nameplate capacity of the qualified facility. If a qualified facility has *integrated operations* with one or more other qualified facilities, then the aggregate nameplate capacity of the qualified facilities is used for the purposes of determining if the qualified facility meets the requirements of paragraph (b)(1) of this section. The nameplate capacity for purposes of the One Megawatt Exception is the maximum electrical generating output in megawatts that a qualified facility is capable of producing on a steady state basis and during continuous operation under standard conditions, as measured by the manufacturer and consistent with the definition of nameplate capacity provided in 40 CFR 96.202. If applicable, the International Standard Organization conditions should be used

to measure the maximum electrical generating output.

(2) *Nameplate capacity for qualified facilities that generate in direct current for purposes of the One Megawatt Exception.* For qualified facilities that generate electricity in direct current, the taxpayer determines the maximum net output (in alternating current) of each qualified facility by using the lesser of:

(i) The sum of the nameplate generating capacities within the unit of qualified facility in direct current, which is deemed the nameplate generating capacity of the unit of qualified facility in alternating current; or

(ii) The nameplate capacity of the first component of property that inverts the direct current electricity into alternating current.

(3) *Integrated operations.* Solely for the purposes of the One Megawatt Exception, a qualified facility is treated as having *integrated operations* with any other qualified facility of the same technology type if the facilities are owned by the same or related taxpayers, placed in service in the same taxable year; and transmit electricity generated by the facilities through the same point of interconnection or, if the facilities are not grid-connected or are delivering electricity directly to an end user behind a utility meter, are able to support the same end user.

(4) *Related taxpayers*—(i) *Definition.* For purposes of this section, the term *related taxpayers* means members of a group of trades or businesses that are under common control (as defined in § 1.52–1(b)).

(ii) *Related taxpayer rule.* For purposes of this section, related taxpayers are treated as one taxpayer in determining whether a qualified facility has integrated operations.

(d) *Applicability date*—(1) *In general.* Except as provided in paragraph (d)(2) of this section, this section applies to qualified facilities placed in service in taxable years ending after January 15, 2025, and the construction of which begins after January 15, 2025. Taxpayers may apply this section to qualified facilities placed in service in taxable years ending on or before January 15, 2025, and qualified facilities placed in service in taxable years ending after January 15, 2025, the construction of which begins before January 15, 2025, provided that taxpayers follow this section in its entirety and in a consistent manner.

(2) *Paragraph (b)(1) of this section.* Paragraph (b)(1) of this section applies to qualified facilities placed in service in taxable years ending after January 15, 2025, and the construction of which begins after March 17, 2025. Taxpayers may apply this section to qualified facilities placed in service in taxable years ending on or before January 15, 2025, the construction of which begins before January 15, 2025, provided that taxpayers follow this section in its entirety and in a consistent manner.

■ **Par. 5.** Sections 1.45Y–4 and 1.45Y–5 are added to read as follows:

* * * * *

Sec.

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§ 1.45Y–4 Rules of general application.

(a) *Only production in the United States is taken into account for purposes of section 45Y.* Consumption, sales, or storage are taken into account for purposes of the section 45Y credit (defined in § 1.45Y–2(a)) only with respect to electricity the production of which is within the United States (within the meaning of section 638(1) of the Internal Revenue Code (Code)), or a United States territory, which for purposes of section 45Y and the section 45Y regulations (defined in § 1.45Y–2(a)) has the meaning of the term a possession of the United States (within the meaning of section 638(2)).

(b) *Production attributable to the taxpayer*—(1) *In general.* In the case of a qualified facility in which more than one person has an ownership share (and the arrangement is not treated as a partnership for Federal tax purposes) production from the qualified facility is allocated among such persons in proportion to their respective ownership shares in the gross sales from such qualified facility. The respective owners each determine their respective section 45Y credit under section 45Y(a) and based on their respective ownership shares in the gross sales from such qualified facility during the taxable year.

(2) *Example of gross sales.* A, B and C, all calendar year taxpayers, each own an interest in a solar facility which is a qualified facility (as defined in § 1.45Y–2(a)) (Solar Facility). A owns 45 percent, B owns 35 percent, and C owns 20 percent, and each are allocated gross sales from the Solar Facility in proportion to their ownership interest. The Solar Facility produced 1000 kWh of electricity during the taxable year. A, B, and C will each determine their respective section 45Y credit under section 45Y(a) and § 1.45Y–1(b) based on their allocable share of the gross sales from the 1000 kWh of electricity produced at the Solar Facility during the taxable year.

(3) *Section 761(a) election.* If a qualified facility is owned through an unincorporated organization that has made a valid election under section 761(a) of the Code, each member's undivided ownership share in the qualified facility will be treated as a separate qualified facility owned by such member.

(c) *Expansion of facility; Incremental production (Incremental Production Rule)*—(1) *In general.* Solely for purposes of this paragraph (c), the term *qualified facility* includes either a new unit or an addition of capacity placed in service after December 31, 2024, in connection with a facility described in section 45Y(b)(1)(A) (without regard to section 45Y(b)(1)(A)(ii)) that was placed in service before January 1, 2025, but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit or addition of capacity. This rule is only applicable to an addition of capacity or new unit that would not otherwise qualify as a separate qualified facility as defined in section 45Y(b)(1)(A). A new unit or an addition of capacity that meets the requirements of this paragraph (c) will be treated as a separate qualified facility. For purposes of this paragraph (c), a new unit or an addition of capacity requires the addition or replacement of components of property, including any new or replacement integral property, added to a facility necessary to increase capacity. For purposes of assessing the One Megawatt Exception provided in section 45Y(a)(2)(B)(i), the maximum net output for a new unit or an addition of capacity is the sum of the capacity of the added qualified facility and the capacity of the facility to which the qualified facility was added, as determined under § 1.45Y–3(c) and paragraph (c)(2) of this section.

(2) *Measurement standard.* For purposes of this paragraph (c), taxpayers must use one of the measurement standards described in paragraph (c)(2)(i), (ii), or (iii) of this section to measure the capacity and change in capacity of a facility, except a taxpayer cannot use the measurement standard described in paragraph (c)(2)(ii) of this section if they are able to use the measurement standard described in paragraph (c)(2)(i) of this section:

(i) Modified or amended facility operating licenses from the Federal Energy Regulatory Commission (FERC) or the Nuclear Regulatory Commission (NRC), or related reports prepared by FERC or NRC as part of the licensing process;

(ii) Nameplate capacity certified consistent with generally accepted

industry standards, such as the International Standard Organization (ISO) conditions to measure the nameplate capacity of the facility consistent with the definition of nameplate capacity provided in 40 CFR 96.202; or

(iii) A measurement standard prescribed by the Secretary in guidance published in the Internal Revenue Bulletin (see § 601.601 of this chapter).

(3) *Special rule for restarted facilities.* Solely for purposes of this paragraph (c), a facility that is decommissioned or in the process of decommissioning and restarts can be considered to have increased capacity from a base of zero if the conditions described in each of paragraphs (c)(3)(i) through (iv) of this section are met:

(i) The existing facility must have ceased operations;

(ii) The existing facility must have a shutdown period of at least one calendar year during which it was not authorized to operate by its respective Federal regulatory authority (that is, FERC or NRC);

(iii) The restarted facility must be eligible to restart based on an operating license issued by either FERC or NRC; and

(iv) The existing facility may not have ceased operations for the purpose of qualifying for the special rule for restarted facilities in this paragraph (c)(3).

(4) *Computation of increased amount of electricity produced.* To determine the increased amount of electricity produced by a facility in a taxable year by reason of a new unit or an addition of capacity, a taxpayer must multiply the amount of electricity that the facility produces during that taxable year after the new unit or addition of capacity is placed in service by a fraction, the numerator of which is the added capacity that results from the new unit or addition of capacity, and the denominator of which is the total capacity of the facility with the new unit or addition of capacity added, provided the added capacity and resulting total capacity are measured using a measurement standard identified in paragraph (c)(2) of this section.

(5) *Examples.* This paragraph (c)(5) provides examples illustrating the rules of paragraph (c) of this section.

(i) *Example 1. New Unit.* X owns a hydropower facility (Facility H) that was originally placed in service in 2020, with a FERC license authorizing an installed capacity of 60 megawatts. During taxable years 2020 through 2024, X claimed a section 45 credit for the electricity produced by Facility H. On July 1, 2025, as allowed by a FERC license amendment, X places in service components of property comprising a new unit that results in Facility H having an increased authorized installed capacity of 90 megawatts in 2025. For purposes of paragraph (c) of this section, this new unit will be treated as a separate facility (Facility J). X may claim a section 45Y credit during the 10-year credit period starting on July 1, 2025, based on the increased amount of electricity generated as a result of the new unit, which is determined by multiplying the electricity that Facility H produces with Facility J by one-third (equal to the 30-megawatt increase in capacity that results from the addition of Facility J divided by the 90 megawatt capacity of Facility H with Facility J). Even though X claimed a section 45 credit for the existing capacity of Facility H in taxable years 2020 through 2024, X can claim a section 45Y credit for the production of electricity associated with Facility J. X may also continue to claim the section 45 credit through taxable year 2030 for electricity generated by Facility H (excluding the incremental electricity generation related to Facility J).

(ii) *Example 2. Addition of Capacity.* Y owns a nuclear facility (Facility N) that was originally placed in service on January 1, 2000. Y claimed a section 45U credit in taxable years 2024 and 2025 for the electricity generated by Facility N. On January 15, 2026, Y completed and placed in service an investment associated with a power uprate approved by an NRC license amendment that involved the removal and replacement of components of property and placing in service additional components of property. NRC reports associated with the license amendment describe the uprate as increasing the nuclear facility's electrical capacity by 100 MW to 900 MW. For purposes of this paragraph (c), Facility N's addition of capacity is treated as a new separate qualified facility placed in service on January 15, 2026 (Facility P). Y may claim a section 45Y credit during the 10-year credit period starting on January 15, 2026, based on the increased amount of electricity produced at Facility N that is attributable to the addition of capacity (Facility P), which is determined by multiplying the electricity that Facility N produces with Facility P by 1/9 (equal to the 100-megawatt increase in capacity divided by Facility N's new total capacity of 900 megawatts with Facility P, as described in NRC reports associated with the license amendment). Even though Y claimed a section 45U credit in taxable years 2024 and 2025 for the existing capacity of Facility N, Y can claim a section 45Y credit for the production of electricity associated with Facility P. Y may also continue to claim the section 45U credit for electricity generated by Facility N (excluding the incremental electricity generation related to Facility P).

(iii) *Example 3. Geothermal Turbine and Generator Additions of Capacity.* X owns a geothermal power plant (Facility G) with a 24 MW nameplate capacity, which is placed in service in 2007. Over the subsequent years, the plant's generating capability declines because of physical degradation of the turbine and generator. On March 1, 2027, X places in service components of property at Facility G that increase its capacity. The turbine rotor is removed, and the eroded blades are replaced with new blades. The generator is refurbished by removing old subcomponents of the generator and replacing those with new subcomponents, as well as replacing the old copper windings with new windings in concert with new insulation. After the upgrade, the plant increases its nameplate capacity to 26 MW, an increase of 2 MW over the previous nameplate capacity. For purposes of this paragraph (c), the addition of capacity to Facility G is treated as a new separate qualified facility placed in service on March 1, 2027 (Facility N). X may claim a section 45Y credit during the 10-year credit period starting on March 1, 2027, based on the amount of electricity produced by Facility N, which is determined by multiplying the aggregate amount of electricity that Facility G produces with Facility N by 1/13 (that is, the fraction equal to the 2-megawatt increase in nameplate capacity attributable to Facility N divided by the new total aggregate 26 megawatt nameplate capacity of Facility G with Facility N).

(iv) *Example 4. Hydropower Addition of Capacity.* X owns a hydropower plant (Facility H) that was placed in service in 1960. Facility H has become less efficient since it was placed in service with attendant reductions in its generating capacity. As approved by a FERC license amendment, X increases Facility H's capacity by installing new headcovers, new turbines with integrated dissolved oxygen injection, and a new high pressure digital governor system. The new turbines are more efficient and are capable of more power output than the original design. Improvements to the generators involve removing the old asphalt coated copper windings and purchasing and then installing new epoxy coated double wound windings. X adds digital

controls to effectively utilize new digital governors while simultaneously investing in cybersecurity protection. As set forth in the FERC order amending its license, these investments, which are placed in service on April 15, 2026, increase Facility H's authorized installed capacity from 180 MW to 190 MW, an increase of 10 MW. For purposes of this paragraph (c), Facility H's addition of capacity is treated as a new separate qualified facility placed in service on April 16, 2026 (Facility A). X may claim a section 45Y credit during the 10-year credit period starting on April 16, 2026, based on the amount of electricity produced by Facility A, which is determined by multiplying the aggregate amount of electricity that Facility H produces with Facility A by 1/19 (equal to the 10-megawatt increase in capacity attributable to Facility A divided by the new total aggregate 190 MW capacity of Facility H with Facility A).

(v) *Example 5. Nonoperational Nuclear Facility that Satisfies Restart Rule.* T owns a nuclear facility (Facility N) that was originally placed in service in 1982. In 2020, Facility N ceased operations, began decommissioning, and the NRC no longer authorized the operation of Facility N. T did not cease operations at Facility N for the purpose of qualifying for the special rule for restarted facilities under section 45Y. In 2028, the NRC authorized Facility N to restart and, on October 1, 2028, Facility N placed in service components of property and restarted and resumed operations, with an electrical capacity of 800 MW, as indicated in NRC documents related to the authorization to restart. For purposes of this paragraph (c), the restart of Facility N is considered to have increased capacity from a base of zero, and Facility N is treated as having an addition of capacity equal to 800 MW. For purposes of this paragraph (c), Facility N's 800 MW addition of capacity is treated as a new qualified facility placed in service on October 1, 2028 (Facility P). T may claim a section 45Y credit during the 10-year period starting on October 1, 2028, based on the increased amount of electricity produced at Facility N that is attributable to that addition of capacity (Facility P).

(d) *Retrofit of an existing facility (80/20 Rule)*—(1) *In general.* For purposes of section 45Y(b)(1)(B), a facility may qualify as originally placed in service even if it contains some used components of property within the unit of qualified facility, provided the fair market value of the used components of the unit of qualified facility is not more than 20 percent of the total value of the unit of qualified facility (that is, the cost of the new components of property plus the fair market value of the used components of property within the unit of qualified facility) (80/20 Rule). If a facility satisfies the requirements of the 80/20 Rule, then the date on which such qualified facility is considered originally placed in service for purposes of section 45Y(b)(1)(B) is the date on which the new components of property of the unit of qualified facility are placed in service. A qualified facility that meets the 80/20 Rule may claim the section 45Y credit without regard to any addition of capacity to the qualified facility.

(2) *Cost of new components of property.* For purposes of the 80/20 Rule, the cost of new components of the unit of qualified facility includes all costs properly included in the depreciable basis of the new components of property of the unit of qualified facility.

(3) *Examples.* The following examples illustrate the rules of this paragraph (d).

(i) *Example 1. Retrofitted facility that meets the 80/20 Rule.* A owns an existing wind facility. On February 1, 2026, A replaces used components of the unit of qualified facility of a wind facility with new components at a cost of $2 million. The fair market value of the remaining original components of the unit of qualified facility is $400,000, which is not more than 20 percent of the retrofitted unit of qualified facility's total fair market value of $2.4 million (the cost of the new components ($2 million) + the fair market value of the remaining original components of the unit of qualified facility ($400,000)). Thus, the retrofitted wind facility will be considered newly placed in service for purposes of section 45Y, and the section 45Y credit is allowable for electricity produced by A at the wind qualified facility and sold, consumed, or stored, during the 10-year period beginning on February 1, 2026, assuming all the other requirements of section 45Y are met.

(ii) *Example 2. Retrofit of an existing facility that meets the 80/20 Rule.* Facility Z, a facility that was originally placed in service on January 1, 2026, was not a qualified facility (as described in § 1.45Y–2(a)) when it was placed in service because it did not meet the greenhouse gas emissions rate requirements (as determined under rules provided in § 1.45Y–5). On January 1, 2027, Facility Z was retrofitted and now meets the requirements to be a qualified facility under § 1.45Y–2(a). After the retrofit, the cost of the new property included in the unit of qualified facility of Facility Z is greater than 80 percent of the unit of qualified facility of Facility Z's total fair market value. Because Facility Z meets the 80/20 Rule, Facility Z is deemed to be originally placed in service on January 1, 2027. Therefore, a section 45Y credit is allowable for electricity produced by Facility Z and sold, consumed, or stored during the 10-year period beginning on January 1, 2027, assuming all the other requirements of section 45Y are met.

(iii) *Example 3. Retrofitted nuclear facility that satisfied the 80/20 Rule.* T owns a nuclear facility (Facility N) that was originally placed in service on March 1, 1982. T replaces used components of property of unit of qualified facility of Facility N with new components at a cost of $200 million, placing in service the components of property on July 15, 2026. The fair market value of the remaining original components of the unit of qualified facility of Facility N, prior to the retrofit, is $30 million, which is less than 20 percent of the unit of qualified facility of Facility N's total fair market value of $230 million (the cost of the new components ($200 million) + the fair market value of the remaining original components of the unit of qualified facility ($30 million)) ($30 million/$230 million = 13%). Thus, Facility N will be considered newly placed in service on July 15, 2026, for purposes of section 45Y, and T will be able to claim a section 45Y credit based on the electricity generated at Facility N, assuming all the other requirements of section 45Y are met.

(iv) *Example 4. Capital improvements to an existing qualified facility that do not satisfy the 80/20 Rule.* X owns an existing facility, Facility C, that was originally placed in service on January 1, 2023. X makes capital improvements to Facility C that are placed in service on June 1, 2026. The cost of the capital improvements to the unit of qualified facility of Facility C is $500,000 and the fair market value of the unit of qualified facility of Facility C after the improvements is $2 million. The value of the old components of property of the unit of qualified facility is $1,500,000 out of $2.0 million, or 75 percent ($500,000/$2,000,000) of the total fair market value of the unit of qualified facility after the improvements. Because the fair market value of the new property included in the unit of qualified facility is less than 80 percent of the total fair market value of the unit of qualified facility, Facility C does not meet the 80/20 Rule. Facility C will not be considered a qualified facility (as defined in § 1.45Y–2(a)) eligible for the section 45Y credit. If the capital

improvements to Facility C increase its nameplate capacity, the determination that it does not meet the 80/20 Rule does not prevent X from claiming a section 45Y credit if the requirements under paragraph (c)(1) of this section are met.

(v) *Example 5. Upgrades to a hydropower qualified facility that satisfies the 80/20 Rule:* Y owns a hydropower qualified facility (hydropower facility) and no taxpayer, including Y, has ever claimed a section 45 credit for the hydropower facility. The hydropower facility consists of a unit of qualified facility including water intake, water isolation mechanisms, turbine, pump, motor, and generator. The associated impoundment (dam) and power conditioning equipment are integral parts of the unit of qualified facility. Y makes upgrades to the unit of qualified facility by replacing the turbine, pump, motor, and generator with new components at a cost of $1.5 million. Y does not make any upgrades to the property that is an integral part of the unit of qualified facility. The remaining original components of the unit of qualified facility have a fair market value of $100,000, which is not more than 20 percent of the retrofitted hydropower facility's total value of $1.6 million (that is, the cost of the new components ($1.5 million) + the value of the remaining original components ($100,000)). Thus, the retrofitted hydropower facility will be considered newly placed in service for purposes of section 45Y, and Y will be able to claim a section 45Y credit based on the cost of the new components ($1.5 million).

(e) *Applicability date.* This section applies to qualified facilities placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

§ 1.45Y–5 Greenhouse gas emissions rates for qualified facilities under section 45Y.

(a) *In general.* This section provides rules and definitions for determining emissions rates for purposes of section 45Y of the Internal Revenue Code (Code). Paragraph (b)(4) of this section provides a definition for a facility that produces electricity through combustion or gasification and paragraph (b)(7) of this section defines a facility that does not produce electricity through combustion or gasification. Paragraphs (c) through (e) provide rules for determining the greenhouse gas emissions rates for facilities for purposes of section 45Y. Paragraph (f) of this section provides rules for the annual publication of emissions rates. Paragraph (g) of this section provides rules related to provisional emissions rates. Paragraph (h) of this section provides rules regarding reliance on the annual publication of emissions rates and provisional emissions rates. Finally, paragraph (i) of this section provides rules regarding substantiation requirements.

(b) *Definitions.* The definitions in this paragraph (b) apply for purposes of this section.

(1) *CO_2e per kWh.* The term *CO_2e per kWh* means with respect to any greenhouse gas, the equivalent carbon dioxide (as determined based on global warming potential) per kWh of electricity produced. The 100-year time horizon global warming potentials (GWP–100) from the Intergovernmental Panel on Climate Change's Fifth Assessment Report (AR5) must be used to convert emissions to equivalent carbon dioxide emissions. For purposes of this paragraph (b)(1), the GWP–100 from AR5 (as shown in table 1 to this paragraph (b)(1)) excludes climate-carbon feedbacks. Table 1 to this paragraph (b)(1) provides GWP–100 amounts for certain greenhouse gases applicable to this section.

TABLE 1 TO PARAGRAPH (b)(1)—100 YEAR GLOBAL WARMING POTENTIALS FOR GREENHOUSE GASES

Greenhouse gas	GWP
CO_2	1.
CH_4	28.
N_2O	265.
SF_6	23,500.
Hydrofluorocarbons	Varies by gas.
Perfluorocarbons	Varies by gas.

(2) *Combustion.* The term *combustion* means a rapid exothermic chemical reaction, specifically the oxidation of a fuel, which liberates energy including heat and light.

(3) *Gasification.* The term *gasification* means a thermochemical process that converts carbon-containing materials into syngas, a gaseous mixture that is composed primarily of carbon monoxide, carbon dioxide, and hydrogen.

(4) *Facility that produces electricity through combustion or gasification (C&G Facility).* Consistent with section 45Y(b)(2)(B), the term *facility that produces electricity through combustion or gasification* (C&G Facility) means a facility that produces electricity through combustion or uses an input energy source to produce electricity, if the input energy source was produced through a fundamental transformation of one energy source into another using combustion or gasification.

(5) *Greenhouse gas emissions rate.* Consistent with section 45Y(b)(2)(A), the term *greenhouse gas emissions rate* means the amount of greenhouse gases emitted into the atmosphere by a facility in the production of electricity, expressed as grams of CO_2e per kWh.

(6) *Greenhouse gases emitted into the atmosphere by a facility in the production of electricity.* For purposes of section 45Y(b)(2)(A), for both C&G and Non-C&G Facilities, the term *greenhouse gases emitted into the atmosphere by a facility in the production of electricity* means emissions from a facility that directly occur from the processes that transform the input energy source into electricity but excludes emissions described in paragraphs (b)(6)(i) through (vi) of this section.

(i) Emissions from electricity production by back-up or auxiliary generators that are primarily used in maintaining critical systems in case of a power system outage or for supporting restart of a generator after an outage.

(ii) Emissions from routine operational and maintenance activities that are integral to the production of electricity, including, but not limited to, emissions from internal combustion vehicles used to access and perform maintenance on remote electricity generating facilities or emissions occurring from heating and cooling control rooms or dispatch centers.

(iii) Emissions from a step-up transformer that conditions the electricity into a form suitable for productive use or sale.

(iv) Emissions that occur before commercial operations commence or after commercial operations terminate, including, but not limited to, on-site emissions occurring from construction or manufacturing of the facility itself, emissions from the off-site manufacturing of facility components, or emissions occurring due to siting or decommissioning.

(v) Emissions from infrastructure associated with the facility, including, but not limited to, emissions from road construction for feedstock production.

(vi) Emissions from the distribution of electricity to consumers.

(7) *Non-C&G Facility.* The term *Non-C&G Facility* means a facility that produces electricity and is not described in paragraph (b)(4) of this section.

(8) *Fuel.* The term *fuel* means material directly used to produce electricity or energy inputs that are used to produce electricity.

(9) *Feedstock.* The term *feedstock* means any raw material used in a process for electricity generation or to produce an intermediate product or

finished fuel used for electricity generation.

(10) *Market-mediated effects.* The term *market-mediated effects* means effects resulting from policy interventions and other factors (for example, technological advances) that alter the availability of and demand for marketed goods and activities and their related greenhouse gas (GHG) emissions profiles. These effects are driven by and result in changes in absolute and relative prices which can occur at local, national, and global boundaries. Examples of market-mediated effects include direct and significant indirect emissions, such as land use changes or land use management changes that result from the production of fuels derived from biomass and shifts in total market demand and supply for input fuels, feedstocks and related commodities, and other materials, as a result of changes associated with the policy intervention.

(c) *Non-C&G Facilities*—(1) *Determining a greenhouse gas emissions rate for Non-C&G Facilities.* Greenhouse gas emissions rates for Non-C&G Facilities must be determined under paragraphs (c) and (e) of this section.

(i) *Excluded emissions.* With respect to Non-C&G Facilities only, greenhouse gases emitted into the atmosphere by a facility in the production of electricity excludes emissions of greenhouse gases that are not directly produced by the fundamental transformation of the input energy source into electricity, including, but not limited to:

(A) Emissions from hydropower reservoirs due to anoxic conditions;

(B) Ebullitive, diffuse, and degassing emissions from hydropower operations;

(C) Emissions of non-condensable gases from underground reservoirs during geothermal operations; and

(D) Emissions occurring due to activities and operations occurring off-site, including but not limited to, the production and transportation of fuels used by the facility, or land use change from siting or changes in demand.

(ii) *Emissions assessment process.* Subject to paragraphs (b)(6) and (c)(1) of this section, a greenhouse gas emissions rate for a Non-C&G Facility must be determined through a technical and engineering assessment of the fundamental energy transformation into electricity. This assessment must consider all input and output energy carriers and chemical reactions or mechanical processes taking place at the facility in the production of electricity.

(iii) *Example of greenhouse gas emissions rate determination for a Non-C&G Facility*—(A) *Facts.* A facility uses solar photovoltaic technologies to convert light directly into electricity through use of the photovoltaic effect. This is a physical phenomenon in which certain semiconducting materials upon exposure to light, absorb the light and transform the energy contained in the light directly into an electric current. There are many materials that may be used to generate electricity through this method, including crystalline silicon, amorphous silicon, cadmium telluride, copper indium gallium diselenide, perovskites, quantum dots, and carbon-based materials known as organic photovoltaics. The smallest unit of photovoltaic materials is a cell. Multiple cells are typically assembled into a panel or module and electrically connected. Multiple modules or panels are generally connected to comprise a solar system or installation. Solar photovoltaic technologies produce direct current electricity that can be used as is or, more typically, can be fed into inverters to transform it into alternating current. Solar panels can be ground mounted at a fixed angle or can be mounted with tracking systems that move the panels to track the location of the sun over the course of the day and season in order to maximize electricity production. Solar panels may also be mounted on buildings (for example, on roofs), or solar photovoltaic materials can be integrated into other building components such as roofing tiles.

(B) *Analysis.* For solar photovoltaic technologies, the fundamental transformation of input energy (solar electromagnetic radiation) into electricity using the photovoltaic effect involves no mechanical energy or chemical reactions. Academic studies on the lifecycle greenhouse gas emissions from solar photovoltaic power indicate that there is a small but non-zero amount of emissions associated with the operational phase of these technologies. However, these emissions exclusively occur due to ongoing maintenance (for example, the washing of solar panels), preventative maintenance (for example, the periodic replacement of electrical equipment such as inverters), and a minimal amount of project management (for example, inverter standby mode at night). These emissions do not occur directly due to the production of electricity. Therefore, consistent with paragraph (c)(1)(ii) of this section, the greenhouse gas emissions rate for facilities that produce electricity by solar photovoltaic properties is not greater than zero.

(2) *Non-C&G Facilities with a greenhouse gas emissions rate that is not greater than zero.* The types or categories of facilities described in paragraphs (c)(2)(i) through (viii) of this section are Non-C&G Facilities with a greenhouse gas emissions rate that is not greater than zero and may be treated as listed in the Annual Table (see paragraph (g) of this section) with an emissions rate that is not greater than zero:

(i) Wind (including small wind properties);

(ii) Hydropower (including retrofits that add electricity production to non-powered dams, conduit hydropower, hydropower using new impoundments, and hydropower using diversions such as a penstock or channel);

(iii) Marine and hydrokinetic;

(iv) Solar (including photovoltaic and concentrated solar power);

(v) Geothermal (including flash and binary plants);

(vi) Nuclear fission;

(vii) Fusion energy; and

(viii) Waste energy recovery property that derives energy from a source described in paragraphs (c)(2)(i) through (vii) of this section.

(d) *C&G Facilities*—(1) *Determining a greenhouse gas emissions rate for C&G Facilities.* The greenhouse gas emissions rate for a C&G Facility—

(i) Must be determined by a lifecycle analysis (LCA) that complies with the requirements of paragraphs (d) and (e) of this section; and

(ii) Equals the net rate of greenhouse gases emitted into the atmosphere by such facility (taking into account lifecycle greenhouse gas emissions, as described in 42 U.S.C. 7545(o)(1)(H)) in the production of electricity, expressed as grams of CO_2e per kWh.

(2) *LCA requirements.* For purposes of this paragraph (d), an LCA must comply with the requirements of paragraphs (d)(2)(i) through (x) of this section:

(i) *Starting boundary.* The starting boundary of the LCA for an LCA involving generation-derived feedstocks (such as biogenic feedstocks) is feedstock generation. The starting boundary of the LCA for an LCA involving extraction-derived feedstocks (such as fossil fuel feedstocks) is feedstock extraction. The starting boundaries include the processes and inputs necessary to produce and collect or extract the raw materials used to produce electricity from combustion or gasification technologies, including those used as energy inputs to electricity production. This includes, but is not limited to, the emissions effects, including associated direct and indirect greenhouse gas emissions, of relevant land management activities or changes related to or associated with the

extraction or production of raw feedstock materials or fuel.

(ii) *Ending boundary.* The ending boundary of the LCA for electricity that is transmitted to the grid or electricity that is used on-site is the meter at the point of production of the C&G Facility. The use of such electricity generated by the C&G Facility (and what other types of energy sources it displaces), including emissions from transmission and distribution, are outside of the LCA boundary.

(iii) *Baseline.* The LCA must be based on a future anticipated baseline, which projects future status quo in the absence of the availability of the section 45Y and 48E credits (taking into account anticipated changes in technology, policies, practices, and environmental and other socioeconomic conditions). The future anticipated baseline must be updated as necessary to capture material regulatory, economic, supply chain, or environmental changes. The baseline must be updated at least every ten years, but not more often than every five years.

(iv) *Offsets and offsetting activities.* Offsets and offsetting activities may not be taken into account in the LCA.

(v) *Principles for included emissions.* The LCA must take into account direct emissions and significant indirect emissions. Sources of direct emissions include those associated with feedstock production or extraction, including emissions at all stages of fuel and feedstock production, and distribution, and emissions associated with distribution, delivery, and use of feedstocks to and by a C&G Facility. Sources of significant indirect emissions include emissions in the United States and other countries associated with market-mediated changes in related commodity markets, such as emission from indirect land use change and emissions consequences of commodity production. These included emissions are within the system boundary of the LCA.

(A) *Direct emissions.* For purposes of this paragraph (d)(2)(v), direct emissions include, but are not limited to:

(*1*) Emissions from feedstock generation, production, and extraction (including emissions from feedstock and fuel harvesting and extraction and direct land use change and management, including emissions from fertilizers, and changes in carbon stocks);

(*2*) Emissions from feedstock and fuel transport (including emissions from transporting the raw or processed feedstock to the fuel processing facility);

(*3*) Emissions from transporting and distributing fuels to electricity production facility;

(*4*) Emissions from handling, processing, upgrading, and/or storing feedstocks, fuels and intermediate products (including emissions from on/offsite storage and preparation/pre-treatment for use (for example, torrefaction or pelletization) and emissions from process additives); and

(*5*) Emissions from combustion and gasification at the electricity generating facility (including emissions from the combustion and/or gasification process and emission from gasification or combustion additives).

(B) *Significant indirect emissions.* For purposes of this paragraph (d)(2)(v), examples of significant indirect emissions include, but are not limited to, emissions from indirect land use and land use change, and induced emissions associated with the increased use of the feedstock for energy production.

(vi) *Principles for excluded emissions.* The LCA must not take into account the types of emissions described in paragraphs (d)(2)(vi)(A) through (D) of this section:

(A) Emissions from facility construction, siting or decommissioning (including on-site emissions occurring from construction or manufacturing of the facility itself);

(B) Emissions from facility maintenance (including emissions from the on and offsite construction or maintenance of the facility; emissions from vehicles used to access and perform maintenance on electricity generating facilities; emissions from back-up generators that do not provide additional firm power and are used in maintaining critical systems in case of a power system outage or for supporting restart of a generator after an outage; and emissions occurring from heating and cooling control rooms or dispatch centers);

(C) Emissions from infrastructure associated with the facility (including emissions from road construction for feedstock production and emissions from onsite backup or emergency generators used in an emergency or unplanned outage); and

(D) Emissions from the distribution of electricity to consumers.

(vii) *Alternative fates and avoided emissions.* The LCA may consider alternative fates and account for avoided emissions, including for the fuels and feedstocks consumed in the fuel and feedstock supply chain and at the electricity generating facility. The term *alternative fate* means a set of informed assumptions (for example, production processes, material outcomes, and market-mediated effects) used to estimate the emissions from the use or disposal of each feedstock were it not for the feedstock's new use due to the implementation of policy (that is, to produce electricity). The term *avoided emissions* means the estimated emissions associated with the feedstock, including the feedstock's production and use or disposal, that would have occurred in the alternative fate (if such feedstock had not been diverted for electricity production) but are instead avoided with the feedstock's use for electricity production.

(viii) *Temporal scales.* The LCA should evaluate the emissions over a time horizon of 30 years from the year in which a qualified facility first qualifies for the credit (or, for purposes of the section 48E credit, the year in which a qualified facility was placed in service).

(ix) *Spatial scales.* To determine the initial spatial scope of the LCA, the initial qualitative assessment should analyze whether the feedstock has been or is anticipated: to be used or sold on the market in the absence of the section 45Y and 48E credits; to be used directly in or as an input to an activity or good in local markets; to be transported for use in domestic markets elsewhere; to be traded for use in international markets; and to be used in a manner that has significant ramifications on other markets. If this assessment concludes that the feedstock does not meet one or more of the criteria in this paragraph (d)(2)(ix), then the market-mediated effects analysis would not be necessary beyond the relevant spatial scale(s) (for example, if the feedstock is not traded or not anticipated to be traded for use in international markets and increased use in the United States is not anticipated to have significant market ramifications abroad, international market-mediated effects analysis would not be necessary). Based on the results of the assessment, the LCA should evaluate the emissions on a sub-regional, regional, national, or international scale as appropriate. The evaluation of emissions should include the market and emissions implications of sourcing new or additional material for electricity generation across the applicable market and spatial scales.

(x) *Categorization of products.* As appropriate, the LCA should distinguish between primary products, co-products, byproducts, and waste products.

(A) Products should be categorized based on the definitions in paragraphs (d)(2)(x)(A)(*1*) through (*4*) of this section.

(*1*) A *primary product* is an input or an output with marketability and is the main driver of the process from which it is produced.

(*2*) A *co-product* is an input or an output with marketability that is produced together with another product, both of which are economic drivers of the process from which they are produced.

(*3*) A *byproduct* is an input or an output that is produced together with another product, and which has a market recognized economic value of zero or greater, but the output is not an economic driver of the process from which it is produced.

(*4*) A *waste product* is an input or an output with negative economic value, demonstrated by—

(*i*) The absence of a market in which the product is purchased and sold; and

(*ii*) The existence of a market in which producers pay for the collection and removal or disposal of the input or output material or the existence of a predominant operational practice in which producers themselves collect and remove, give away, or dispose of the input or output material as part of operational processes.

(B) The LCA should adopt the principles in paragraphs (d)(2)(x)(B)(*1*) through (*6*) of this section for categorizing and assessing the emissions outcomes for different types of products if such categorization is relevant to the LCA model or models used.

(*1*) All classification of materials and LCAs should take into account relevant geospatial variations in supply and demand (that is, differences across local, sub-regional, and larger regions), as well as variations across specific product types and characteristics, and producer types as relevant.

(*2*) The LCA should assess whether there are market-mediated effects and, if so, take these into account as part of the GHG analysis.

(*3*) Regardless of how a material is categorized, the LCA should consider whether the availability of the section 45Y and 48E credits is expected to result in additional production of that material or in material changes in the supply chain, and, if so, should take into account the direct and indirect emissions impact of the additional production or changes in the supply chain.

(*4*) Policy and other interventions (for example, technological advances) can alter the availability and demand for marketed goods and services, which can alter the treatment of materials once disposed of. Therefore, reevaluation of material categorization should occur at least every ten years, but not more often than every five years.

(*5*) All determinations of marketability, market-mediated effects, and behavioral changes must be supported by an analytical assessment performed by one or more National Laboratories, in consultation with other Federal agency experts as appropriate.

(*6*) A material should be considered to have a market recognized economic value and an established market if one existed within the last five years as of the date of the analysis.

(e) *Use of methane from certain sources to produce electricity*—(1) *In general.* The requirements provided by this paragraph (e) apply to C&G Facilities (as defined in paragraph (b)(4) of this section) that produce electricity through combustion or gasification using methane derived from biogas, renewable natural gas (RNG) derived from biogas, or fugitive sources of methane (or any hydrogen derived from methane from these sources) as a fuel or feedstock.

(2) *Definitions.* The following definitions apply for purposes of paragraph (e) of this section:

(i) *Biogas.* The term *biogas* means gas containing methane that results from the decomposition of organic matter under anaerobic conditions.

(ii) *Coal mine methane.* The term *coal mine methane* means methane that is stored within coal seams and is liberated as a result of current or past mining activities. Liberated coal mine methane can be released intentionally by the mine for safety purposes, such as through mine degasification boreholes or underground mine ventilation systems, or it may leak out of the mine through vents, fissures, or boreholes. The term coal mine methane does not include methane removed from virgin coal seams (for example, coal bed methane).

(iii) *Fugitive methane.* The term *fugitive methane* means methane released from equipment leaks or venting during the extraction, processing, transformation, or delivery of fossil fuels and other gaseous fuels to the point of final use.

(iv) *Renewable natural gas.* The term *renewable natural gas* (RNG) means biogas that has been upgraded to remove water, CO_2, and other impurities such that it is interchangeable with fossil natural gas.

(3) *Considerations regarding the lifecycle greenhouse gas emissions associated with the production of electricity using methane from certain sources*—(i) *In general.* For purposes of determining the GHG emissions rate of a C&G Facility (as provided in paragraph (d)(1) of this section) that produces electricity through combustion or gasification using methane derived from biogas, RNG derived from biogas, or fugitive sources of methane (or any hydrogen derived from methane from these sources) as a fuel or feedstock, measurements of lifecycle GHG emissions must consider all the direct and significant indirect emissions associated with a C&G Facility's production of electricity. For purposes of determining the alternative fates and avoided emissions under paragraph (d)(2)(vii) of this section, such determinations must consider the alternative fates of that methane, including avoided emissions and alternative productive uses of that methane; the risk that the availability of tax credits creates incentives resulting in the production of additional methane or otherwise induces additional emissions; and observable trends and anticipated changes in waste management and disposal practices over time as they are applicable to methane generation and uses.

(ii) *Methane from landfill sources.* For purposes of determining the GHG emissions rate of a C&G Facility (as provided in paragraph (d)(1) of this section) that produces electricity through combustion or gasification using methane derived from landfill sources as a fuel or feedstock, the alternative fate of such gas must be flaring.

(iii) *Methane from wastewater sources.* For purposes of determining the GHG emissions rate of a C&G Facility (as provided in paragraph (d)(1) of this section) that produces electricity through combustion or gasification using methane derived from wastewater sources as a fuel or feedstock, the alternative fate of such gas must be flaring of gas not used to heat the anaerobic digester.

(iv) *Coal mine methane.* For purposes of determining the GHG emissions rate of a C&G Facility (as provided in paragraph (d)(1) of this section) that produces electricity through combustion or gasification using coal mine methane that is drainage gas as a fuel or feedstock, the alternative fate of such gas must be flaring.

(v) *Methane from animal waste.* For purposes of determining the GHG emissions rate of a C&G Facility (as provided in paragraph (d)(1) of this section) that produces electricity through combustion or gasification using methane derived from animal waste as a fuel or feedstock, the emissions associated with producing and transporting such biogas must use an alternative fate derived from the national average of all animal waste management practices, which results in a carbon intensity score of –51 gCO_2e/megajoule (MJ), where the MJ basis refers to the lower heating value of the

methane contained in the biogas prior to upgrading.

(vi) *Fugitive methane other than coal mine methane.* For purposes of determining the GHG emissions rate of a C&G Facility (as provided in paragraph (d)(1) of this section) that produces electricity through combustion or gasification using fugitive methane other than coal mine methane as a fuel or feedstock, such as fugitive methane from oil and gas operations, the alternative fate of such gas must be productive use, resulting in emissions equivalent to the carbon intensity of using fossil natural gas.

(4) *Book-and-claim.* For purposes of determining a GHG emissions rate of a facility under section 45Y or 48E, a book-and-claim accounting system may not be used to establish or claim the energy attributes of biogas, RNG, coal mine methane, or any other methane described in this paragraph (e), or any other input or feedstock.

(f) *Carbon capture and sequestration*—(1) *In general.* For purposes of determining a greenhouse gas emissions rate for a Non-C&G Facility or C&G Facility, the greenhouse gas emissions rate must not include any qualified carbon dioxide (as defined in section 45Y(c)(3)) that is produced in such facility's production of electricity, that is captured by the taxpayer, and pursuant section 45Q(f)(2) and 26 CFR 1.45Q–3, disposed of by the taxpayer in secure geological storage, or utilized by the taxpayer in a manner described in section 45Q(f)(5) and 26 CFR 1. 45Q–4.

(2) *Substantiation.* The requirements for substantiation and verification of carbon capture and sequestration provided by regulations and guidance published in the Internal Revenue Bulletin (*see* § 601.601 of this chapter) under section 45Q (section 45Q requirements) must be satisfied for qualified carbon dioxide to be taken into account under paragraph (e)(1) of this section. A taxpayer that uses carbon capture and sequestration at a qualified facility for which a section 45Y credit is claimed must comply with applicable requirements of the U.S. Environmental Protection Agency's Greenhouse Gas Reporting Program (GHGRP) under 40 CFR part 98, subpart PP (for carbon capture), subpart RR (for geological storage), and subpart RR or VV (for storage through enhanced oil recovery). In addition to the section 45Q requirements, taxpayers using the ISO 27916 standard for enhanced oil recovery must report information to GHGRP under 40 CFR part 98, subpart VV. Furthermore, the taxpayer must also include their applicable GHGRP ID number(s) on the IRS Form used to claim the section 45Y or section 48E credit, with the exception of taxpayers claiming the credits by performing carbon capture and utilization. The GHGRP does not provide a reporting mechanism for utilization.

(g) *Annual publication of emissions rates*—(1) *In general.* As required by section 45Y(b)(2)(C)(i), the Secretary will annually publish a table that sets forth the greenhouse gas emissions rates for types or categories of facilities (Annual Table), which a taxpayer must use for purposes of section 45Y. Except as provided in paragraph (h) of this section, a taxpayer that owns a facility that is described in the Annual Table on the first day of the taxpayer's taxable year in which the section 45Y credit or section 48E credit is determined with respect to such facility must use the Annual Table as of such date to determine an emissions rate for such facility for such taxable year.

(2) *Publication of analysis required for changes to the Annual Table.* In connection with the publication of the Annual Table, the Secretary must publish an accompanying expert analysis that addresses any types or categories of facilities added or removed from the Annual Table, as well as any changes to emissions determinations for any types or categories of facilities in the Annual Table, since its last publication. Types or categories of facilities will be added or removed from the Annual Table consistent with, for Non-C&G Facilities, a technical assessment of the fundamental energy transformation into electricity as provided in paragraph (c)(1)(ii) of this section, and, for C&G Facilities, an LCA that complies with paragraphs (d) and (f) of this section. Such expert analysis must be prepared by one or more of the National Laboratories, in consultation with other Federal agency experts as appropriate, and must address whether the addition or removal of types or categories of facilities from the Annual Table complies with section 45Y(b)(2)(A) and (B) of the Internal Revenue Code and this section.

(h) *Provisional emissions rates*—(1) *In general.* In the case of any facility that is of a type or category for which an emissions rate has not been established by the Secretary under paragraph (g) of this section, a taxpayer that owns such facility may file a petition with the Secretary for the determination of the emissions rate with respect to such facility (Provisional Emissions Rate or PER). A PER must be determined and obtained under the rules of this section.

(2) *Rate not established.* An emissions rate has not been established by the Secretary for a facility for purposes of section 45Y(b)(2)(C)(ii) if such facility is not described in the Annual Table. If a taxpayer's request for an emissions value pursuant to paragraph (h)(5) of this section is pending at the time such facility is or becomes described in the Annual Table, the taxpayer's request for an emissions value will be automatically denied.

(3) *Process for filing a PER petition.* To file a PER petition with the Secretary, a taxpayer must submit a PER petition by attaching it to the taxpayer's Federal income tax return or Federal return, as appropriate, for the first taxable year in which the taxpayer claims the section 45Y credit with respect to the facility to which the PER petition applies. The PER petition must contain an emissions value, and, if applicable, the associated letter from the Department of Energy (DOE). An emissions value may be obtained from DOE or by using the designated LCA model in accordance with paragraph (h)(6) of this section. An emission value obtained from DOE will be based on an analytical assessment of the emissions rate associated with the facility, performed by one or more National Laboratories, in consultation with other Federal agency experts as appropriate, consistent with this section. A taxpayer must retain in its books and records a copy of the application and correspondence to and from DOE including a copy of the taxpayer's request to DOE for an emissions value and any information provided by the taxpayer to DOE pursuant to the emissions value request process provided in paragraph (h)(5) of this section. Alternatively, an emissions value can be determined by the taxpayer for a facility using the most recent version of an LCA model, as of the time the PER petition is filed, that has been designated by the Secretary for such use under paragraph (h)(6) of this section. If an emissions value is determined using the most recent version of the model or models, the taxpayer is required to provide to the IRS information to support its determination in the form and manner prescribed in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter. A taxpayer may not request an emissions value from DOE for a facility for which an emissions value can be determined by using the most recent version of an LCA model or models that have been designated by the Secretary for such use under paragraph (h)(6) of this section.

(4) *PER determination.* Upon the IRS's acceptance of the taxpayer's Federal income tax return or Federal return, as

appropriate, containing a PER petition, the emissions value of the facility specified on such petition will be deemed accepted. A taxpayer may rely upon an emissions value provided by DOE for purposes of claiming a section 45Y credit, provided that any information, representations, or other data provided to DOE in support of the request for an emissions value are accurate. If applicable, a taxpayer may rely upon an emissions value determined for a facility using the most recent version of the specific LCA model or models that, as of the time the PER petition is filed, have been designated by the Secretary for such use under paragraph (h)(6) of this section, provided that any information, representations, or other data used to obtain such emissions value are accurate. The IRS's deemed acceptance of an emissions value is the Secretary's determination of the PER. However, the taxpayer must still comply with all applicable requirements for the section 45Y credit and any information, representations, or other data supporting an emissions value are subject to later examination by the IRS.

(5) *Emissions value request process.* An applicant that submits a request for an emissions value must follow the procedures specified by DOE to request and obtain such emissions value. Emissions values will be determined consistent with the rules provided in this section. An applicant may request an emissions value from DOE only after a front-end engineering and design (FEED) study or similar indication of project maturity, as determined by DOE, such as completion of a project specification and cost estimation sufficient to inform a final investment decision for the facility. DOE may decline to review applications that are not responsive, including those applications that relate to a facility described in the Annual Table (consistent with paragraph (h)(2) of this section) or a facility for which an emissions value can be determined by an LCA model designated under paragraph (h)(6) of this section (consistent with paragraph (h)(3) of this section), or applications that are incomplete. DOE will publish guidance and procedures that applicants must follow to request and obtain an emissions value from DOE. DOE's guidance and procedures will include a process for, under limited circumstances, requesting a revision to DOE's initial assessment of an emissions value based on revised technical information or facility design and operation.

(6) *LCA model for determining an emissions value for C&G Facilities.* The Secretary may designate one or more LCA models for determining an emissions value for C&G Facilities that are not described in the Annual Table. The Secretary may only designate a model under this paragraph (h)(6) if the model complies with section 45Y(b)(2)(B) and paragraphs (d) and (f) of this section. The Secretary may revoke the designation of an LCA model or models. In connection with the designation or revocation of a designation of an LCA model or models, the Secretary is required to publish an accompanying expert analysis of the model that is prepared by one or more of the National Laboratories, in consultation with other Federal agency experts as appropriate, and such analysis must address the model's compliance with section 45Y(b)(2)(B) of the Internal Revenue Code and paragraphs (d) and (f) of this section.

(7) *Effect of PER.* A taxpayer may use a PER determined by the Secretary to determine eligibility for the section 45Y credit for the facility to which the PER applies, provided all other requirements of section 45Y are met. The Secretary's PER determination is not an examination or inspection of books of account for purposes of section 7605(b) of the Code and does not preclude or impede the IRS (under section 7605(b) or any administrative provisions adopted by the IRS) from later examining a return or inspecting books or records with respect to any taxable year for which the section 45Y credit is claimed. Further, a PER determination does not signify that the IRS has determined that the requirements of section 45Y have been satisfied for any taxable year.

(i) *Reliance on Annual Table or provisional emissions rate.* Taxpayers may rely on the Annual Table in effect as of the date a facility began construction or the provisional emissions rate determined by the Secretary for the taxpayer's facility under paragraph (h)(4) of this section to determine the facility's greenhouse gas emissions rate for any taxable year that is within the 10-year period described in section 45Y(b)(1)(B), provided that the facility continues to operate as a type of facility that is described in the Annual Table or the facility's emissions value request, as applicable, for the entire taxable year.

(j) *Substantiation*—(1) *In general.* A taxpayer must maintain in its books and records documentation regarding the design, operation, and, if applicable, feedstock or fuel source used by the facility that establishes that such facility had a greenhouse gas emissions rate, as determined under this section, that is not greater than zero for the taxable year.

(2) *Sufficient substantiation.* Documentation sufficient to substantiate that a facility had a greenhouse gas emissions rate, as determined under this section, that is not greater than zero for the taxable year includes documentation or a report prepared by an unrelated party that verifies that a facility had such an emissions rate. For a facility described in paragraph (c)(2) of this section, the taxpayer can maintain sufficient documentation to demonstrate a greenhouse gas emissions rate that is not greater than zero for the taxable year by showing that it is the type of facility described in paragraph (c)(2). For qualified facilities not described in paragraph (c)(2), the taxpayer must demonstrate that the qualified facility meets the specific criteria that the analytical assessment prepared by the National Laboratories, in consultation with other Federal agency experts as appropriate, has found are necessary for a facility to meet the statutory requirement of a greenhouse gas emissions rate not greater than zero. For C&G Facilities that utilize biomass feedstocks, the taxpayer must substantiate that the source of such fuels or feedstocks used are consistent with the taxpayer's claims. The Secretary may determine that qualified facilities not described in paragraph (c)(2) can sufficiently substantiate a greenhouse gas emissions rate, as determined under this section, that is not greater than zero with certain documentation and will describe such facilities and documentation in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter. For facilities that utilize unmarketable feedstocks that are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer will be required to maintain documentation substantiating the origin and original form of the feedstock.

(k) *Applicability date.* This section applies to qualified facilities placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

■ **Par. 6.** Sections 1.48E–0 through 1.48E–5 are added to read as follows:

Sec.

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§ 1.48E–0 Table of contents.

This section lists the captions contained in §§ 1.48E–1 through 1.48E–5.

(l) Applicability date.

§ 1.48E–1 Clean electricity investment credit.

(a) *Overview*—(1) *In general.* For purposes of section 46 of the Internal Revenue Code (Code), the section 48E credit (defined in paragraph (a)(10) of this section) is determined under section 48E of the Code and the section 48E regulations (defined in paragraph (a)(11) of this section). This paragraph (a) provides definitions of terms that, unless otherwise specified, apply for purposes of section 48E, the section 48E regulations, and any provision of the Code or this chapter that expressly refers to any provision of section 48E or the section 48E regulations. Paragraph (b) of this section provides rules for determining the amount of the section 48E credit for any taxable year. Paragraph (c) of this section provides rules regarding the phase-out of the section 48E credit. *See* § 1.48E–2 for rules relating to qualified investments in qualified facilities and energy storage technology (EST) for purposes of the section 48E credit. *See* § 1.48E–4 for rules of general application for the section 48E credit. *See* § 1.48E–5 for rules to determine greenhouse gas emissions rates for qualified facilities under section 48E.

(2) *Claim.* For purposes of determining a taxpayer's section 48E credit with respect to a qualified facility or EST or a credit described in section 48E(b)(3)(C), the term *claim* means filing a completed Form 3468, Investment Credit, or any successor form(s), or other relevant form as it relates to the credits described in section 48E(b)(3)(C), with the taxpayer's timely filed (including extensions) Federal income tax return or Federal return, as appropriate, for the taxable year in which the qualified facility or EST is placed in service, and for the taxable year in which the facility for which the credit described in section 48E(b)(3)(C) is placed in service. It includes making an election under section 6417 or 6418 of the Code and 26 CFR 1.6417–1 and 1.6418–1, respectfully, with respect to such section 48E credit on the taxpayer's filed return.

(3) *Code.* The term *Code* means the Internal Revenue Code.

(4) *EST.* The term *EST* for purposes of the section 48E credit means energy storage technology as defined in § 1.48E–2(g).

(5) *kWh.* The term *kWh* means kilowatt hours.

(6) *Qualified facility.* The term *qualified facility* for purposes of the section 48E credit has the meaning provided in § 1.48E–2(b).

(7) *Qualified investment with respect to a qualified facility.* The term *qualified investment with respect to a qualified facility* for purposes of the section 48E credit has the meaning provided in § 1.48E–2(a).

(8) *Qualified investment with respect to EST.* The term *qualified investment with respect to EST* for purposes of the section 48E credit has the meaning provided in § 1.48E–2(g)(4).

(9) *Secretary.* The term *Secretary* means the Secretary of the Treasury or their delegate.

(10) *Section 48E credit.* The term *section 48E credit* means the clean electricity investment credit determined under section 48E of the Code and the section 48E regulations.

(11) *Section 48E regulations.* The term *section 48E regulations* means this section and §§ 1.48E–2 through 1.48E–5.

(12) *Waste energy recovery property (WERP).* WERP is property that generates electricity solely from heat from buildings or equipment if the primary purpose of such building or equipment is not the generation of electricity. Examples of buildings or equipment the primary purpose of which is not the generation of electricity include, but are not limited to, manufacturing plants, medical care facilities, facilities on school campuses, and associated equipment.

(b) *Credit amount*—(1) *In general.* For purposes of section 46 of the Code, the section 48E credit for any taxable year is an amount equal to the applicable percentage of the qualified investment for such taxable year with respect to any qualified facility and any EST.

(2) *Applicable percentage.* The term *applicable percentage* means the base rate described in paragraph (b)(3) of this section or the alternative rate described in paragraph (b)(4) of this section. The applicable percentage may be increased as provided in section 48E(a)(3)(A) and paragraph (b)(5) of this section in the case of a qualified facility that is located in an energy community. Similarly, the applicable percentage may be increased as provided in section 48E(a)(3)(B) and paragraph (b)(6) of this section in the case of a qualified facility that satisfies the domestic content requirements.

(3) *Base rate.* Under section 48E(a)(2)(A)(i) and (B)(i), in the case of any qualified facility or EST that does not satisfy the requirements provided in section 48E(a)(2)(A)(ii) or (B)(ii), the applicable percentage is the *base rate,* which is 6 percent.

(4) *Alternative rate.* In the case of any qualified facility or EST that satisfies the prevailing wage and apprenticeship requirements provided in section 48E(a)(2)(A)(ii) or (B)(ii), the applicable percentage is the *alternative rate,* which is 30 percent.

(5) *Energy communities increase in credit rate*—(i) *In general.* In the case of any qualified facility or EST that is placed in service within an energy community (as defined in section 45(b)(11)(B)), the applicable percentage under section 48E(a)(2) and paragraph (b)(2) of this section will be increased by the applicable credit rate increase described in section 48E(a)(3)(A)(ii) and paragraph (b)(5)(ii) of this section.

(ii) *Applicable credit rate increase.* In the case of any qualified investment with respect to a qualified facility or EST to which the base rate is applicable, the applicable credit rate increase is 2 percentage points, and with respect to any qualified investment with respect to a qualified facility or EST to which the alternative rate is applicable, the applicable credit rate increase is 10 percentage points.

(6) *Domestic content increase in credit rate*—(i) *In general.* In the case of any qualified facility or EST that satisfies the requirements of section 45(b)(9)(B) (domestic content requirement), the applicable percentage under section 48E(a)(2) and paragraph (b)(2) of this section will be increased by the applicable credit rate increase described in paragraph (b)(6)(ii) of this section.

(ii) *Applicable credit rate increase.* In the case of any qualified investment with respect to a qualified facility or EST to which the base rate is applicable, 2 percentage points, and with respect to any qualified investment with respect to a qualified facility or EST to which the alternative rate is applicable, 10 percentage points.

(c) *Credit phase-out*—(1) *In general.* The amount of the credit as determined under section 48E(a) and paragraph (b) of this section for any qualified facility or EST, the construction of which begins during a calendar year described in section 48E(e)(2) and paragraph (c)(2) of this section is equal to the product of—

(i) The amount of the credit determined under section 48E(a) and paragraph (b) of this section without regard to section 48E(e) and paragraph (c) of this section; multiplied by

(ii) The phase-out percentage under section 48E(e)(2) and paragraph (c)(2) of this section.

(2) *Phase-out percentage.* The phase-out percentage under this paragraph (c)(2) is equal to—

(i) For any qualified investment with respect to any qualified facility or EST the construction of which begins during the first calendar year following the applicable year, 100 percent;

(ii) For any qualified investment with respect to any qualified facility or EST the construction of which begins during the second calendar year following the applicable year, 75 percent;

(iii) For any qualified investment with respect to any qualified facility or EST the construction of which begins during the third calendar year following the applicable year, 50 percent; and

(iv) For any qualified investment with respect to any qualified facility or EST the construction of which begins during any calendar year subsequent to the calendar year described in paragraph (c)(2)(iii) of this section, 0 percent.

(3) *Applicable year.* For purposes of this paragraph (c), the term *applicable year* has the same meaning provided under § 1.45Y–1(c)(3).

(d) *Related taxpayers*—(1) *Definition.* For purposes of the section 48E credit, the term *related taxpayers* means members of a group of trades or businesses that are under common control (as defined in § 1.52–1(b)).

(2) *Related taxpayer rule.* For purposes of the section 48E credit, related taxpayers are treated as one taxpayer in determining whether a taxpayer has made an investment in a qualified facility or EST with respect to which a section 48E credit may be determined.

(e) *Applicability date.* This section applies to qualified facilities and ESTs placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

§ 1.48E–2 Qualified investments in qualified facilities and EST for purposes of section 48E.

(a) *Qualified investment with respect to a qualified facility*—(1) *In general.* A *qualified investment* of a taxpayer for a taxable year with respect to a qualified facility is the total basis amount for the taxable year with respect to the qualified facility.

(2) *Total basis amount.* The *total basis amount* is the sum of:

(i) The basis of any qualified property that is a part of the qualified facility and that is placed in service by the taxpayer during the taxable year; plus

(ii) The amount of any expenditures paid or incurred by the taxpayer for qualified interconnection property (as defined in section § 1.48E–4(a)(2)) in connection with a qualified facility which has a maximum net output of not greater than five megawatts (as measured in alternating current), that was placed in service during the taxable year of the taxpayer, and that are properly chargeable to the capital account.

(b) *Qualified facility*—(1) *In general.* A qualified facility is a facility that:

(i) Is used for the generation of electricity, meaning that it is a net generator of electricity taking into account any electricity consumed by the facility;

(ii) Is placed in service by the taxpayer after December 31, 2024; and

(iii) Has an anticipated greenhouse gas emissions rate of not greater than zero (as determined under the rules provided in § 1.48E–5).

(2) *Placed in service*—(i) *In general.* A qualified facility is considered placed in service in the earlier of:

(A) The taxable year in which, under the taxpayer's depreciation practice, the period for depreciation with respect to such qualified facility begins; or

(B) The taxable year in which the qualified facility is placed in a condition or state of readiness and availability to produce electricity, whether in a trade or business or in the production of income. A qualified facility in a condition or state of readiness and availability to produce electricity includes, but is not limited to, components of property that are acquired and set aside during the taxable year for use as replacements for a particular qualified facility (or facilities) in order to avoid operational time loss and equipment that is acquired for a specifically assigned function and is operational but is undergoing testing to eliminate any defects. However, components of property acquired to be used in the construction of a qualified facility are not considered in a condition or state of readiness and availability for a specifically assigned function.

(ii) *Qualified facility subject to § 1.48–4 election to treat lessee as purchaser.* Notwithstanding paragraph (b)(2)(i) of this section, a qualified facility with respect to which an election is made under section 50(d)(5) of the Code and § 1.48–4 to treat the lessee as having purchased such qualified facility is considered placed in service by the lessor in the taxable year in which possession is transferred to such lessee.

(c) *Qualified property*—(1) *In general.* For purposes of this paragraph (c), the term *qualified property* means all property owned by the taxpayer that meets all of the requirements of paragraphs (c)(1)(i) through (iii) of this section:

(i) The property is tangible personal property (as defined in paragraph (e)(1) of this section) or other tangible property (as defined in paragraph (e)(2) of this section) but only if such other tangible property is used as an integral part of the qualified facility;

(ii) Depreciation (or amortization in lieu of depreciation) is allowable (as defined in paragraph (e)(3) of this section) with respect to the property; and

(iii) Either—

(A) The construction, reconstruction, or erection of the property is completed by the taxpayer (as defined in paragraph (e)(4) of this section) with respect to the property; or

(B) The taxpayer acquires the property (as defined in paragraph (e)(5) of this section) and the original use of the property (as defined in paragraph (e)(6) of this section) commences with the taxpayer.

(2) *Location of property.* Any component of qualified property that otherwise satisfies the requirements of this paragraph (c) is part of a qualified facility regardless of where such component is located.

(d) *Property included in qualified facility*—(1) *In general.* A qualified facility includes a unit of a qualified facility (as defined in paragraph (d)(2) of this section) owned by the taxpayer. A qualified facility also includes components of qualified property owned by the taxpayer that are an integral part (as defined in paragraph (d)(3) of this section) of the qualified facility. Any component of qualified property that meets the requirements of this paragraph (d) is part of a qualified facility regardless of where such component of qualified property is located. A qualified facility does not include any electrical transmission equipment, such as electrical transmission lines and towers, or any equipment beyond the electrical transmission stage. *See* § 1.48E–4(b) regarding the Incremental Production Rule and § 1.48E–4(c) for rules regarding a retrofitted qualified facility (80/20 rule).

(2) *Unit of a qualified facility*—(i) *In general.* For purposes of the section 48E credit, a unit of a qualified facility includes all functionally interdependent components of property (as defined in paragraph (d)(2)(ii) of this section) owned by the taxpayer that are operated together and that can operate apart from other property to produce electricity. No provision of this section, § 1.48E–1, or §§ 1.48E–3 through 1.48E–5 uses the term *unit* in respect of a qualified facility with any meaning other than that provided in this paragraph (d)(2)(i).

(ii) *Functionally interdependent.* Components of property are functionally interdependent if the placing in service of each of the components is dependent upon the placing in service of the other components to generate electricity.

(3) *Integral part*—(i) *In general.* For purposes of the section 48E credit, a

component of property owned by a taxpayer is an integral part of a qualified facility if it is used directly in the intended function of the qualified facility and is essential to the completeness of such function. Property that is an integral part of a qualified facility is part of the qualified facility. A taxpayer may not claim the section 48E credit for any property not owned by the taxpayer that is an integral part of the qualified facility owned by the taxpayer.

(ii) *Power conditioning and transfer equipment.* Power conditioning equipment and transfer equipment are integral parts of a qualified facility. Power conditioning equipment includes, but is not limited to, transformers, inverters and converters, which modify the characteristics of electricity into a form suitable for use, transmission, or distribution. Parts related to the functioning or protection of power conditioning equipment are also treated as power conditioning equipment and include, but are not limited to, switches, circuit breakers, arrestors, and hardware used to monitor, operate, and protect power conditioning equipment. Transfer equipment includes components of property that allow for the aggregation of electricity generated by a qualified facility and components of property that alter voltage to permit electricity to be transferred to a transmission or distribution line. Transfer equipment does not include transmission or distribution lines. Examples of transfer equipment include, but are not limited to, wires, cables, and combiner boxes that conduct electricity. Parts related to the functioning or protection of transfer equipment are also treated as transfer equipment and may include items such as current transformers used for metering, electrical interrupters (such as circuit breakers fuses, and other switches) and hardware used to monitor, operate, and protect transfer equipment.

(iii) *Roads.* Roads that are integral to the intended function of the qualified facility such as onsite roads that are used to operate and maintain the qualified facility are an integral part of a qualified facility. Roads used primarily to access the site, or roads used primarily for employee or visitor vehicles, are not integral to the intended function of the qualified facility, and thus are not an integral part of a qualified facility.

(iv) *Fences.* Fencing is not an integral part of a qualified facility because it is not integral to the intended function of the qualified facility.

(v) *Buildings.* Generally, buildings are not integral parts of a qualified facility because they are not integral to the intended function of the qualified facility. For purposes of section 48E, a structure that is essentially an item of machinery or equipment is not considered a building. In addition, a structure is not a building if it houses components of property that are integral to the intended function of the qualified facility and if the use of the structure is so closely related to the use of the housed components of property therein that the structure clearly can be expected to be replaced if the components of property it initially houses are replaced.

(vi) *Shared integral property.* Multiple qualified facilities (whether owned by one or more taxpayers), including qualified facilities with respect to which a taxpayer has claimed a credit under section 48E or another Federal income tax credit, may include shared property that may be considered an integral part of each qualified facility so long as the cost basis for the shared property is properly allocated to each qualified facility and the taxpayer only claims a section 48E credit with respect to the portion of the cost basis properly allocable to a qualified facility for which the taxpayer is claiming a section 48E credit. The total cost basis of such shared property divided among the qualified facilities may not exceed 100 percent of the cost of such shared property. In addition, a component of property that is shared by a qualified facility as defined by section 48E(b)(3) (48E Qualified Facility) and a qualified facility as defined in section 45Y(b) (45Y Qualified Facility) that is an integral part of both qualified facilities will not affect the eligibility of the 48E Qualified Facility for the section 48E credit or the 45Y Qualified Facility for the section 45Y credit.

(vii) *Examples.* This paragraph (d)(3)(vii) provides examples illustrating the rules of this paragraph (d).

(A) *Example 1. Co-located qualified facilities owned by the same taxpayer that share integral property.* X constructs and owns a solar facility (Solar Facility) and nearby also constructs and owns a wind facility (Wind Facility) that are each a qualified facility. The Solar Facility and Wind Facility each connect to a shared transformer that steps up the electricity produced by each qualified facilities to electrical grid voltage before it is transmitted to the electrical grid through an intertie. X assigns 50% of the cost of the shared transformer to the Solar Facility and the Wind Facility, respectively. The fact that the Solar Facility and Wind Facility share property that is integral to both does not impact the ability of X to claim a section 48E credit for both qualified facilities. When X places the qualified facilities in service, 50% of the cost of the transformer is included in X's basis in each of the qualified facilities for purposes of computing the section 48E credit.

(B) *Example 2. Co-located qualified facilities owned by different taxpayers that share integral property.* X constructs and owns a solar facility (Solar Facility), and nearby Y constructs and owns a wind facility (Wind Facility) that are each a qualified facility. The Solar Facility and the Wind Facility both connect to a shared transformer that steps up the electricity produced by both qualified facilities to electrical grid voltage before it is transmitted to the electrical grid through an intertie. X and Y each pay 50% of the cost of the shared transformer. The fact that the Solar Facility and Wind Facility share property that is integral to both does not impact the ability of X or Y to claim a section 48E credit for their respective qualified facilities. When X and Y place their respective qualified facilities in service, 50% of the cost of the transformer is included in X's and Y's basis in their respective qualified facilities for purposes of computing the section 48E credit.

(C) *Example 3. Co-located qualified facility and Energy Storage Technology (EST) owned by the same taxpayer.* X constructs and owns a wind facility (Wind Facility) that is co-located with an EST that X also constructs and owns. The Wind Facility and EST share transfer equipment that is integral to both. X assigns 50% of the cost of the shared transfer equipment to the Wind Facility and 50% of the cost to the EST. The fact that the Wind Facility and EST share property that is integral to both does not impact the ability of X to claim a section 48E credit for the Wind Facility and the EST. X may include 50% of the cost of the transfer equipment in its basis to determine a section 48E credit for the Wind Facility and the EST.

(D) *Example 4. Co-located qualified facility and Energy Storage Technology owned by different taxpayers.* X constructs and owns a solar facility that is a qualified facility (Solar Facility) and is co-located with an EST constructed and owned by Y. The Solar Facility and EST share transfer equipment that is integral to both. X and Y each incur 50% of the cost of the transfer equipment. The fact that the Solar Facility and EST share property that is integral to both does not impact the

ability of X to claim a section 48E credit for the Solar Facility or Y to claim a section 48E credit for the EST. When X and Y place in service the Solar Facility and EST, for purposes of computing the section 48E credit, 50% of the cost of the transfer equipment is included in X's basis in the Solar Facility and 50% of the cost is included in Y's basis in the EST.

(E) *Example 5. Qualified facility with integral property owned by a different taxpayer.* X constructs and owns a hydropower production facility that is a qualified facility (Hydropower Facility). The Hydropower Facility connects to a dam owned by Y, a government entity, that is an integral part of the Hydropower Facility. X pays for upkeep of the dam. The fact that X does not own the dam does not impact the ability of X to claim a section 48E credit for the Hydropower Facility. When X places in service the Hydropower Facility, for purposes of computing the section 48E credit, the cost incurred by X related to the dam would not be included in X's basis in the Qualified Facility because X does not own the dam.

(e) *Definitions related to requirements for qualified property*—(1) *Tangible personal property.* The term *tangible personal property* means any tangible property except land or improvements thereto, such as buildings or other inherently permanent structures (including items that are structural components of such buildings or structures. Tangible personal property includes all property (other than structural components) that is contained in or attached to a building. Further, all property that is in the nature of machinery (other than structural components of a building or other inherently permanent structure) is considered tangible personal property even though located outside a building. Machinery located outside of a building is qualified property if it is used for the generation of electricity and the components of machinery are functionally interdependent. Local law does not control whether property is tangible property or is tangible personal property for purposes of the section 48E credit. Thus, tangible property may be tangible personal property for purposes of the section 48E credit even though under local law the property is considered a fixture and therefore is real property under local law.

(2) *Other tangible property.* The term *other tangible property* means tangible property other than tangible personal property (not including a building and its structural components) that is used as an integral part of furnishing electricity by a person engaged in a trade or business of furnishing any such service. Other tangible property may be tangible property for purposes of the section 48E credit even though under local law the property is considered a fixture and is therefore real property under local law.

(3) *Depreciation allowable*—(i) *In general.* For purposes of applying paragraph (c) of this section, depreciation (or amortization in lieu of depreciation) (collectively, *depreciation*) is allowable with respect to the property if such property is of a character subject to the allowance for depreciation under section 167 of the Code and the basis or cost of such property is recovered using a method of depreciation (for example, the straight line method), which includes any additional first year depreciation deduction method of depreciation (for example, under section 168(k) of the Code). Further, if an adjustment with respect to the Federal income tax or Federal return, as appropriate, for such taxable year requires the basis or cost of such qualified property to be recovered using a method of depreciation, depreciation is allowable to the taxpayer with respect to the qualified property.

(ii) *Exclusions from allowable.* For purposes of paragraph (c) of this section, depreciation is not allowable with respect to a qualified facility if the basis or cost of such qualified facility is not recovered through a method of depreciation but, instead, such basis or cost is recovered through a deduction of the full basis or cost of the qualified facility in one taxable year (for example, under section 179 of the Code).

(4) *Construction, reconstruction, or erection of the property.* The term *construction, reconstruction, or erection of the property* means work performed to construct, reconstruct, or erect property either by the taxpayer or for the taxpayer in accordance with the taxpayer's specifications.

(5) *Acquisition of qualified property.* The term *acquisition of qualified property* means a transaction by which a taxpayer acquires the rights and obligations to establish tax ownership of the property for Federal tax purposes.

(6) *Original use of the property.* The term *original use of the property* means the first use to which the unit of property is put, whether or not such use is by the taxpayer.

(7) *Retrofitted qualified facility.* A retrofitted qualified facility acquired by the taxpayer will not be treated as being put to original use by the taxpayer unless the rules in § 1.48E–4(c) regarding retrofitted qualified facilities (80/20 Rule) apply. The question of whether a qualified facility meets the 80/20 Rule is a facts and circumstances determination.

(f) *Coordination with other credits*—(1) *In general.* The term *qualified facility* (as defined in section 48E(b)(3)) and paragraph (b) of this section does not include any facility for which a credit determined under section 45, 45J, 45Q, 45U, 45Y, 48, or 48A is allowed under section 38 of the Code for the taxable year or any prior taxable year. A taxpayer that directly owns a qualified facility (as defined in section 48E(b)(3)) for which the taxpayer is eligible for both a section 48E credit and another Federal income tax credit is eligible for the section 48E credit only if the other Federal income tax credit was not allowed to the taxpayer with respect to the qualified facility. Nothing in this paragraph (f) precludes a taxpayer from claiming a section 48E credit with respect to a qualified facility (as defined in section 48E(b)(3)) that is co-located with another facility for which a credit determined under section 45, 45J, 45Q, 45U, 45Y, 48, or 48A is allowed under section 38 of the Code for the taxable year or any prior taxable year.

(2) *Allowed.* For purposes of this paragraph (f), the term *allowed* only includes credits that taxpayers have claimed on a Federal income tax return or Federal return, as appropriate, and that the Internal Revenue Service (IRS) has not challenged in terms of the taxpayer's eligibility.

(3) *Examples.* This paragraph (f)(3) provides examples illustrating the rules provided in this paragraph (f).

(i) *Example 1. Taxpayer claims a section 45Y credit on a solar farm and section 48E credit on co-located Energy Storage Technology.* X owns a solar farm that is a qualifying facility (as defined in § 1.45Y–2(a)) (Solar Qualified Facility), and a co-located EST (Energy Storage). The Energy Storage is not part of the Solar Qualified Facility, and therefore X may claim the section 45Y credit based on the kWh of electricity produced by the Solar Qualified Facility, and X may also claim the section 48E credit based on its qualified investment in the Energy Storage.

(ii) *Example 2. Different taxpayers claim a section 45Y credit for a solar farm and a co-located Energy Storage Technology.* X owns a solar farm that is a qualifying facility (as defined in § 1.45Y–2(a)) (Solar Qualified Facility), and Y owns a co-located EST (Energy Storage). The Energy Storage is not part of the Solar Qualified Facility, and therefore, X may claim the section 45Y credit based on the kWh of electricity produced by the Solar Qualified Facility, and Y may claim the section

48E credit based on its qualified investment in the Energy Storage.

(iii) *Example 3. Taxpayer claiming a section 48E credit; another credit is not allowed.* X owns a wind facility that satisfies the requirements of a qualified facility under section 48E as well as the requirements of a qualified facility as defined in § 1.45Y–2(a) under section 45Y. X claims a section 45Y credit with respect to the wind facility. While a credit may be available with regard to the wind facility under section 48E, because X has already claimed a section 45Y credit with respect to the wind facility, a section 48E credit is not allowed. Local law is not controlling for purposes of determining whether property is or is not tangible property or tangible personal property. Thus, tangible property may be personal property for purposes of the energy credit even though under local law the property is considered a fixture and therefore real property.

(iv) *Example 4. Interaction of section 48E and section 45Q credits for single qualified facility.* X owns a qualified facility (Facility A) that includes carbon capture equipment, which is needed for the facility to meet the zero greenhouse gas requirement, so it is functionally interdependent to the production of electricity by the Facility A. X uses the carbon capture equipment to capture and utilize (as described in section 45Q(f)(5)) qualified carbon dioxide and claimed a section 45Q credit in the current taxable year. As a result, X cannot claim a section 48E credit for its 48E Facility A because a qualified facility does not include a facility for which a credit determined under section 45Q is allowed.

(v) *Example 5. Interaction of section 48E and section 45Q credits for co-located qualified facilities.* Assume the same facts as in paragraph (f)(3)(iv) of this section (Example 4), except that X owns a co-located qualified facility (Facility B) that also includes carbon capture equipment, which is needed for the facility to meet the zero greenhouse gas requirement, so it is functionally interdependent to the production of electricity by the Facility B. X uses the carbon capture equipment to capture and utilize (as described in section 45Q(f)(5)) qualified carbon dioxide, but does not claim a section 45Q credit with respect to the Facility B. While X claimed a section 45Q credit in the current taxable year for the Facility A (see Example 4), the Facility B is not part of the Facility A, and, therefore, X may claim the section 48E credit for its Facility B.

(g) *EST*—(1) *Property included in EST.* An EST includes a unit of energy storage technology (unit of EST) (as defined in paragraph (g)(2) of this section) that meets the requirements of paragraph (g)(2)(ii) of this section. An EST also includes property owned by the taxpayer that is an integral part (as defined in paragraph (g)(3) of this section) of the EST. An EST does not include equipment that is an addition or modification to an existing EST. For purposes of the section 48E credit, EST includes electrical energy storage property (as described in paragraph (g)(6)(i) of this section), thermal energy storage property (as described in paragraph (g)(6)(ii) of this section), and hydrogen energy storage property (as described in paragraph (g)(6)(iii) of this section).

(2) *Unit of EST*—(i) *In general.* For purposes of the section 48E credit, a unit of EST includes all functionally interdependent components of property (as defined in paragraph (g)(2)(ii) of this section) owned by the taxpayer that are operated together and that can operate apart from other property to perform the intended function of the EST. No provision of this section, § 1.48E–1, or §§ 1.48E–3 through 1.48E–5 uses the term *unit* in respect of an EST with any meaning other than that provided in this paragraph (g)(2)(i).

(ii) *Functionally interdependent.* Components of property are functionally interdependent if the placing in service of each of the components is dependent upon the placing in service of each of the other components to perform the intended function of the EST.

(3) *Integral part.* For purposes of the section 48*E* credit, property owned by a taxpayer is an integral part of an EST owned by the same taxpayer if it is used directly in the intended function of the EST and is essential to the completeness of such function. Property that is an integral part of an EST is part of that EST. A taxpayer may not claim the section 48E credit for any property not owned by the taxpayer that is an integral part of EST owned by the taxpayer.

(4) *Qualified investment with respect to EST.* The qualified investment with respect to any EST for any taxable year is the basis of any EST placed in service by the taxpayer during such taxable year.

(5) *Placed in service*—(i) *In general.* An EST is considered placed in service in the earlier of:

(A) The taxable year in which, under the taxpayer's depreciation practice, the period for depreciation with respect to such EST begins; or

(B) The taxable year in which the EST is placed in a condition or state of readiness and availability for the intended function of the EST, whether in a trade or business or in the production of income. An EST in a condition or state of readiness and availability for its intended function includes, but is not limited to, components of property that are acquired and set aside during the taxable year for use as replacements for a particular EST (or ESTs) in order to avoid operational time loss and equipment that is acquired for a specifically assigned function and is operational but is undergoing testing to eliminate any defects. However, components of property acquired to be used in the construction of an EST are not considered in a condition or state of readiness and availability for a specifically assigned function.

(ii) *EST subject to § 1.48–4 election to treat lessee as purchaser.* Notwithstanding paragraph (g)(5)(i) of this section, EST with respect to which an election is made under section 50(d)(5) of the Code and § 1.48–4 to treat the lessee as having purchased such EST is considered placed in service by the lessor in the taxable year in which possession is transferred to such lessee.

(6) *Types of EST*—(i) *Electrical energy storage property.* Electrical energy storage property is property (other than property primarily used in the transportation of goods or individuals and not for the production of electricity) that receives, stores, and delivers energy for conversion to electricity, and has a nameplate capacity of not less than 5 kWh. For example, subject to the exclusion for property primarily used in the transportation of goods or individuals, electrical energy storage property includes but is not limited to rechargeable electrochemical batteries of all types (such as lithium-ion, vanadium redox flow, sodium sulfur, and lead-acid); ultracapacitors; physical storage such as pumped storage hydropower, compressed air storage, flywheels; and reversible fuel cells.

(ii) *Thermal energy storage property*—(A) *In general.* Thermal energy storage property is property comprising a system that is directly connected to a heating, ventilation, or air conditioning (HVAC) system; removes heat from, or adds heat to, a storage medium for subsequent use; and provides energy for the heating or cooling of the interior of a residential or commercial building. Thermal energy storage property includes equipment and materials, and parts related to the functioning of such equipment, to store thermal energy for later use to heat or cool, or to provide hot water for use in heating a residential or commercial building. It does not

include property that transforms other forms of energy into heat in the first instance. Property that ''removes heat from, or adds heat to, a storage medium for subsequent use'' is property that is designed with the particular purpose of substantially altering the time profile of when heat added to or removed from the thermal storage medium can be used for heating or cooling of the interior of a residential or commercial building. Paragraph (g)(6)(ii)(B) of this section provides a safe harbor for determining whether a thermal energy storage property has such a purpose. Thermal energy storage property does not include a swimming pool, combined heat and power system property (as defined in section 45Y(g)(2)), or a building or its structural components. For example, thermal energy storage property includes, but is not limited to, a system that adds heat to bricks heated to high temperatures that later use this stored energy to heat a building through the HVAC system; thermal ice storage systems that use electricity to run a refrigeration cycle to produce ice that is later connected to the HVAC system as an exchange medium for air conditioning a building, heat pump systems that store thermal energy in an underground tank, an artificial pit, an aqueous solution, a borehole field, or a solid-liquid phase change material to be extracted for later use for heating and/or cooling; and air-to-water heat pump systems with a water storage tank. However, consistent with § 1.48–14(d), if thermal energy storage property, such as a heat pump system, includes equipment, such as a heat pump, that also serves a purpose in an HVAC system that is installed in connection with the thermal energy storage property, the taxpayer's qualified investment with respect to the thermal energy storage property includes the total cost of the thermal energy storage property and HVAC system less the cost of an HVAC system without thermal storage capacity that would meet the same functional heating or cooling needs as the heat pump system with a storage medium, other than time shifting of heating or cooling. *See* § 1.48–14(h) for application of the Incremental Cost Rule.

(B) *Safe harbor.* A thermal energy storage property will be deemed to have the purpose of substantially altering the time profile of when heat added to or removed from the thermal storage medium can be used to heat or cool the interior of a residential or commercial building if that thermal energy storage property is capable of storing energy that is sufficient to provide heating or cooling of the interior of a residential or commercial building for a minimum of one hour.

(iii) *Hydrogen energy storage property.* Hydrogen energy storage property is property (other than property primarily used in the transportation of goods or individuals and not for the production of electricity) that stores hydrogen and has a nameplate capacity of not less than 5 kWh, equivalent to 0.127 kg of hydrogen or 52.7 standard cubic feet (scf) of hydrogen. Hydrogen energy storage property includes, but is not limited to, above ground storage tanks, underground storage facilities, and associated compressors. Property that is an integral part of hydrogen energy storage property includes, but is not limited to, hydrogen liquefaction equipment and gathering and distribution lines within a hydrogen energy storage property.

(7) *Modification of EST.* With respect to an electrical energy storage property or a hydrogen energy storage property, modified as set forth in this paragraph (g)(7), such property will be treated as an electrical energy storage property (as described in paragraph (g)(6)(i) of this section) or a hydrogen energy storage property (as described in paragraph (g)(6)(iii) of this section), except that the basis of any existing electrical energy storage property or hydrogen energy storage property prior to such modification is not taken into account for purposes of this paragraph (g)(7) and section 48E. This paragraph (g)(7) applies to any electrical energy storage property and hydrogen energy storage property that either:

(i) Was placed in service before August 16, 2022, and would be described in section 48(c)(6)(A)(i), except that such property had a nameplate capacity of less than 5 kWh and is modified in a manner that such property (after such modification) has a nameplate capacity of not less than 5 kWh; or

(ii) Is described in section 48(c)(6)(A)(i) and is modified in a manner that such property (after such modification) has an increase in nameplate capacity of not less than 5 kWh. The increase in nameplate capacity is equal to the difference between nameplate capacity immediately after the modification and nameplate capacity immediately prior to the modification.

(h) *Applicability date.* This section applies to qualified facilities and EST placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

§ 1.48E–3 Rules relating to the increased credit for prevailing wage and apprenticeship.

(a) *In general.* If any qualified facility or EST satisfies the requirements in paragraph (b) of this section, the applicable percentage used for calculating the amount of the credit for a qualified investment determined under section 48E(a) for the taxable year equals 30 percent.

(b) *Qualified facility or EST requirements.* A qualified facility or EST satisfies the requirements of this paragraph (b) if it is a facility described in one of paragraphs (b)(1) through (6) of this section:

(1) A qualified facility with a maximum net output of less than one megawatt of electrical energy (as measured in alternating current) based on the nameplate capacity as provided in paragraph (c) of this section (One Megawatt Exception);

(2) A qualified facility the construction of which began prior to January 29, 2023;

(3) A qualified facility that meets the prevailing wage requirements of section 48E(d)(3) and §§ 1.45–7(a)(2) and (3) and (b) through (d) and 1.48–13(c), the apprenticeship requirements of section 45(b)(8) and § 1.45–8, and the recordkeeping and reporting requirements of § 1.45–12;

(4) An EST with a capacity of less than one megawatt based on the nameplate capacity as provided in paragraph (c) of this section (EST One Megawatt Exception);

(5) An EST the construction of which began prior to January 29, 2023; or

(6) An EST that satisfies the prevailing wage requirements of section 48E(d)(3) and §§ 1.45–7(a)(2) and (3) and (b) through (d) and 1.48–13(c), the apprenticeship requirements of section 45(b)(8) and § 1.45–8, and the recordkeeping and reporting requirements of § 1.45–12.

(c) *Nameplate capacity for purposes of the One Megawatt Exception*—(1) *Qualified facilities.* For purposes of paragraph (b)(1) of this section, whether a qualified facility has a maximum net output of less than 1 megawatt (MW) of electrical energy (as measured in alternating current) is determined based on the nameplate capacity of the facility. If a qualified facility has integrated operations (as defined in paragraph (c)(4)(i) of this section) with one or more other qualified facilities, then the aggregate nameplate capacity of the qualified facilities is used for the purposes of determining if the qualified facilities satisfy the One Megawatt Exception. If applicable, taxpayers should use the International Standard

Organization (ISO) conditions to measure the maximum electrical generating output of a facility.

(2) *Nameplate capacity for qualified facilities that generate in direct current for purposes of the One Megawatt Exception.* For qualified facilities that generate electricity in direct current, the taxpayer determines the maximum net output (in alternating current) of each unit of qualified facility by using the lesser of:

(i) The sum of the nameplate generating capacities within the unit of qualified facility in direct current, which is deemed the nameplate generating capacity of the unit of qualified facility in alternating current; or

(ii) The nameplate capacity of the first component of property that inverts the direct current electricity into alternating current.

(3) *EST*—(i) *In general.* Paragraphs (c)(3)(ii) through (iv) of this section provide rules for applying the EST One Megawatt Exception described in paragraph (b)(4) of this section to different types of energy storage properties. If the EST has integrated operations (as defined in paragraph (c)(4)(ii) of this section) with one or more other ESTs, then the aggregate nameplate capacity of the ESTs is used for the purposes of the EST One Megawatt Exception. If applicable, taxpayers should use the ISO conditions to measure the maximum net output of an EST.

(ii) *Electrical energy storage property.* In the case of electrical energy storage property (as defined in § 1.48E–2(g)(6)(i)), the EST One Megawatt Exception is determined by using the storage device's maximum net output. If the output of electrical energy storage property is in direct current, taxpayer should apply the rules of paragraph (c)(2) of this section.

(iii) *Thermal energy storage property.* In the case of thermal energy storage property (as defined in § 1.48E–2(g)(6)(ii)), the EST One Megawatt Exception is determined by using the property's maximum net output. The maximum net output in MW is calculated by using a conversion whereby one MW is equal to 3.4 million British Thermal Units per hour (mmBtu/hour) for heating and 284 tons for cooling (Btu per hour/3,412,140 = MW). The maximum net output is the maximum instantaneous rate of discharge and is determined based on the nameplate capacity of the equipment that generates or distributes thermal energy for productive use (including distributing the thermal energy from the storage medium). For purposes of determining the maximum net output of thermal energy storage property, if the nameplate capacity of the thermal energy storage is not available, the nameplate capacity of the equipment delivering thermal energy to the thermal energy storage may be used. For thermal energy storage property distributing thermal energy to a building or buildings, the nameplate capacity can be assessed as either the aggregate maximum thermal capacity of all individual heating or cooling elements within the building or buildings, or as the maximum thermal output that the thermal energy storage property is capable of delivering to a building or buildings at any given moment. The maximum thermal capacity of an entire thermal energy storage property is capable of delivering at any given moment does not take into account the capacity of redundant equipment if such equipment is not operated when the system is at maximum output during normal operation. For thermal energy storage property and other energy property that generates or distributes thermal energy for a productive use, the maximum thermal capacity that the entire system is capable of delivering is considered to be the greater of the rate of cooling or the rate of heating of the aggregate of the nameplate capacity of the equipment distributing energy for productive use, including distributing the thermal energy from the thermal energy storage medium to the building or buildings. If such nameplate capacity is unavailable, in the case of thermal energy storage property only, the maximum thermal capacity may instead be considered to be the greater of the rate of cooling or the rate of heating of the aggregate of the nameplate capacity of all the equipment delivering energy to the thermal energy storage property in the project.

(iv) *Hydrogen energy storage property.* In the case of a hydrogen energy storage property (as defined in § 1.48E–2(g)(6)(iii)), the EST One Megawatt Exception is determined by using the property's maximum net output. The maximum net output in MW is calculated by using a conversion whereby one MW is equal to 3.4 mmBtu/hour of hydrogen or equivalently 10,500 standard cubic feet (scf) per hour of hydrogen.

(4) *Integrated operations*—(i) *One Megawatt Exception.* Solely for the purposes of the One Megawatt Exception described in paragraph (b)(1) of this section, a qualified facility is treated as having *integrated operations* with any other qualified facility of the same technology type if the facilities are:

(A) Owned by the same or related taxpayers;

(B) Placed in service in the same taxable year; and

(C) Transmit electricity generated by the facilities through the same point of interconnection or, if the facilities are not grid-connected or are delivering electricity directly to an end user behind a utility meter, are able to support the same end user.

(ii) *EST One Megawatt Exception.* Solely for the purposes of the EST One Megawatt Exception described in paragraph (b)(4) of this section, an EST is treated as having *integrated operations* with any other EST of the same technology type if the ESTs are:

(A) Owned by the same or related taxpayers;

(B) Placed in service in the same taxable year; and

(C) Transmit energy through the same point of interconnection or, if the ESTs are not grid-connected or are providing storage directly to an end user behind a utility meter, are able to support the same end user. In the case of EST described in paragraphs (c)(3)(iii) and (iv) of this section, which use the same piping and distribution systems for the respective type of EST.

(d) *Transition waiver of penalty for prevailing wage requirements.* For purposes of the transition waiver described in § 1.48–13(c)(2) (by reference to § 1.45–7(c)(6)(iii)), the penalty payment required by § 1.45–7(c)(1)(ii) to cure a failure to satisfy the prevailing wage requirements in paragraph (b)(3) or (6) of this section is waived with respect to a laborer or mechanic who performed work in the construction, alteration, or repair of an energy project on or after January 29, 2023, and prior to January 15, 2025, if the taxpayer relied upon Notice 2022–61, 2022–52 I.R.B. 560, or the PWA proposed regulations (REG–100908–23) (88 FR 60018), corrected in 88 FR 73807 (Oct. 27, 2023), corrected in 89 FR 25550 (April 11, 2024), to determine when the activities of any laborer or mechanic became subject to the prevailing wage requirements, and the taxpayer makes the correction payments required by § 1.45–7(c)(1)(i) with respect to such laborer and mechanics within 180 days of January 15, 2025.

(e) *No alteration or repair during recapture period described in § 1.48–13(c)(3).* If no alteration or repair work occurs during the five-year recapture period, the taxpayer is deemed to satisfy the prevailing wage requirements described in paragraph (b)(3) or (6) of this section with respect to such taxable year.

(f) *Applicability date.* This section applies to qualified facilities and qualified ESTs placed in service in taxable years ending after January 15, 2025, and the construction of which begins after March 17, 2025. Taxpayers may apply this section to qualified facilities and qualified ESTs placed in service in taxable years ending on or after January 15, 2025, the construction of which begins before January 15, 2025, provided that taxpayers follow this section in its entirety and in a consistent manner.

§ 1.48E–4 Rules of general application.

(a) *Qualified interconnection costs included in certain lower-output qualified facilities*—(1) *In general.* For purposes of determining the section 48E credit (as defined in § 1.48E–1(a)), the qualified investment with respect to a qualified facility (as defined in § 1.48E–2(a)) includes amounts paid or incurred by the taxpayer for qualified interconnection property (as defined in paragraph (a)(2) of this section), in connection with a qualified facility (as defined in § 1.48E–2(a)) that has a maximum net output of not greater than 5 MW (as measured in alternating current) as described in paragraph (a)(3) of this section (Five-Megawatt Limitation). The qualified interconnection property must provide for the transmission or distribution of the electricity produced by a qualified facility and must be properly chargeable to the capital account of the taxpayer as reduced by paragraph (a)(6) of this section. If the costs borne by the taxpayer are reduced by utility or non-utility payments, Federal income tax principles may require the taxpayer to reduce the amounts of costs treated as paid or incurred for qualified interconnection property to determine a section 48E credit.

(2) *Qualified interconnection property.* For purposes of this paragraph (a), the term *qualified interconnection property* means, with respect to a qualified facility, any tangible property that is part of an addition, modification, or upgrade to a transmission or distribution system that is required at or beyond the point at which the qualified facility interconnects to such transmission or distribution system in order to accommodate such interconnection; is either constructed, reconstructed, or erected by the taxpayer (as defined in § 1.48E–2(e)(4)), or for which the cost with respect to the construction, reconstruction, or erection of such property is paid or incurred by such taxpayer; and the original use (as defined in § 1.48E–2(e)(6)) of which, pursuant to an interconnection agreement (as defined in paragraph (a)(4) of this section), commences with a utility (as defined in paragraph (a)(5) of this section). For purposes of determining the original use of interconnection property in the context of a sale-leaseback or lease transaction, the principles of section 50(d)(4) of the Internal Revenue Code (Code) must be taken into account, as applicable, with such original use determined on the date of the sale-leaseback or lease. Qualified interconnection property is not part of a qualified facility. As a result, qualified interconnection property is not taken into account in determining whether a qualified facility satisfies the requirements for the increase in credit rate for energy communities provided in section 48E(a)(3)(A) of the Code, the increase in credit rate for domestic content referenced in section 48E(a)(3)(B) (by reference to the rules of section 48(a)(12)) or the increase in credit rate for prevailing wage requirements referenced in section 48E(d)(3) and apprenticeship requirements referenced in section 48E(d)(4).

(3) *Five-Megawatt Limitation*—(i) *In general.* For purposes of this paragraph (a), the Five-Megawatt Limitation is measured at the level of the qualified facility in accordance with section 48E(b)(1)(B). The maximum net output of a qualified facility is measured only by nameplate generating capacity (in alternating current) of the unit of qualified facility, which does not include the nameplate capacity of any integral property, at the time the qualified facility is placed in service. The nameplate generating capacity of the unit of qualified facility is measured independently from any other qualified facilities that share the same integral property.

(ii) *Nameplate capacity for purposes of the Five-Megawatt Limitation.* For purposes of paragraph (a)(1) of this section, the determination of whether a qualified facility has a maximum net output of not greater than 5 MW (as measured in alternating current) is based on the nameplate capacity. The nameplate capacity for purposes of the Five-Megawatt Limitation is the maximum electrical generating output in megawatts that the unit of qualified facility is capable of producing on a steady state basis and during continuous operation under standard conditions, as measured by the manufacturer and consistent with the definition of nameplate capacity provided in 40 CFR 96.202. If applicable, taxpayers should use the International Standard Organization (ISO) conditions to measure the maximum electrical generating output of a unit of qualified facility.

(iii) *Nameplate capacity for qualified facilities that generate in direct current for purposes of the Five-Megawatt Limitation.* For qualified facilities that generate electricity in direct current, a taxpayer determines whether a qualified facility has a maximum net output of not greater than five MW (in alternating current) by using the lesser of:

(A) The sum of the nameplate generating capacities within the unit of qualified facility property in direct current, which is deemed the nameplate generating capacity of the unit of qualified facility property in alternating current; or

(B) The nameplate capacity of the first component of the qualified facility that inverts the direct current electricity into alternating current.

(4) *Interconnection agreement.* For purposes of this paragraph (a), the term *interconnection agreement* means an agreement with a utility for the purposes of interconnecting the qualified facility owned by such taxpayer to the transmission or distribution system of the utility. In the case of the election provided under section 50(d)(5) (relating to certain leased property), the term includes an agreement regarding a qualified facility leased by such taxpayer.

(5) *Utility.* For purposes of this paragraph (a), the term *utility* means the owner or operator of an electrical transmission or distribution system that is subject to the regulatory authority of a State or political subdivision thereof, any agency or instrumentality of the United States, a public service or public utility commission or other similar body of any State or political subdivision thereof, or the governing or ratemaking body of an electric cooperative.

(6) *Reduction to amounts chargeable to capital account.* In the case of costs paid or incurred for qualified interconnection property as defined in paragraph (a)(2) of this section, amounts otherwise chargeable to capital account with respect to such costs must be reduced under rules of section 50(c) (including section 50(c)(3)).

(7) *Examples.* This paragraph (a)(7) provides examples illustrating the application of the general rules provided in paragraph (a)(1) of this section and Five-Megawatt Limitation provided in this paragraph (a).

(i) *Example 1. Application of Five-Megawatt Limitation to an interconnection agreement for qualified facilities owned by taxpayer.* X places in service two solar qualified facilities (48E Facilities) each with a maximum net output of 5 MW (as measured in

alternating current by using the nameplate capacity of an inverter, which is the first component of property attached to each of the 48E Facilities that inverts the direct current electricity into alternating current). The two 48E Facilities each have their own inverter, which is integral property to each facility, and share a step-up transformer, which is integral property to both facilities. As part of the development of the 48E Facilities, interconnection costs are required by the utility to modify and upgrade the transmission system at or beyond the common intertie to the utility's transmission system to accommodate the interconnection. X has an interconnection agreement with the utility that allows for a maximum output of 10 MW (as measured in alternating current). The interconnection agreement provides the total cost to X of the qualified interconnection property. X may include the costs paid or incurred by X, respectively, for qualified interconnection property subject to the terms of the interconnection agreement, to calculate X's section 48E credit for each of the 48E Facilities because each qualified facility has a maximum net output of not greater than 5 MW (alternating current).

(ii) *Example 2. Application of Five-Megawatt Limitation to an interconnection agreement for qualified facilities owned by separate taxpayers.* X places in service a solar farm that is a qualified facility (as defined in § 1.48E–2(a)) (Solar Qualified Facility) with a maximum net output of 5 MW (as measured in alternating current by using the nameplate capacity of the first component of property attached to the Solar Qualified Facility that inverts the direct current electricity into alternating current). The Solar Qualified Facility includes an inverter, which is integral property. Y places in service a wind facility (as defined in § 1.48E–2(a)) (Wind Qualified Facility), with a maximum net output of 5 MW (as measured in alternating current by using the nameplate capacity of the first component of property attached to the Wind Qualified Facility that inverts the direct current electricity into alternating current). The Solar Qualified Facility and the Wind Qualified Facility share a step-up transformer, which is integral to both facilities. As part of the development of the Solar Qualified Facility and Wind Qualified Facility, interconnection costs are required by the utility to modify and upgrade the transmission system at or beyond the common intertie to the utility's transmission system to accommodate the interconnection. X and Y are party to the same interconnection agreement with the utility that allows for a maximum output of 10 MW (as measured in alternating current). The interconnection agreement provides the total cost of the qualified interconnection property to X and Y. X and Y may include the costs paid or incurred by X and Y, respectively, for qualified interconnection property subject to the terms of the interconnection agreement, to calculate their respective section 48E credits for the Solar Qualified Facility and the Wind Qualified Facility because each has a maximum net output of not greater than 5 MW (alternating current).

(iii) *Example 3. Application of Five-Megawatt Limitation to an interconnection agreement for a single qualified facility.* X develops three solar farms (Solar Qualified Facilities) located in close proximity. Each of the Solar Qualified Facilities is a unit of qualified facility that has a maximum net output of 4 MW. The nameplate capacity of each Solar Qualified Facility is determined by using the sum of the nameplate generating capacities within the unit of each Solar Qualified Facility in direct current, which is deemed the nameplate generating capacity of each Solar Qualified Facility in alternating current. Electricity from the three Solar Qualified Facilities feeds into a single gen-tie line and a common point of interconnection with the transmission system. X is party to a separate interconnection agreement with the utility for each of the Solar Qualified Facilities and each interconnection agreement allows for a maximum output of 10 MW (as measured in alternating current). X may include the costs it paid or incurred for qualified interconnection property for each of the Solar Qualified Facilities to calculate its section 48E credit for each of the Solar Qualified Facilities, subject to the terms of each interconnection agreement, because each of the Solar Qualified Facilities has a maximum net output of not greater than 5 MW (in alternating current). X cannot include more than the total costs X paid or incurred for the qualified interconnection property in calculating the aggregate section 48E credit amount for the Solar Qualified Facilities.

(iv) *Example 4. Utility payment reducing costs borne by taxpayer.* In year 1, X places in service a solar facility (Solar Qualified Facility) with a maximum net output of 3 MW (as measured in alternating current) by using the nameplate capacity of the inverter attached to the solar facility, which is the first component of the qualified facility that inverts the direct current electricity into alternating current. X is party to an interconnection agreement with a utility for the purpose of connecting the Solar Qualified Facility to the transmission or distribution system of the utility. Pursuant to the interconnection agreement, X pays $1 million to the utility, and the utility places in service qualified interconnection property. In year 1, X had no reasonable expectation of any payment from the utility or other parties with respect to the qualified interconnection property. The $1 million is properly chargeable to the capital account of X, subject to paragraph (a)(6) of this section. X properly includes the $1 million paid to the utility in determining its credit under section 48E for Year 1. In Year 4, taxpayer Y enters into an agreement with the utility under which Y pays the utility $100,000 for the use of qualified interconnection property placed in service by the utility pursuant to the interconnection agreement between X and the utility. The utility pays $100,000 to X. Under these circumstances, the payment from the utility in year 4 would not require X to reduce the amount treated as paid or incurred for the qualified interconnection property for the purpose of determining the section 48E credit in year 1; instead X would treat the payment as income.

(v) *Example 5. Non-utility payment reducing costs borne by taxpayer.* The facts in year 1 are the same as in paragraph (a)(7)(iii) of this section (*Example 3*). In Year 4, taxpayer Y enters into an agreement with the utility under which Y pays X $100,000 for the use of qualified interconnection property placed in service by the utility pursuant to the interconnection agreement between X and the utility. Y pays $100,000 to X. In year 1, X had no reasonable expectation of any payment from Y for subsequent agreements with Y or other parties with respect to the qualified interconnection property. Under these circumstances, the payment from Y in year 4 would not require X to reduce the amount treated as paid or incurred for the qualified interconnection property for the purpose of determining the section 48E credit in year 1; instead X would treat the payment as income.

(b) *Expansion of facility; Incremental production (Incremental Production Rule)*—(1) *In general.* Solely for purposes of this paragraph (b), the term *qualified facility* includes either a new unit or an addition of capacity placed in service after December 31, 2024, in connection with a facility described in section 48E(b)(3)(A) (without regard to

section 48E(b)(3)(A)(ii)), which was placed in service before January 1, 2025, but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit or addition of capacity. This paragraph (b) is only applicable to an addition of capacity or new unit that would not otherwise qualify as a separate qualified facility as defined in section 48E(b)(3). A new unit or an addition of capacity that meets the requirements of this paragraph (b) will be treated as a separate qualified facility. For purposes of this paragraph (b), a new unit or an addition of capacity requires the addition or replacement of qualified property (as defined in § 1.48E–2(e)), including any new or replacement integral property, added to a facility necessary to increase capacity. For purposes of assessing the One Megawatt Exception provided in section 48E(a)(2)(A)(ii)(I), the maximum net output for a new unit or an addition of capacity is the sum of the capacity of the added qualified facility and the capacity of the facility to which the qualified facility was added, as determined under § 1.48E–3(c) and paragraph (b)(2) of this section.

(2) *Measurement standard.* For purposes of this paragraph (b), taxpayers must use one of the measurement standards described in paragraph (b)(2)(i), (ii), or (iii) of this section to measure the capacity and change in capacity of a facility, except a taxpayer cannot use the measurement standard described in paragraph (b)(2)(ii) of this section if the taxpayer is able to use the measurement standard described in paragraph (b)(2)(i) of this section:

(i) Modified or amended facility operating licenses from the Federal Energy Regulatory Commission (FERC) or the Nuclear Regulatory Commission (NRC), or related reports prepared by FERC or NRC as part of the licensing process;

(ii) Nameplate capacity certified consistent with generally accepted industry standards, such as the International Standard Organization (ISO) conditions to measure the nameplate capacity of the facility consistent with the definition of nameplate capacity provided in 40 CFR 96.202; or

(iii) A measurement standard prescribed by the Secretary in guidance published in the Internal Revenue Bulletin (see § 601.601 of this chapter).

(3) *Special rule for restarted facilities.* Solely for purposes of this paragraph (b), a facility that is decommissioned or in the process of decommissioning and restarts can be considered to have increased capacity from a base of zero if the conditions described in each of paragraphs (b)(3)(i) through (iv) of this section are met:

(i) The existing facility must have ceased operations;

(ii) The existing facility must have a shutdown period of at least one calendar year during which it was not authorized to operate by its respective Federal regulatory authority (that is, FERC or NRC);

(iii) The restarted facility must be eligible to restart based on an operating license issued by either FERC or NRC; and

(iv) The existing facility may not have ceased operations for the purpose of qualifying for the special rule for restarted facilities.

(4) *Computation of qualified investment for a new unit or an addition of capacity.* For purposes of this paragraph (b), a new unit or an addition of capacity requires the addition or replacement of components of qualified property, including any new or replacement integral property, added to a facility necessary to increase capacity. The taxpayer's qualified investment during the taxable year that resulted in an increased capacity of a facility by reason of a new unit or addition of capacity is its total qualified investment associated with the components of property that result in the new unit or addition of capacity.

(5) *Examples.* This paragraph (b)(5) provides examples illustrating the rules of this paragraph (b).

(i) *Example 1. New Unit.* X owns a hydropower facility (Facility H) that was originally placed in service in 2020, with a FERC license authorizing an installed capacity of 60 megawatts. During taxable years 2020 through 2024, X claimed a section 45 credit for the electricity produced by Facility H. On July 1, 2025, as allowed by a FERC license amendment, X places in service components of property comprising a new unit that results in Facility H having an increased authorized installed capacity of 90 megawatts in 2025. These components of property meet the requirements of qualified property (as defined in § 1.48E–2(e)). For purposes of this paragraph (b), this new unit will be treated as a separate facility (Facility J). X determines the amount of its section 48E credit based on the amount of its qualified investment in Facility J. Even though X claimed a section 45 credit for electricity produced by Facility H in taxable years 2020 through 2024, X can claim a section 48E credit for its qualified investment in Facility J. X may also continue to claim the section 45 credit through taxable year 2030 for electricity generated by Facility H (excluding the incremental electricity generation related to Facility J).

(ii) *Example 2. Addition of Capacity.* Y owns a nuclear facility (Facility N) that was originally placed in service on January 1, 2000. Y claimed a section 45U credit in taxable years 2024 and 2025 for the electricity generated by Facility N. On January 15, 2026, Y completed and placed in service an investment associated with a power uprate approved by an NRC license amendment that involved the removal and replacement of components of property and placing in service additional components of property. Both of these replacement and additional components of property meet the requirements of qualified property (as defined in § 1.48E–2(c)). NRC reports associated with the license amendment describe the uprate as increasing the nuclear facility's electrical capacity by 100 MW to 900 MW. For purposes of this paragraph (b), Facility N's addition of capacity equal to 100 MW is treated as a new separate qualified facility placed in service on January 15, 2026 (Facility P). Y determines the amount of its section 48E credit based on the entire amount of its qualified investment on January 15, 2026. Even though Y claimed a section 45U credit in taxable years 2024 and 2025 for the existing capacity of Facility N, Y can claim a section 48E credit for its investment in components of property needed to support the increase in capacity. Y may also continue to claim the section 45U credit for electricity generated by Facility N (excluding the incremental electricity generation related to Facility P).

(iii) *Example 3. Geothermal Turbine and Generator Additions of Capacity.* X owns a geothermal power plant (Facility G) with a 24 MW nameplate capacity, which is placed in service in 2007. Over the subsequent years, the plant's generating capability declines because of physical degradation of the turbine and generator. On March 1, 2027, X places in service components of property at Facility G that increase its capacity. The turbine rotor is removed, and the eroded blades are replaced with new blades, with associated capital expenditures. The generator is refurbished by removing old subcomponents of the generator and replacing those with new subcomponents, as well as replacing the old copper windings with new windings in concert with new insulation. These components of property meet the requirements of qualified property (as defined in § 1.48E–2(c)). After the upgrade, the plant increases its nameplate capacity to 26 MW, an

increase of 2 MW over the previous nameplate capacity. For purposes of this paragraph (b), the addition of capacity to Facility G is treated as a new separate qualified facility placed in service on March 1, 2027 (Facility N). X determines the amount of its section 48E credit based on the amount of its qualified investment in qualified property needed to increase the capacity of the facility.

(iv) *Example 4. Hydropower Addition of Capacity.* X owns a hydropower plant (Facility H) placed in service in 1960. Facility H has become less efficient since it was placed in service with attendant reductions in its generating capacity. As approved by a FERC license amendment, X increases Facility H's capacity by installing new headcovers, new turbines with integrated dissolved oxygen injection, and a new high pressure digital governor system. All of the existing turbine systems are replaced with new turbine and governor systems. The new turbines are more efficient, and are capable of more power output, than the original design installed in 1960. Improvements to the generators involve removing the old asphalt coated copper windings and purchasing and then installing new epoxy coated double wound windings. X adds digital controls to effectively utilize new digital governors. These components of property meet the requirements of qualified property (as defined in § 1.48E–2(c)). X simultaneously invests in cybersecurity protection. As set forth in the FERC order amending its license, these investments, which are placed in service on April 15, 2026, increase Facility H's authorized installed nameplate capacity from 180 MW to 190 MW, an increase of 10 MW over the previous nameplate capacity. For purposes of this paragraph (b), Facility H's addition of capacity is treated as a new separate qualified facility placed in service on April 16, 2026 (Facility A). X determines the amount of its section 48E credit based on the amount of its qualified investment in qualified property needed in Facility A to result in the final 190 MW capacity, which would not include any investments in intangible property, such as those that might be associated with cybersecurity protection.

(v) *Example 5. Nonoperational Nuclear Facility that Satisfies Restart Rule.* T owns a nuclear facility (Facility N) that was originally placed in service in 1982. In 2020, Facility N ceased operations, began decommissioning, and the NRC no longer authorized the operation of Facility N. T did not cease operations at Facility N for the purpose of qualifying for the special rule for restarted facilities under section 48E. In 2028, the NRC authorized Facility N to restart, and, on October 1, 2028, Facility N placed in service qualified property that enabled Facility N to restart and resume operations, with an electrical capacity of 800 MW, as indicated in NRC documents related to the authorization to restart. For purposes of this paragraph (b), the restart of Facility N is considered to have increased capacity from a base of zero, and Facility N is treated as having an addition of capacity equal to 800 MW. For purposes of this paragraph (b), Facility N's 800 MW addition of capacity is treated as a new qualified facility placed in service on October 1, 2028 (Facility P). T determines the amount of its section 48E credit based on the amount of its qualified investment in qualified property needed to restart the facility.

(c) *Retrofit of an existing facility (80/20 Rule)*—(1) *In general.* For purposes of section 48E(b)(3)(A)(ii), a retrofitted qualified facility or an energy storage technology (EST) may qualify as originally placed in service even if it contains some used components of property within the unit of qualified facility or unit of EST, provided that the fair market value of the used components of the unit of qualified facility or unit of EST is not more than 20 percent of the total value of the unit of qualified facility or unit of EST (that is, the cost of the new components of property plus the value of the used components of property within the unit of qualified facility or unit of EST) (80/20 Rule). A qualified facility or EST that meets the 80/20 Rule may claim the section 48E credit without regard to any addition of capacity to the qualified facility or EST.

(2) *Expenditures taken into account.* Notwithstanding the rule provided in paragraph (c)(1) of this section, only the cost of new components of the unit of qualified facility or unit of EST are taken into account for purposes of computing the credit determined under section 48E with respect to the qualified facility or EST.

(3) *Cost of new components.* For purposes of this 80/20 Rule, the cost of new components of the unit of qualified facility or unit of EST includes all costs properly included in the depreciable basis of the new components of the unit of qualified facility.

(4) *New costs.* If the taxpayer satisfies the 80/20 Rule with regard to the unit of qualified facility or unit of EST and the taxpayer pays or incurs new costs for property that is an integral part of the qualified facility (as defined in § 1.48E–2(a)) or the EST (as defined in § 1.48E–2(g)), the taxpayer may include these new costs paid or incurred for property that is an integral part of the qualified facility or EST in the basis of the qualified facility or EST for purposes of the section 48E credit.

(5) *Excluded costs.* Costs incurred for new components of property added to used components of a unit of qualified facility or unit of EST may not be taken into account for purposes of the section 48E credit unless the taxpayer satisfies the 80/20 Rule by placing in service a unit of qualified facility or unit of EST for which the fair market value of the used components of property is not more than 20 percent of the total value of the unit of qualified facility or unit of EST taking into account the cost of the new components of property plus the value of the used components of property.

(6) *Examples.* This paragraph (c)(6) provides examples illustrating the rules of this paragraph (c).

(i) *Example 1. Retrofitted facility that satisfies the 80/20 Rule.* A owns an existing wind facility. On February 1, 2026, A replaces used components of unit of qualified facility of the wind facility with new components at a cost of $2 million. The fair market value of the remaining original components of the unit of qualified facility is $400,000, which is not more than 20 percent of the retrofitted unit of qualified facility's total fair market value of $2.4 million (the cost of the new components ($2 million) + the fair market value of the remaining original components of the unit of qualified facility ($400,000)). Thus, the retrofitted wind facility will be considered newly placed in service for purposes of section 48E, assuming all the other requirements of section 48E are met, and A will be able to claim a section 48E credit based on its investment in 2026 ($2 million).

(ii) *Example 2. Retrofit of an existing facility that meets the 80/20 Rule.* Facility Z, a facility that was originally placed in service on January 1, 2026, was not a qualified facility (as defined in § 1.48E–2(a)) when it was placed in service because it did not meet the greenhouse gas emissions rate requirements (as determined under rules provided in § 1.48E–5). On January 1, 2027, Facility Z was retrofitted and now meets the requirements to be a qualified facility (as defined in § 1.48E–2(a)). After the retrofit, the cost of the new property included in the unit of qualified facility of Facility Z is greater than 80 percent of unit of qualified facility's total fair market value. Because Facility Z meets the 80/20 Rule, Facility Z is deemed to be originally placed in

service on January 1, 2027. Assuming all the other requirements of section 48E are met, Z may claim a section 48E credit based on its investment in the new components used to retrofit the existing facility in 2027.

(iii) *Example 3. Retrofitted nuclear facility that satisfied the 80/20 Rule.* T owns a nuclear facility (Facility N) that was originally placed in service on March 1, 1982. T replaces used components of property of the unit of qualified facility of Facility N with new components at a cost of $200 million, and then places in Facility N in service on July 15, 2026. The fair market value of the remaining original components of the unit of qualified facility, prior to the retrofit, is $30 million, which is not more than 20 percent of the unit of qualified facility's total fair market value of $230 million (the cost of the new components ($200 million) + the fair market value of the remaining original components of the unit of qualified facility ($30 million)) ($30 million/$230 million = 13%). Thus, assuming all the other requirements of section 48E are met, Facility N will be considered newly placed in service on July 15, 2026, for purposes of section 48E, and T will be able to claim a section 48E credit based on its investment in the new components ($200 million).

(iv) *Example 4. Capital improvements to an existing qualified facility that do not satisfy the 80/20 Rule.* X owns an existing facility, Facility C, that was originally placed in service on January 1, 2023. X makes capital improvements to Facility C that are placed in service on June 6, 2026. The cost of the capital improvements to the unit of qualified facility of Facility C total $500,000 and the fair market value of the unit of qualified facility after the improvements is $2 million. The fair market value of the old components of the unit of qualified facility is $1,500,000 or 75 percent of the total fair market value of the Facility C after the improvements. Because the fair market value of the new property included in the unit of qualified facility is less than 80 percent of the unit of qualified facility's total fair market value, Facility C does not meet the 80/20 Rule.

(v) *Example 5. Upgrades to a hydropower qualified facility that satisfies the 80/20 Rule:* Y owns a hydropower qualified facility (hydropower facility) and no taxpayer, including Y, has ever claimed a section 45 credit for the hydropower facility. The hydropower facility consists of a unit of qualified facility including water intake, water isolation mechanisms, turbine, pump, motor, and generator. The associated impoundment (dam) and power conditioning equipment are integral parts of the unit of qualified facility. Y makes upgrades to the unit of qualified facility by replacing the turbine, pump, motor, and generator with new components at a cost of $1.5 million. Y does not make any upgrades to the property that is an integral part of the unit of qualified facility. The remaining original components of the unit of qualified facility have a fair market value of $100,000, which is not more than 20 percent of the retrofitted hydropower facility's total value of $1.6 million (that is, the cost of the new components ($1.5 million) + the value of the remaining original components ($100,000)). Thus, the retrofitted hydropower facility will be considered newly placed in service for purposes of section 48E, and Y will be able to claim a section 48E credit based on the cost of the new components ($1.5 million).

(d) *Special rules regarding ownership*—(1) *Qualified investment with respect to a qualified facility or EST.* For purposes of this paragraph (d), a taxpayer that owns a qualified investment with respect to a qualified facility or EST is eligible for the section 48E credit only to the extent of the taxpayer's basis in the qualified facility or EST. In the case of multiple taxpayers holding direct ownership through their qualified investments in a single qualified facility or EST (and such arrangement is not treated as a partnership for Federal income tax purposes), each taxpayer determines its basis based on its fractional ownership interest in the qualified facility or EST.

(2) *Multiple owners.* A taxpayer must directly own at least a fractional interest in the entire unit of qualified facility (as defined in § 1.48E–2(b)(2)) or unit of EST (as defined in § 1.48E–2(g)(2)) for a section 48E credit to be determined with respect to such taxpayer's interest. No section 48E credit may be determined with respect to a taxpayer's ownership of one or more separate components of a qualified facility or an EST if the components do not constitute a unit of qualified facility (as defined in § 1.48E–2(b)(2)) or unit of EST (as defined in § 1.48E–2(g)(2)). However, the use of property owned by one taxpayer that is an integral part of a qualified facility or EST owned by another taxpayer will not prevent a section 48E credit from being determined with respect to the second taxpayer's qualified investment in a qualified facility or EST (though neither taxpayer would be eligible for a section 48E credit with respect to the first taxpayer's property). See § 1.48E–2(b)(3)(vi) for rules regarding shared integral property.

(3) *Section 761(a) election.* If a qualified facility or EST is owned through an unincorporated organization that has made a valid election under section 761(a) of the Code, each member's undivided ownership share in the qualified facility or EST will be treated as a separate qualified facility or EST owned by such member.

(4) *Examples.* The following examples illustrate the rules in this paragraph (d). In each example, X and Y are unrelated taxpayers.

(i) *Example 1. Fractional ownership required to satisfy section 48E.* X and Y each own a direct fractional ownership interest in an entire qualified facility (as defined in § 1.48E–2(b)) and as a result, a section 48E credit may be determined with respect to X's and Y's qualified investment in their fractional ownership interests in the qualified facility.

(ii) *Example 2. Ownership of separate components of property that are part of a qualified facility.* X and Y each own separate components of a qualified facility, which taken together would constitute a unit of qualified facility but taken separately would not constitute a unit of qualified facility. X owns component A and Y owns component B. No section 48E credit may be determined with respect to either component A or component B because X and Y each owns a separate component of a qualified facility that does not constitute a unit of qualified facility (as defined in § 1.48E–2(b)(2)).

(iii) *Example 3. Separate ownership of property that is an integral part of separate qualified facilities.* X owns a solar farm that is a qualified facility (as defined in § 1.48E–2(b)) (Solar Qualified Facility), which includes property that is an integral part of the Solar Qualified Facility, specifically a transformer in which the electricity is stepped up to electrical grid voltage before being transmitted to the electrical grid through an intertie. Y owns a wind facility that is a qualified facility (as defined in § 1.48E–2(b)) (Wind Qualified Facility) that connects to X's transformer. X and Y are not related persons within the meaning of paragraph (d)(4)(i) of this section. Because Y does not hold an ownership interest in the transformer, Y may compute its section 48E credit for the Wind Qualified Facility, but it may not include any costs relating to the transformer in its section 48E credit base.

(iv) *Example 4. Related taxpayers and property that is an integral part.* X owns a wind facility that is a unit of qualified facility and a solar facility that is a unit of qualified facility. Both the wind facility and the solar facility are connected to a transformer where the

electricity is stepped up to electrical grid voltage before being transmitted to the electrical grid through an intertie. The transformer is an integral part of both the wind facility and the solar facility (within the meaning of § 1.48E–2(d)(3)(i)) and is owned by Y. X and Y are related persons within the meaning of paragraph (d)(4)(i) of this section. X and Y are treated as one taxpayer under paragraph (d)(4)(ii) of this section. X may include the basis of the transformer in computing its section 48E credit with respect to the wind facility and the solar facility (but may not include more than 100% of that basis in the aggregate).

(e) *Coordination rule for section 42 credits and section 48E credits.* As provided under section 50(c)(3)(C) of the Code, in determining eligible basis for purposes of calculating a credit under section 42 of the Code (section 42 credit), a taxpayer is not required to reduce its basis in a qualified facility or EST by the amount of the section 48E credit determined with respect to the taxpayer's qualified investment with respect to such qualified facility or EST. The qualified investment with respect to a qualified facility or EST property may be used to determine a section 48E credit and may also be included in eligible basis to determine a section 42 credit. See paragraph (d) of this section for special rules regarding ownership.

(f) *Recapture*—(1) *In general.* The credit calculated under section 48E(a) and § 1.48E–1(b) is subject to general recapture rules under section 50(a). Additionally, section 48E(g) provides for recapture for any qualified facility for which a taxpayer claimed a section 48E credit that has a greenhouse gas emissions rate (as determined under rules provided in § 1.45Y–5) of greater than 10 grams of CO_2e per kWh during the five-year period beginning on the date such qualified facility is originally placed in service (five-year recapture period).

(2) *Recapture event*—(i) *In general.* Any event that results in a qualified facility having a greenhouse gas emissions rate (as determined under rules provided in § 1.45Y–5) of greater than 10 grams of CO_2e per kWh during the five-year period is a recapture event. If a qualified facility's greenhouse gas emissions rate exceeds 10 grams of CO_2e per kWh, the section 48E credit is subject to recapture.

(ii) *Changes to the Annual Table.* A change to the greenhouse gas emissions rate for a type or category of facility that is published in the Annual Table (as defined in § 1.48E–5(f)) after a facility is placed in service does not result in a recapture event.

(iii) *Yearly determination*—(A) *In general.* A determination of whether a recapture event occurred under this paragraph (f)(2) must be made for each taxable year (or portion thereof) occurring within the five-year recapture period, beginning with the taxable year ending after the date the qualified facility is placed in service. Thus, for each taxable year that begins or ends within the five-year recapture period, the taxpayer must determine, for any qualified facility for which it has claimed the section 48E credit, whether such facility has maintained a greenhouse gas emissions rate of not greater than 10 grams of CO_2e per kWh.

(B) *Annual reporting requirement.* A taxpayer that has claimed the section 48E credit amount under § 1.48E–1(b), including a taxpayer that has transferred a specified credit portion under section 6418 of the Code, is required to provide to the IRS information on the greenhouse gas emissions rate of the qualified facility during the recapture period at the time and in the form and manner prescribed in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter.

(iv) *Carryback and carryforward adjustments.* In the case of any recapture event described in this paragraph (f)(2), the carrybacks and carryforwards under section 39 of the Code must be adjusted by reason of such recapture event.

(3) *Recapture amount*—(i) *In general.* If a recapture event occurred as described in paragraph (f)(2) of this section, the tax under chapter 1 of the Code for the taxable year in which the recapture event occurs is increased by an amount equal to the applicable recapture percentage multiplied by the credit amount that was claimed by the taxpayer under § 1.48E–1(b).

(ii) *Applicable recapture percentage.* If the recapture event occurs:

(A) Within one full year after the property is placed in service, the recapture percentage is 100;

(B) Within one full year after the close of the period described in paragraph (f)(3)(ii)(A) of this section, the recapture percentage is 80;

(C) Within one full year after the close of the period described in paragraph (f)(3)(ii)(B) of this section, the recapture percentage is 60;

(D) Within one full year after the close of the period described in paragraph (f)(3)(ii)(C) of this section, the recapture percentage is 40; and

(E) Within one full year after the close of the period described in paragraph (f)(3)(ii)(D) of this section, the recapture percentage is 20.

(4) *Recapture period.* The five-year recapture period begins on the date the qualified facility is placed in service and ends on the date that is five full years after the placed in service date. Each 365-day period (366-day period in case of a leap year) within the five-year recapture period is a separate recapture year for recapture purposes.

(5) *Increase in tax for recapture.* The increase in tax under chapter 1 of the Code for the recapture of the credit amount claimed under section 48E(a) and § 1.48E–1(b) occurs in the year of the recapture event.

(g) *Qualified progress expenditure election.* A taxpayer may elect, as provided in § 1.46–5, to increase the qualified investment with respect to any qualified facility or EST of an eligible taxpayer for the taxable year, by any qualified progress expenditures made after August 16, 2022.

(h) *Incremental cost*—(1) *In general.* For purposes of section 48E, if a component of qualified property of a qualified facility or component of property of an EST is also used for a purpose other than the intended function of the qualified facility or EST, only the incremental cost of such component is included in the basis of the qualified facility or EST. The term *incremental cost* means the excess of the total cost of a component over the amount that would have been expended for the component if that component were used for a non-qualifying purpose.

(2) *Example.* A installs a solar qualified facility above the surface of an existing roof of a building that A owns. The solar qualified facility uses bifacial panels that convert to energy the light that strikes both the front and back of the panels. Therefore, along with installing the bifacial panels, A is reroofing their building with a reflective roof that has a highly reflective surface. Because the reflective roof enables the panels' generation of significant amounts of electricity from reflected sunlight, when installed in connection with the solar qualified facility, it constitutes part of that solar qualified facility to the extent that the cost of the reflective roof exceeds the cost of reroofing A's building with a non-reflective roof. The cost of reroofing with the reflective roof is $15,000 whereas the cost of a reroofing with a standard roof for the building would be $10,000. The incremental cost of the reflective roof is $5,000, and that amount is included in A's basis in the solar qualified facility for purposes of the section 48E credit.

(i) *Cross references.* (1) To determine applicable recapture rules, see section 50(a) of the Code.

(2) For rules regarding the credit eligibility of property used outside the United States, see section 50(b)(1) of the Code.

(3) For rules regarding the credit eligibility of property used by certain tax-exempt organizations, see section 50(b)(3) of the Code. See section 6417(d)(2) of the Code for an exception to the rule in section 50(b)(3) in the case of an applicable entity making an elective payment election.

(4) For application of the normalization rules to the section 48E credit in the case of certain regulated companies, including rules regarding the election not to apply the normalization rules to EST (as defined in section 48(c)(6) of the Code without regard to section 48(c)(6)(D) of the Code), see section 50(d)(2) of the Code.

(5) For rules relating to certain leased property, see section 50(d)(5) of the Code.

(j) *Applicability date.* This section applies to qualified facilities and ESTs placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

§ 1.48E–5 Greenhouse gas emissions rates for qualified facilities under section 48E.

(a) *In general.* Section 48E(b)(3)(B)(ii) provides that rules similar to the rules of section 45Y(b)(2) regarding greenhouse emissions rates apply for purposes of section 48E. Paragraphs (b) through (f) of this section thus provide that the definitions and rules regarding greenhouse gas emissions rate requirements (as determined under rules provided in § 1.45Y–5) apply for purposes of section 48E and this section. Paragraph (g) of this section provides rules related to provisional emissions rates for purposes of section 48E and this section. Paragraph (h) of this section provides rules for determining an anticipated greenhouse gas emissions rate. Paragraph (i) of this section provides rules regarding reliance on the annual publication of emissions rates and provisional emissions rates. Finally, paragraph (j) of this section provides rules regarding substantiation requirements.

(b) *Definitions.* The definitions provided in § 1.45Y–5(b) apply for purposes of section 48E and this section.

(c) *Non-C&G Facilities.* The rules provided in § 1.45Y–5(c) apply for purposes of determining greenhouse gas emissions rates for Non-C&G Facilities for purposes of section 48E and this section.

(d) *C&G Facilities.* The rules provided in § 1.45Y–5(d) apply for purposes of determining greenhouse gas emissions rates for C&G Facilities for purposes of section 48E and this section.

(e) *Use of methane from certain sources to produce electricity.* The rules provided in § 1.45Y–5(e) regarding the use of methane from certain sources to produce electricity apply for purposes of section 48E and this section.

(f) *Carbon capture and sequestration.* The rules provided in § 1.45Y–5(f) regarding carbon capture and sequestration apply for purposes of section 48E and this section.

(g) *Annual publication of emissions rates.* The rules provided in § 1.45Y–5(g) regarding the annual publication of a table (Annual Table) that sets forth the greenhouse gas emissions rates for types or categories of facilities apply for purposes of section 48E and this section.

(h) *Provisional emissions rates*—(1) *In general.* In the case of any facility for which an emissions rate has not been established by the Secretary, a taxpayer that owns such facility may file a petition with the Secretary for determination of the emissions rate with respect to such facility (Provisional Emissions Rate or PER). A PER must be determined and obtained under the rules of this section.

(2) *Rate not established.* An emissions rate has not been established by the Secretary for a facility for purposes of sections 45Y(b)(2)(C)(ii) and 48E(b)(3)(B)(ii) if such facility is not described in the Annual Table. If a taxpayer's request for an emissions value pursuant to paragraph (h)(5) of this section is pending at the time such facility is or becomes described in the Annual Table, the taxpayer's request for an emissions value will be automatically denied.

(3) *Process for filing a PER petition.* To file a PER petition with the Secretary, a taxpayer must submit a PER petition by attaching it to the taxpayer's Federal income tax return or Federal return, as appropriate, for the taxable year in which the taxpayer claims the section 48E credit with respect to the facility to which the PER petition relates. The PER petition must contain an emissions value and, if applicable, the associated letter from DOE. An emissions value may be obtained from DOE or by using the designated LCA model in accordance with paragraph (h)(6) of this section. An emission value obtained from DOE will be based on an analytical assessment of the emissions rate associated with the facility performed by one or more of the National Laboratories, in consultation with other Federal agency experts as appropriate, consistent with this section. A taxpayer must retain in its books and records the application and correspondence to and from DOE including a copy of the taxpayer's request to DOE for an emissions value and any information provided by the taxpayer to DOE pursuant to the emissions value request process provided in paragraph (h)(5) of this section. Alternatively, an emissions value can be determined by the taxpayer for a facility using the most recent version of an LCA model, as of the time the PER petition is filed, that has been designated by the Secretary for such use under paragraph (h)(6) of this section. If an emissions value is determined using the designated LCA model under paragraph (h)(6) of this section, a taxpayer is required to provide to the IRS information to support its determination in the form and manner prescribed in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter. A taxpayer may not request an emissions value from DOE for a facility for which an emissions value can be determined using the most recent version of an LCA model or models designated for such use under paragraph (h)(6) of this section.

(4) *PER determination.* Upon the IRS's acceptance of the taxpayer's return to which a PER petition is attached, the emissions value of the facility specified on such petition is deemed accepted. A taxpayer can rely upon an emissions value provided by DOE for purposes of claiming a section 48E credit, provided that any information, representations, or other data provided to DOE in support of the request for an emissions value are accurate. If applicable, a taxpayer may rely upon an emissions value determined for a facility using the LCA model designated under paragraph (h)(6) of this section, provided that any information, representations, or other data used to obtain such emissions value are accurate. The IRS's deemed acceptance of an emissions value is the Secretary's determination of the PER. However, the taxpayer must also comply with all applicable requirements for the section 48E credit and any information, representations, or other data supporting an emissions value are subject to later examination by the IRS.

(5) *Emissions value request process.* An applicant that submits a request for an emissions value must follow the procedures specified by DOE to request and obtain such emissions value.

Emissions values will be determined consistent with the rules provided in this section. An applicant can request an emissions value from DOE only after a front-end engineering and design (FEED) study or similar indication of project maturity, as determined by DOE, such as the completion of a project specification and cost estimation sufficient to inform a final investment decision for the facility. DOE may decline to review applications that are not responsive, including those applications that relate to a facility described in the Annual Table (consistent with paragraph (h)(2) of this section) or a facility for which an emissions value can be determined by an LCA model under paragraph (h)(6) of this section (consistent with paragraph (h)(3) of this section), or applications that are incomplete. Applicants must follow DOE's guidance and procedures for requesting and obtaining an emissions value from DOE. DOE will publish this guidance and procedures, including a process for, under limited circumstances, a revision to DOE's initial assessment of an emissions value on the basis of revised technical information or facility design and operation.

(6) *LCA model for determining an emissions value for C&G Facilities.* The rules provided in § 1.45Y–5(h)(6) regarding the designation of an LCA model or models for determining an emissions value for C&G Facilities apply for purposes of section 48E and this section.

(7) *Effect of PER.* A taxpayer who files for a PER must use a PER determined by the Secretary to determine eligibility for the section 48E credit, provided all other requirements of section 48E are met. The Secretary's PER determination is not an examination or inspection of books of account for purposes of section 7605(b) of the Code and does not preclude or impede the IRS (under section 7605(b) or any administrative provisions adopted by the IRS) from later examining a return or inspecting books or records with respect to any taxable year for which the section 48E credit is claimed. Further, a PER determination does not signify that the IRS has determined that the requirements of section 48E have been satisfied for any taxable year.

(i) *Determining anticipated greenhouse gas emissions rate*—(1) *In general.* A facility's anticipated greenhouse gas emissions rate must be objectively determined based on an examination of all the facts and circumstances. Certain Non-C&G Facilities, such as the facilities described in § 1.45Y–5(c)(2), may have an anticipated greenhouse gas emissions rate that is not greater than zero based on the technology and practices they rely upon to generate electricity. For facilities that require the use of certain fuel sources, which may vary, or carbon capture and sequestration, to generate electricity with a greenhouse gas emissions rate that is not greater than zero, objective indicia that such facilities will use such fuel sources or operate such carbon capture equipment, as applicable, in a manner that results in a greenhouse gas emissions rate that is not greater than zero for at least 10 years beginning from the date the facility is placed in service are required to establish a reasonable expectation that the combination of fuel, type of facility, and practice will result in a greenhouse gas emissions rate that is not greater than zero. Taxpayers must attest under penalty of perjury that the anticipated greenhouse gas emissions rate as determined under the statute and these final regulations is not greater than zero. A facility subject to legally binding Federal or State permit conditions requiring that the facility operate in a manner that would be incompatible with a greenhouse gas emissions rate of not greater than zero is not a facility for which the anticipated greenhouse gas emissions rate is not greater than zero.

(2) *Examples of objective indicia.* Examples of objective indicia that may establish an anticipated greenhouse gas emissions rate that is not greater than zero for specific elements of the type of facility, fuel source, or practice include, but are not limited to:

(i) Co-location of the facility with a fuel source (for example, an anaerobic digester) for which the combination of fuel, type of facility, and practice is reasonably expected to result in a greenhouse gas emissions rate that is not greater than zero;

(ii) A 10-year binding written contract to purchase fuels for which the combination of fuel, type of facility, and practice is reasonably expected to result in a greenhouse gas emissions rate that is not greater than zero;

(iii) A facility type that only accommodates one type of fuel or a small range of fuels for which the combination of fuel, type of facility, and practice is reasonably expected to result in a greenhouse gas emissions rate that is not greater than zero;

(iv) A 10-year binding written contract for the permanent geological storage (including after injection into an enhanced oil and gas recovery (EOR) project) or utilization of qualified carbon dioxide from the facility for which the combination of fuel, type of facility, and capture and practice is reasonably expected to result in a greenhouse gas emissions rate that is not greater than zero; or

(v) A legally binding Federal or State air permit which requires, as a condition of the permit, that the facility operates in a manner for which the combination of fuel, type of facility, and practice is reasonably expected to result in a greenhouse gas emissions rate that is not greater than zero and that any captured carbon dioxide is permanently geologically stored and subjects the holder to civil or criminal penalties in the event the relevant permit requirements are breached.

(j) *Reliance on Annual Table or provisional emissions rate.* Taxpayers may rely on the Annual Table in effect as of the date a facility began construction or the provisional emissions rate determined by the Secretary for the taxpayer's facility under paragraph (h)(4) of this section to determine the facility's greenhouse gas emissions rate, provided that the facility continues to operate as a type of facility that is described in the Annual Table or the facility's emissions value request, as applicable, for the entire taxable year.

(k) *Substantiation*—(1) *In general.* A taxpayer must maintain in its books and records documentation regarding the design and operation of a facility that establishes that such facility had an anticipated greenhouse gas emissions rate that is not greater than zero in the year in which the section 48E credit is determined and operated with a greenhouse gas emissions rate that is not greater than 10 grams of CO_2e per kWh during each year of the recapture period that applies for purposes of section 48E(g).

(2) *Sufficient substantiation.* Documentation sufficient to substantiate that a facility had a greenhouse gas emissions rate, as determined under this section, not greater than 10 grams of CO_2e per kWh during each year of the recapture period that applies for purposes of section 48E(g) includes documentation or a report prepared by an unrelated party that verifies the facility's actual emissions rate. A facility described in § 1.45Y–5(c)(2) can maintain sufficient documentation to demonstrate a greenhouse gas emissions rate that is not greater than 10 grams of CO_2e per kWh during each year of the recapture period that applies for purposes of section 48E(g) by showing that it is the type of facility described in § 1.45Y–5(c)(2). The Secretary may determine that other types of facilities can sufficiently substantiate a greenhouse gas emissions rate, as determined under this section, that is

not greater than 10 grams of CO_2e per kWh during each year of the recapture period that applies for purposes of section 48E(g) with certain documentation and will describe such facilities and documentation in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin. *See* § 601.601 of this chapter. For such other types of facilities that utilize biomass feedstocks, the taxpayer must substantiate that the source of such fuels or feedstocks used are consistent with the taxpayer's claims. For all facilities that utilize unmarketable feedstocks that are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer will be required to maintain documentation substantiating the origin and original form of the feedstock.

(l) *Applicability date.* This section applies to qualified facilities placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.

Douglas W. O'Donnell,

Deputy Commissioner.

Approved: December 31, 2024.

Aviva R. Aron-Dine,

Deputy Assistant Secretary of the Treasury (Tax Policy).

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