

Realizing Carbon Capture Projects:

Deal Structures, Government Incentives, Financing Options (Including Direct Pay) and Other Key Issues

Holland & Knight Webinar | September 15, 2022

Holland & Knight



Agenda

- Introduction
- Legislative Overview
- Grants/DOE Loans
- 45Q and Carbon Capture
- Environmental Overview
- California/LCFS
- Deal Structures/Current Market
- Q&A

Meet Our Team



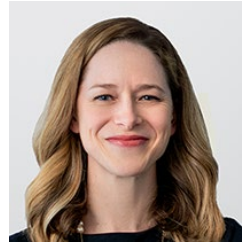
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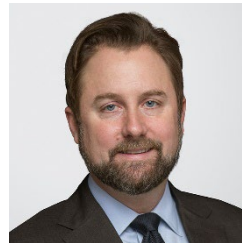
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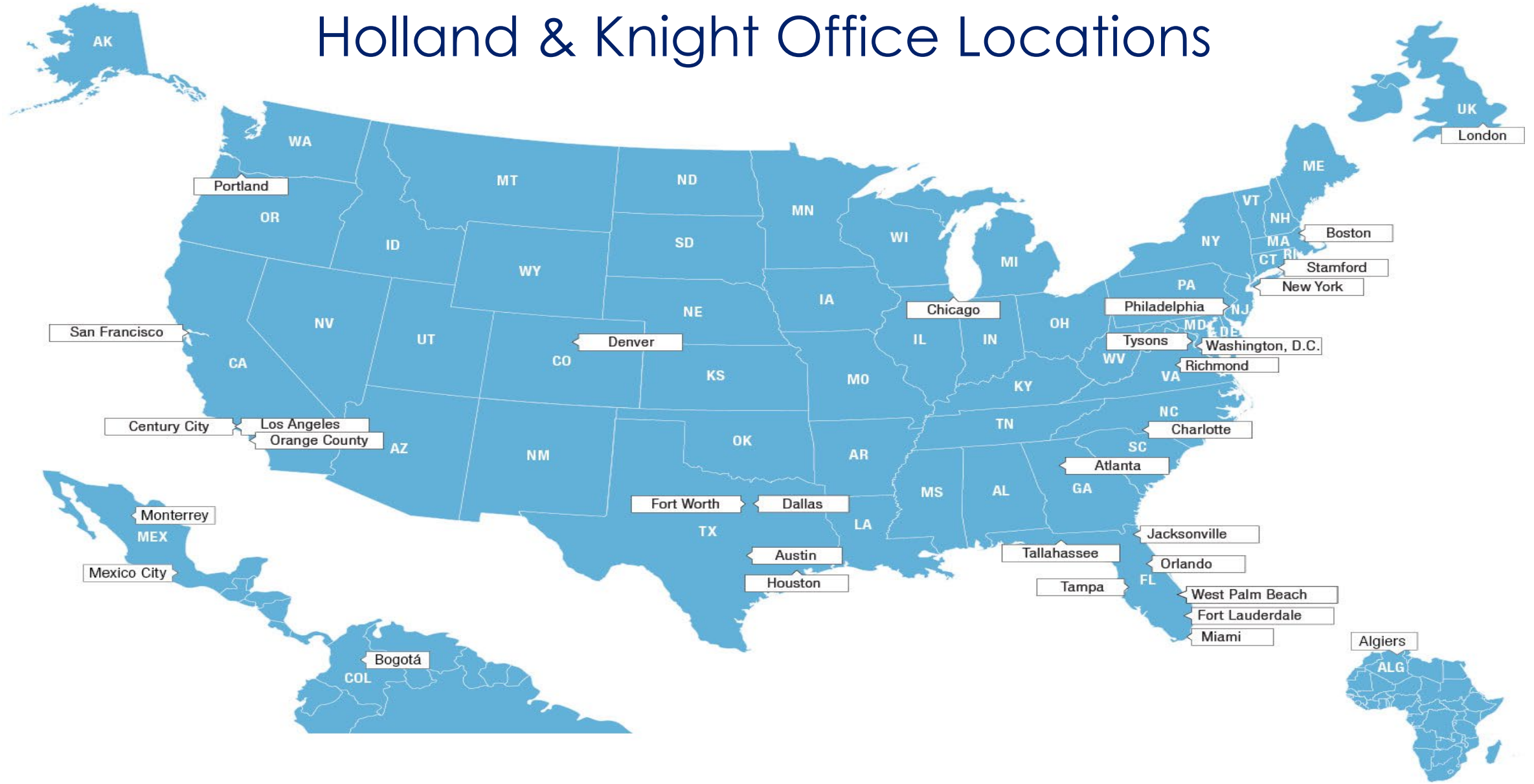
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Firm Overview

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Holland & Knight Office Locations



Introduction

- Carbon Capture is bipartisan and got the best of all possible worlds in the Inflation Reduction Act (IRA)
 - New direct air capture credit of \$180 per metric ton
 - Sequestered carbon increased from \$50 to \$85 per ton
 - Used carbon increased from \$35 to \$60 per ton
- Game changer: Direct Pay for five years
 - Opens up carbon capture to small and medium sized developers
 - Eliminates tax capacity issues
- Can also now transfer the credit
- These huge additions to the credit offer up all kinds of flexibilities to help carbon capture projects get across the finish line!

What is the Big Deal about Carbon Capture?

- Climate scientists believe the earth will continue to warm in the near term with increasingly obvious adverse effects on weather patterns, our environment and human wellbeing. Carbon capture offers a bridge to stop emissions until we are able to replace our energy emissions sources with clean sources of energy.

The West is on fire, Europe is overheating, one-third of Pakistan is under water.



Industry Evolution

- The early projects we are working on are those that have the purest CO₂ emission
 - Ethanol, steam methane reforming, fertilizer plants
 - Petra Nova
- As technology improves, and the cost of installing and operating capture equipment drops, we should see more type of emitting source, such as coal and natural gas fired generation, employing carbon capture

Legislative Overview

- How we got here, why it's important
- Outlook for the rest of the year
 - Permitting reform
 - Appropriations
 - Tax
 - Defense Authorization
- Next Congress
 - Composition and what that means for further legislating in this space
 - Investigations and how they will drive implementation
 - Opportunities to improve/change IRA
 - TCJA expirations

IJA Carbon Capture Programs

IJA Programs	
Development of Four Regional Clean DAC Hubs	\$3,500,000,000
Carbon Capture Demonstration Projects Program	\$2,537,000,000
Carbon Capture Large-scale Pilot Projects	\$937,000,000
Carbon Capture Technology Program (FEED only)	\$100,000,000
Carbon Storage Validation and Testing	\$2,500,000,000
Carbon Utilization Program	\$310,140,781
Pre-commercial DAC Technology Prize Competitions	\$15,000,000
Commercial DAC Technology Prize Competitions	\$100,000,000

Regional Clean DAC Hubs

\$3.5 billion for the development of 4 regional direct air capture hubs

- In the form of grants, cooperative agreements, and contracts.
 - Intended to create a network of direct air capture projects, potential CO₂ utilization off-takers, connective carbon dioxide transportation infrastructure, subsurface resources, and sequestration infrastructure for a region.
 - Have the capacity to sequester and/or utilize at least 1 million metric tons of carbon dioxide (from single or multiple interconnected units)
 - A full direct air capture project, as well as a component project of a regional direct air capture hub, are eligible projects under this program.
- **NOI issued 5/19/2022**

Carbon Capture Large-scale Pilot Projects, Demonstration Projects, and FEED activities

- **\$2.537 billion** is provided for carbon capture demonstration projects.
- An additional \$100 million is provided for a front-end engineering and design ("FEED") program added by the IIJA for carbon dioxide transport infrastructure necessary to enable deployment of carbon capture, utilization, and storage technologies.
- These amounts are in addition to amounts otherwise made available for the program.
- Of the 6 facilities designed to capture carbon dioxide, 2 will be a natural gas electric generation facility, 2 will be a coal electric generation facility; and 2 will be an industrial facility not purposed for electric generation.
- **NOI issued 7/13/2022**

Carbon Storage Validation and Testing

\$2.5 billion in competitive awards through DOE's carbon storage program focused on research, development, demonstration and commercialization.

Large-scale carbon sequestration demonstration program for projects that would inject and sequester at least 50 million metric tons of CO₂ into a geologic formation.

The program will consider a variety of geologic formations, including:

- operating oil and gas fields;
- depleted oil and gas fields;
- residual oil zones;
- unconventional reservoirs and rock types;
- unmineable coal seams;
- saline formations in both sedimentary and basaltic geologies;
- geologic systems that may be used as engineered reservoirs to extract economical quantities of brine from geothermal resources of low permeability or porosity; and
- geologic systems containing in situ carbon dioxide mineralization formations.

NOI Issued 4/29/2022

45Q and Carbon Capture Overview-Where It Started

- Section 45Q was substantially changed as part of the Bipartisan Budget Act of 2018 to provide for tax credits for carbon capture. Previous to its amendment, it was a more modest provision that provided a tax credit for the use of CO₂ in enhanced oil recovery (“EOR”).
- The credit was generally available for carbon capture facilities either under construction or placed in service for tax purposes on or after February 9, 2018 through January 1, 2026 and lasts for 12 years following the “placed- in-service date” for tax purposes.
- Owner of carbon capture equipment may claim the tax credit directly or may elect to pass on credit to an entity that either stores the carbon oxide (including CO₂) or uses the carbon oxide, such as in EOR.
- The value of the credit for carbon oxide captured and sequestered (but not used) increased linearly from \$22.66 in 2017 to \$50 per metric ton in 2026.
- For carbon oxide captured and used, such as for EOR, the value of the credit increased linearly from \$12.83 in 2017 to \$35 per metric ton in 2026.
- There were fairly onerous volume hurdles that had to be met under 45Q pre-IRA in order to obtain the credit. These have changed.

45Q and Carbon Capture

45Q Before the Inflation Reduction Act (“IRA”)

- After its initial enactment, there were numerous structural and technical questions raised about the application of Section 45Q, particularly as to how to structure for tax equity.
- In response to industry and investor requests, the IRS released Rev. Proc. 2020-12 in February, 2020 to provide safe harbors as to the structure of tax equity.
- This safe harbor appears to establish the flip point for 45Q tax equity of greater than 5 years.
- Final regulations under 45Q were issued on January 6, 2021.
- Both Rev. Proc. 2020-12 and the final regulations were, for the most part, regarded as being helpful and user-friendly for structuring Section 45Q transactions.
- To the extent the CO₂ was utilized in a product, the amount of credit was based on the life cycle greenhouse gas emissions.

45Q and Carbon Capture

What Changed Under the IRA?

- In summary, the IRA did the following:
 - (1) substantially increases the availability of the federal income tax credits available for domestic carbon capture projects (“CCUS”),
 - (2) makes it easier for CCUS projects to qualify for 45Q credits, and
 - (3) provides significant new avenues for monetizing 45Q credits.
- Further, the IRA repealed the phase-in of the credit -generally, the full value of the credit applies for years after 2022.
- The credit can be realized for 12 years after the carbon capture equipment is placed in service and will be inflation-adjusted beginning in 2027 and indexed to base year 2025.
- Like many of the tax credits enacted or enhanced under the IRA, there are two levels of the credit. The base level is 20% of the full credit, while the full 100% credit is only realized if the prevailing wage and apprenticeship requirements are met with respect to the construction, repair, alternation and operation of the CCUS facility.

45Q and Carbon Capture

What Changed Under the IRA?

	2018 BBA 45Q Credit	2022 IRA 45Q Credit
QCO Captured by Industrial Facility (Non-EOR/non-utilized)	\$50/MT	\$85/MT
QCO Captured by Industrial Facility (Used in EOR/utilized)	\$35/MT	\$60/MT
QCO Captured by DAC (Non-EOR/non-utilized)	\$50/MT	\$180/MT
QCO Captured by DAC (Used in EOR/utilized)	\$35/MT	\$130/MT

45Q and Carbon Capture

What Changed Under the IRA?

- **The Labor Requirements:**
- **Prevailing Wage:** Under the prevailing wage requirements, a taxpayer must ensure that any laborers and mechanics are paid prevailing wages during the construction of a project and, during the relevant credit period, for the alteration and repair of such project. The IRA provides correction procedures and directs the Secretary of the Treasury to provide further guidance.
- **Apprenticeship:** Under the apprenticeship requirements, a taxpayer must ensure that no less than the applicable percentage of total labor hours for the construction of the project are performed by qualified apprentices. The IRA provides correction procedures and directs the Secretary of the Treasury to provide further guidance.
- **Application:** These requirements do not apply to the extent construction on the project begins before the date that is 60 days after the Secretary publishes guidance with respect to such requirements.

45Q and Carbon Capture

What Changed Under the IRA?

- **Commencement of Construction Extended:** The IRA extended the commencement of construction period for qualifying projects. □
- 45Q's commencement of construction period is extended seven years to January 1, 2033. This means that projects must begin physical work by then to qualify for the credit. Previously, before amendment by the IRA, construction had to commence before January 1, 2026.
- **Direct Pay (Section 6417).** The IRA gives a direct payment option for receiving the credit. □ Carbon capture project developers can receive 45Q as a fully refundable direct payment as if it were an overpayment of taxes. □ For-profit, tax-paying entities can only realize the direct pay option for five years after the carbon capture equipment is placed in service. □ Tax-exempt entities such as states, municipalities, Tribes, and cooperatives can realize the direct pay option for the full 12 years after the carbon capture equipment is placed in service.

45Q and Carbon Capture

What Changed Under the IRA?

- **Transferability of Credits (Section 6418):**

- The IRA extends broad transferability provisions for 45Q. Recipients of the 45Q tax credit may transfer all or any portion of the credit value credit to any third-party, tax-paying entity in exchange for a cash payment during any portion of the 12-year credit window.
- For taxable years beginning after December 31, 2022, taxpayers may elect to transfer certain credits to an unrelated taxpayer. The transfer election is available for tax credits under 45Q.
- Applicable entities” defined for direct pay purposes 9 (i.e., a tax exempt entity, a State or local government, the Tennessee Valley Authority, an Indian Tribal Government, or any Alaska Native Corporation) may not transfer the credits.
- Any consideration paid in respect of the transferred credit must be paid in cash and is not included in income of the transferor (it is treated as tax exempt income for partnerships or S corporations), but is not deductible by the transferee.
- The election to transfer the credits is made on a facility-by-facility basis, and for credits available over an extended period, for each year in which the credit is available.
- Once transferred, the transferee cannot further transfer the relevant credit. Credits which have been carried back or carried forward may not be transferred.

45Q and Carbon Capture

What Changed Under the IRA?

- The IRA broadens the definition of qualified facilities. □
- The capture threshold for credit-eligible power generation facilities will decrease from 500,000 tons of CO₂ emitted per year to 18,750 tons. □
- For industrial facilities, it will decrease from 100,000 tons of CO₂ emitted per year to 12,500 tons.
- For DAC facilities, it will decrease the amount of CO₂ capture requirements from 100,000 tons captured per year to 1,000 tons per year.
- Power generation facilities seeking to qualify for the credit must meet a capture design capacity and requirement of not less than 75% of the CO₂ from the electricity generating unit that will install the capture equipment.

45Q and Carbon Capture

What Changed Under the IRA?

- **Interaction of 45Q and 45V** (relating to the PTC or ITC for green hydrogen)
- **Credit Overlap.** To the extent that the Section the tax credit under Section 45Q Credit is allowed, no tax credits can be taken under Section 45V relating to green hydrogen. The IRA does, however, expressly allow clean hydrogen facilities that produce hydrogen using electricity produced by wind, solar, or nuclear facilities to receive both the clean hydrogen tax credit and the clean energy credit that the wind, solar, and nuclear facilities are eligible to receive.

Environmental Considerations

- **Key Considerations in Project Development and Management**
 - Development / Siting
 - New project or modification of existing project
 - Federal permitting or federal funding
 - Permitting
 - Multi-jurisdictional: federal, tribal, state, and local
 - Multi-segmented: capture, transport/storage, and utilization or permanent sequestration
 - Multi-phased: Construction and operation / closure (for sequestration)
 - Operation and Compliance Management
 - Expertise, systems, and management of change protocols

Environmental Risks

- **Key Risk Areas**

- Regulatory complexity
- “License to operate” hurdles
- Liability for leakage

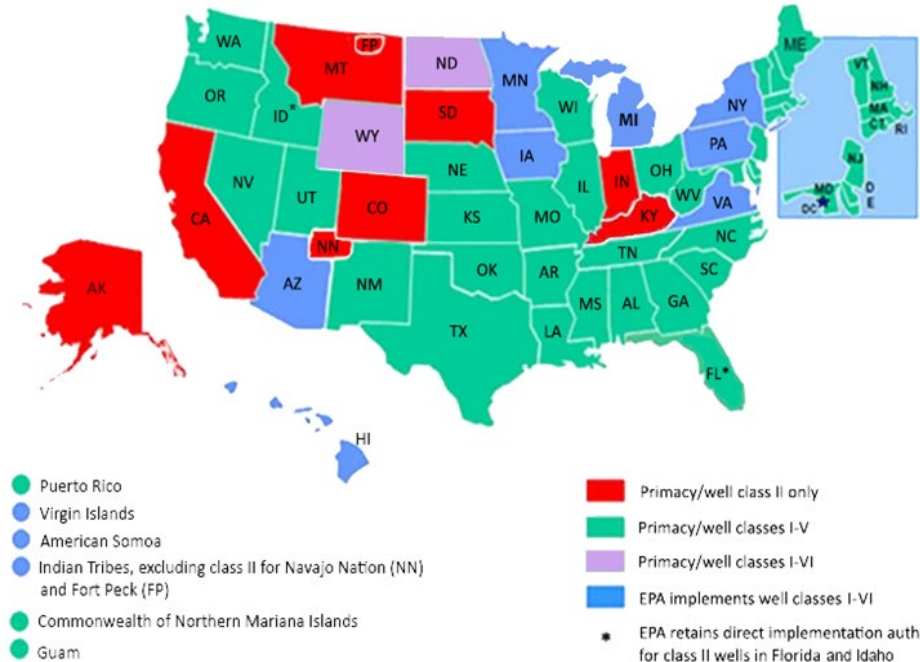
- **Risks Specific to CO₂ Geologic Sequestration Wells**

- Contamination of underground drinking water sources through:
 - vertical migration of CO₂ in the subsurface into shallower drinking water zones or
 - injection pressure-induced movement of water not suitable for drinking into drinking water sources
- Leakage of CO₂ into the ambient air from surface facility components or industrial accidents that could make CO₂ levels harmful to human health;
- Increased CO₂ levels in the soil that could harm plant, animal, and microbial life; and
- Injection pressure-induced seismicity

Class VI CO₂ Geologic Sequestration Wells

- **Permitting**

- U.S. Environmental Protection Agency Safe Drinking Water Act Underground Injection Control (“UIC”) program
- Class VI Wells
- State Primacy
 - ND & WY
 - AZ, LA, TX, WV?



UIC Primacy and Program Revision Applications

	Pre-Application Activities	Completeness Determination	Application Evaluation	Rulemaking and Codification	Application Approved
Primacy Applications	AZ—Classes I-VI*				MI—Class II
Program Revision Applications	WV—Classes I-VI* PR—Classes I-V TX—Class VI*		LA—Class VI*		NM—Class I - Jan. 2022

Primacy Application = new application for a UIC Program (e.g. Class I-V or Class VI)
 Program Revision Application = revision made to an already existing state UIC program
 * State seeking initial primary enforcement responsibility for Class VI

Source: U.S. Environmental Protection Agency Primary Enforcement Authority for the Underground Injection Control Program website (map image above from 9/20/2021), available, including **updated map**, at <https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program-0> (last visited 9/14/2022)

Carbon Capture and Storage Projects in California

- Regulatory Framework
 - No projects yet approved in CA
 - CRC project (TerraVault)
 - Chevron project proposed in Kern County
 - San Joaquin Renewables (turning orchard residue into RNG and storing CO2 from processes)
 - Approximately 3 year process to get Class VI wells permitted through Environmental Protection Agency (EPA)

CA	Fresno	Mendota Carbon Negative Energy Project ProjectCo LLC	N/A	N/A	N/A	Application Withdrawn	Application Withdrawn
CA	Kern	Carbon TerraVault 1, LLC	N/A	N/A	N/A	Pending	Pre-Construction
			N/A	N/A	N/A	Pending	Pre-Construction
CA	Kern	Carbon TerraVault 1, LLC	N/A	N/A	N/A	Pending	Pre-Construction
			N/A	N/A	N/A	Pending	Pre-Construction
			N/A	N/A	N/A	Pending	Pre-Construction
			N/A	N/A	N/A	Pending	Pre-Construction
CA	Kern	San Joaquin Renewables LLC	N/A	N/A	N/A	Pending	Pre-Construction

Carbon Capture and Storage Projects in California

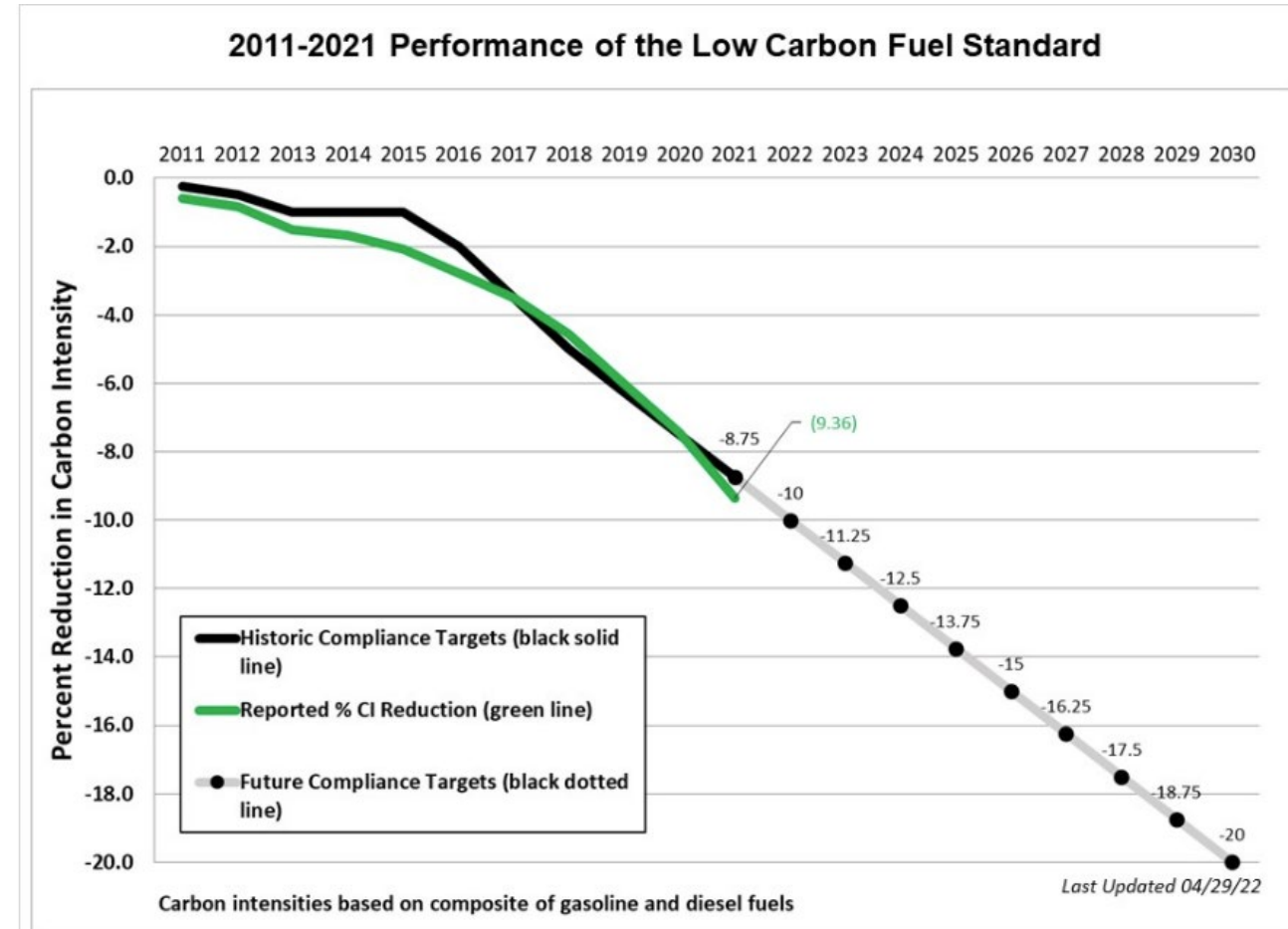
- Other agencies with potential jurisdiction:
 - California Air Resources Board (CARB) (CO2 monitoring, reporting, and verification (MRV) plan, reporting under MRR)
 - State Water Resources Control Board / Regional Water Boards
 - California Geologic Energy Management Division (CalGem)
 - Local air districts
 - State Lands Commission
 - U.S. Fish & Wildlife / California Dept. Fish & Wildlife (UIC permit must find project in compliance with section 7 of ESA)
 - Local governments
 - Tribes (pipelines)
 - Army Corps of Engineers (impacts to waters of the U.S)
 - Bureau of Land Management
 - State Fire Marshall / Pipeline and Hazardous Materials Safety Administration (PHMSA)
 - Coastal Commission

Carbon Capture and Storage Projects in California

- Current Issues
 - Will CA request primacy from EPA for Class VI permitting to reduce timelines?
 - Permitting process needs streamlining to avoid 5+ year approval process
 - State / local permitting and environmental review under CEQA too timely and expensive with high litigation risk
 - Long-term liability
 - Pore space ownership
 - Current rules suggest pore space belongs to surface owner if not separated from mineral estate, but not completely clear
 - CCS bill floated said would not change ownership so likely to remain, but lack of clarity is unhelpful
- Senate Bill 1101
 - Establishes the Geologic Carbon Sequestration Group to provide independent expertise and regulatory guidance to CARB, including identifying:
 - suitable locations for Class VI injection wells,
 - appropriate subsurface monitoring to ensure geologic sequestration, and
 - hazards that may require the suspension of injection.
- Kern County considering streamlined permitting process for CCS

California Low Carbon Fuel Standard (LCFS) (17 CCR § 95480 et seq.)

- Market-based regulatory program designed to decrease the carbon intensity (CI) of California's transportation sector and meet state's aggressive GHG reductions goals.
- Regulated entities include petroleum importers, refineries, and wholesalers.
- Fuels that have a CI lower than the target established by CARB generate "credits," and fuels with CIs higher than CARB's target generate "deficits."
- Entities with deficits must generate or acquire sufficient LCFS credits to be in annual compliance with CARB.



LCFS Credits for CCS

(17 CCR § 95490)

- Types of projects / fuel pathways
 - Direct air capture (DAC) - credits generated by capturer
 - Chemical separation (e.g. absorption membrane separation) of CO₂ directly from ambient air
 - Refinery investment (§ 95489(e)) - credits generated by the refinery
 - CO₂ from steam methane reforming at, or supplying hydrogen to, refinery
 - CO₂ from steam generators and/or combined heat and power plants at a refinery
 - Innovative crude (§ 95489(c)) - credits generated by the crude producer
 - CO₂ from steam methane reforming at a bitumen upgrader
 - CO₂ from steam generators or combined heat and power plants that supply steam, heat, or power at oil field
 - CO₂ from processing of associated gas from crude production at an oil field. Associated gas must be consumed at oil field as part of oil recovery operations.
 - Tier 2 pathways for alternative fuel - credits generated by the alternative fuel producer
 - CO₂ from fermentation during ethanol production
 - CO₂ streams from production of renewable diesel/gasoline
 - CO₂ produced as part of biogas from anaerobic digestion
 - CO₂ from power plants that produce low-CI electricity supplied for eligible transportation uses (EV charging)
 - CO₂ from hydrogen production using steam methane reforming
 - CO₂ from production of any other alternative transportation fuel listed in section 95482(a) of LCFS regulation

LCFS Credits for CCS

- Projects may be located anywhere, but the innovative crude oil or transportation fuel produced and associated with the CCS project must be sold in California markets.
- The credits generated will be pro-rated based on the volumes of fuel sent to California.
- Similarly, DAC projects that store captured CO₂ underground may apply regardless of location.
 - No applications yet.
- LCFS credits may be claimed by the entity that captures the CO₂.
- CO₂ may be captured by one entity and transferred to another entity for sequestration. For crediting, both the capture entity and the sequestering entity must apply as joint applicants.

LCFS Credits for CCS

- Eligible sequestration sites – must be onshore
 - Saline reservoirs
 - Depleted oil and gas reservoirs
 - Oil and gas reservoirs used for CO₂ enhanced oil recovery
- Requirements:
 - Permanence Certification
 - Verification of fuel pathway required under § 95500
 - Annual reporting
 - Recordkeeping
 - Contribute to buffer account for potential invalidation
- Credits invalidated if sequestered CO₂ is leaked to atmosphere
 - Project operator can be held responsible for making up credits for 50 years post-injection

LCFS Credits for CCS

- CCS Protocol – https://ww2.arb.ca.gov/sites/default/files/2020-03/CCS_Protocol_Under_LCFS_8-13-18_ada.pdf
 - 139 pages describing requirements CCS projects must meet in order to generate credits.
 - Permanence requirements described.
 - Contains extensive requirements for site characterization, well construction and corrective action, injection monitoring, remedial and emergency response, reporting, verification, plugging and abandonment, risk assessment and mitigation, design and operation, and financial assurance.
 - **Most scientifically and technically intense portion of CCS project.**
 - Site characterization will be substantial for saline formations, less so for already characterized O&G production fields.
 - Must sequester and monitor for 100 years.
 - Requires 3rd party review.
 - CARB says 1 year turnaround.

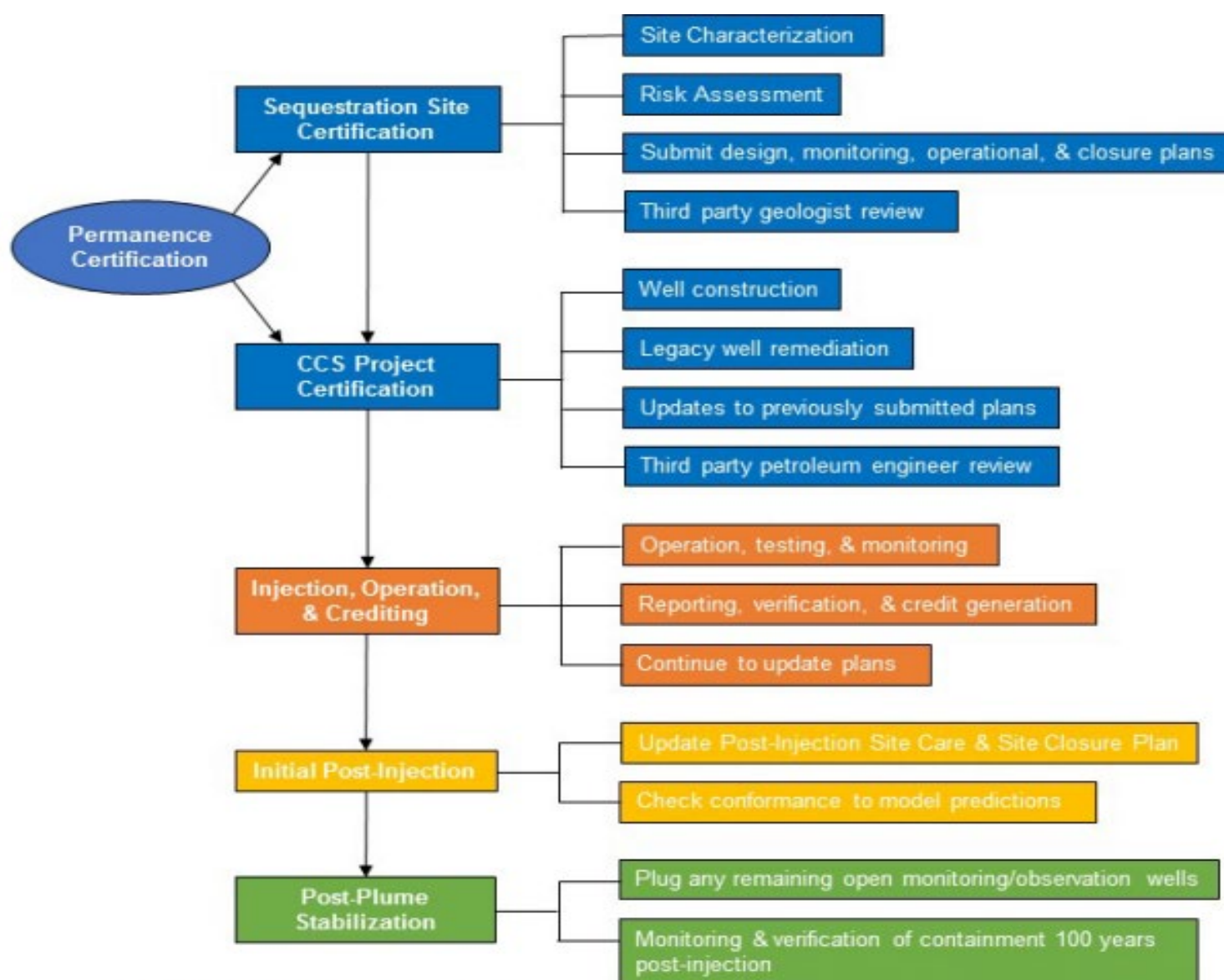
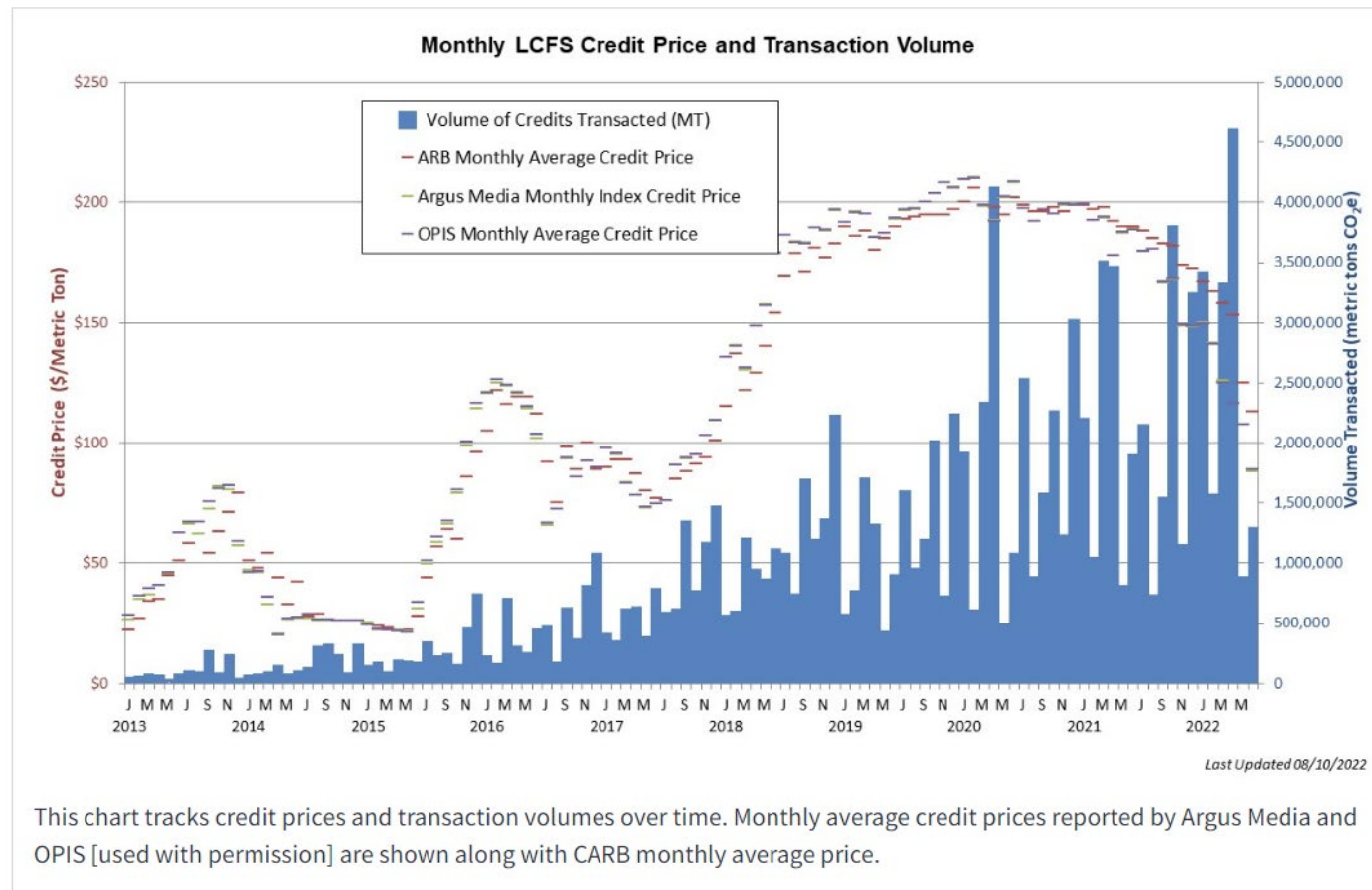


Figure 3. CCS Protocol certification, operation, and closure process.

LCFS Credit Transfers and Prices

- Credits transferred via CARB's Reporting Tool and Credit Bank and Transfer System (LRT-CBTS).
- Prices have recently dropped:
 - \$200 average in 2020
 - \$180 average in 2021, dropping throughout
 - Continued drop in 2022 to below \$100
- Cumulative bank of credits is high

LCFS Weekly Snapshot	29 th August 2022 - 4 th September 2022 ^[1] ^[2]	
Transfer Type	All Non Zero	Type 1
Average Price ^[3] (\$/MT)	\$88.15	\$87.22
Price Range (\$/MT)	\$82.00 - \$110.00	\$85.00 - \$100.00
Total Volume (MT)	214,364	137,246
Total Value (\$)	\$18,896,015	\$11,971,032



Deal Structures/Current Market

- Tax equity capacity can be a big deal
 - Wind, solar, storage, hydrogen
- Advantage of using tax equity is can monetize (for a cost) both the tax credits (0.30 /\$ of capital) and MACRs depreciation (0.14 /\$ of capital)
 - Transaction costs and deal complexity

Deal Structures/Current Market

- Tax equity capacity can be a big deal
 - Wind, solar, storage, hydrogen
 - 50% paygo helpful
- Advantage of using tax equity is can monetize (for a cost) both the tax credits (0.30 /\$ of capital) and MACRs depreciation (0.14 /\$ of capital)
 - Transaction costs and deal complexity
- Tax Equity requires:
 - investment grade rated counterparties
 - sophisticated project participants with track records operating industrial facility, capture equipment, transportation, storage and use of the carbon
- What will be the yield? Will it be wind's 6 to 7% or 12% or more?
- Flip point is 10 years
 - Compared to 8 years for wind

Deal Economics

- The problem with simply owning or financing the capture equipment is the economics of carbon capture become solely dependent on the tax credits without any other revenue source.
 - If capture equipment, pipeline or reservoir goes down, there is no credit or revenue generation, unlike a wind or solar project that can still sell into the spot market
 - The math isn't good
- As a result, we likely will see capture equipment and industrial emitter combined for tax equity transactions
 - The industrial emitter then will have revenue from the sale of its products on top of the tax credits



Deal Economics

- You can't stack carbon capture credits with green hydrogen production or investment tax credits, but you can stack renewable tax credits with green hydrogen tax credits

