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The Tax Credit for Carbon Sequestration (Section 45Q)

Carbon capture and sequestration technologies can reduce greenhouse gas (GHG) emissions from coal- and natural-gas-fired power plants, as well as other large industrial sources. The tax credit for carbon oxide sequestration (Internal Revenue Code [IRC] Section 45Q) is intended to promote investment in carbon capture and sequestration.

What Is Carbon Sequestration?

Geological sequestration of carbon is primarily the process of storing carbon oxides by injecting them into underground geological formations. Usually this process involves carbon dioxide (CO₂), although sequestration of other carbon oxides (e.g., carbon monoxide) is also possible. Geological sequestration is the final step in a Carbon Capture, Utilization, and Storage (CCUS) system. Geological sequestration is intended to permanently trap CO₂ emitted from stationary anthropogenic sources, such as power plants or industrial facilities, thereby reducing net emissions of this GHG into the atmosphere. CO₂ can also be stored underground when injected for enhanced oil recovery (EOR) from aging oil fields, a process used in the United States since the 1970s. Currently, CO₂ used for EOR comes predominantly from natural underground CO₂ reservoirs, although small quantities also come from anthropogenic sources.

An emerging technology to capture CO₂ directly from the atmosphere—“direct air capture” (DAC)—could also serve as a source of CO₂ for geological sequestration or EOR. For additional information on the technical aspects of CCUS, see CRS Report R44902, *Carbon Capture and Sequestration (CCS) in the United States*, by Peter Folger.

The Sequestration Tax Credit (45Q)

The tax credit for carbon oxide sequestration—often referred to using its IRC section, 45Q—is computed per metric ton of qualified carbon oxide captured and sequestered. (Before 2018, the tax credit was exclusively for CO₂.) The amount of the credit, as well as various features of the credit, depend on when the qualifying capture equipment was placed in service (**Table 1**). The Bipartisan Budget Act of 2018 (P.L. 115-123), which was signed into law on February 9, 2018, made numerous changes to the Section 45Q tax credit, as discussed below.

For the purposes of the tax credit, qualified carbon oxide is that which would have been released into the atmosphere if not for the qualifying equipment. To claim a tax credit for emissions, the emissions must be measured at the point of capture as well as point of disposal, injection, or other use. If the captured carbon oxide is being stored, it must be disposed of in “secure geological storage.” Per IRC Section 45Q, secure geological storage includes “storage at deep saline formations, oil and gas reservoirs, and unminable

coal seams.” Tax credits claimed for captured and sequestered carbon oxide may be recaptured, meaning the taxpayer has to return the amount of the tax credit to the Treasury if the carbon oxide ceases to be captured, disposed of, or used in a qualifying manner (i.e., if it escapes into the atmosphere).

Table 1. Key Elements of the Section 45Q Credit

Equipment Placed in Service Before 2/9/2018	Equipment Placed in Service on 2/9/2018 or Later
Credit Amount (per Metric Ton of CO₂)*	
<i>Geologically Sequestered CO₂</i>	
\$23.40 in 2019. Inflation-adjusted annually.	\$28.74 in 2019. Increasing to \$50 by 2026, then inflation-adjusted.
<i>Geologically Sequestered CO₂ with EOR</i>	
\$11.70 in 2019. Inflation-adjusted annually.	\$17.76 in 2019. Increasing to \$35 by 2026, then inflation-adjusted.
<i>Other Qualified Use of CO₂</i>	
None.	\$17.76 in 2019. Increasing to \$35 by 2026, then inflation-adjusted.
Claim Period	
Available until 75 million tons of CO ₂ have been captured and sequestered.	12-year period once facility is placed in service.
Qualifying Facilities	
Capture carbon after 10/3/2008.	Begin construction before 1/1/2024.
Annual Capture Requirements	
Capture at least 500,000 metric tons.	<i>Power plants:</i> capture at least 500,000 metric tons. <i>Facilities that emit no more than 500,000 metric tons per year:</i> capture at least 25,000 metric tons. <i>DAC and other capture facilities:</i> capture at least 100,000 metric tons.
Eligibility to Claim Credit	
Person who captures and physically or contractually ensures the disposal, utilization, or use as a tertiary injectant of the CO ₂ .	Person who owns the capture equipment and physically or contractually ensures the disposal, utilization, or use as a tertiary injectant of the CO ₂ .

Source: CRS analysis of IRC Section 45Q.

*After 2017, the credit can be claimed for all carbon oxides, not just CO₂. “CO₂” is used throughout the table for simplification.

CO₂ captured using equipment placed in service before February 9, 2018, may qualify for tax credits until tax credits have been claimed for 75 million metric tons of CO₂. In May 2019, the Internal Revenue Service (IRS) reported that the credit had been claimed for nearly 63 million metric tons, or 84% of the limit.

Legislative Background

A credit for CO₂ sequestration was added to the tax code in the Energy Improvement and Extension Act of 2008, enacted as Division B of P.L. 110-343. The legislation included several provisions designed to encourage cleaner, more efficient, and environmentally responsible use of coal specifically and GHG emissions reductions broadly.

The Bipartisan Budget Act of 2018 (P.L. 115-123) expanded and extended the 45Q tax credit. Key changes included (**Table 1**): (1) a larger credit amount; (2) a start-of-construction deadline and 12-year claim period instead of the 75 million metric ton cap; (3) allowing the credit for use of CO₂ in addition to EOR and for DAC, as well as allowing smaller facilities to claim the credit; and (4) allowing owners of carbon capture equipment to claim tax credits instead of the person capturing the CO₂, which creates flexibility in ownership structures facilitating tax-equity investment.

Cost Estimates

Tax expenditure estimates, or estimates of the amount of revenue foregone due to taxpayers’ ability to claim the tax credit, provide information on the “cost” of the Section 45Q tax credit. In December 2019, the Joint Committee on Taxation’s (JCT) estimated that the tax expenditure associated with the Section 45Q credit would be less than \$50 million per year through 2023 (the *de minimis* amount), or about \$0.1 billion over the five-year period spanning 2019-2023. The Department of the Treasury’s Section 45Q tax expenditure estimates, published in February 2020, are greater than JCT’s at \$0.6 billion over the 2019-2023 five-year period, or \$2.3 billion from 2020-2029, suggesting an increase in tax credit claims in later years. The variation in these estimates reflects, in part, uncertainty regarding the speed of CCUS deployment.

CCUS in the United States

To date in the United States, nine projects have injected large volumes (i.e., at least 1 million tons each) of CO₂ into underground formations as part of CCUS systems or related EOR research and development (R&D) projects. Four of these projects are currently injecting and storing CO₂. Two projects—a hydrogen production facility in Texas and a natural gas processing facility in Michigan—are injecting CO₂ for EOR. The Illinois Industrial Carbon Capture and Storage Project is injecting CO₂ from an ethanol production plant for geologic sequestration into an onsite sandstone formation. All of these projects operate through collaborations among the Department of Energy, industry, and local research institutions.

At this time, no large-scale commercial sequestration projects are operating and injecting large volumes of CO₂ for the sole purpose of geologic sequestration. The Petra Nova facility in Texas is the first operating industrial-scale coal-fired electricity generating plant with a CCS system in the United States. The captured CO₂ is transported by pipeline to an oil field where it is injected for EOR.

For the near future, CCS projects will likely continue to capture CO₂ for EOR, in part to generate revenue and offset the costs of capture. CCS projects will also likely involve coal- and natural-gas-fired power plants, although Department of Energy R&D could help expand CCS at industrial facilities that emit CO₂, such as fertilizer production plants, steel plants, or hydrogen and other chemical production facilities.

Issues for Congress

Industry stakeholders and lawmakers have expressed concern regarding the lack of guidance and regulations related to implementation of the tax credit. The IRS issued guidance in February 2020 related to determining the start-of-construction deadline and the allocation of credits among project partners. This guidance did not address issues related to determining secure geological storage or tax credit recapture.

Three bills in the 116th Congress—H.R. 5166, H.R. 5883, and S. 2263—would modify the 45Q tax credit. H.R. 5166 would extend the start-of-construction deadline for one year until January 1, 2025. H.R. 5883 would increase the tax credit for DAC facilities, remove the start-of-construction deadline, and reduce the amount of carbon oxide required to be captured by DAC facilities. S. 2263 would amend Section 45Q, by changing what is considered “secure geological storage” of carbon oxide. To qualify as secure storage, the carbon oxide would need to be stored in compliance with existing EPA rules, the Clean Air Act, and the Safe Drinking Water Act. S. 2263 would also set out eligibility requirements for tax credits for carbon oxide storage associated with EOR.

Recent discussions have revealed differing perspectives in Congress regarding tax credits for EOR, which some view as subsidizing the continued development and use of fossil fuels. Tax policy is one potential policy option for supporting CCUS through reducing project cost. Congress may consider these policies in conjunction with other legislative options such as CCUS R&D and appropriations to agencies and programs involved in CCUS. For discussion of other policy options and legislative proposals, see CRS Report R46192, *Injection and Geologic Sequestration of Carbon Dioxide: Federal Role and Issues for Congress*, by Angela C. Jones.

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