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The Tax Credit for Carbon Sequestration (Section 45Q)

Carbon capture and sequestration (CCS) technologies are being proposed as an option to 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 incentivize investment in carbon capture and sequestration.

What Is Carbon Sequestration?

Geological sequestration of carbon is the process of injecting carbon oxides into underground geological formations, where they are either permanently trapped or transformed. Usually this process involves carbon dioxide (CO₂), although injection and sequestration of other carbon oxides (e.g., carbon monoxide) is also possible. Geological sequestration is the final step in a CCS system. Geological sequestration is intended to permanently trap CO₂ emitted from anthropogenic sources, such as power plants or industrial facilities, thereby reducing net emissions of this GHG into the atmosphere. CO₂ can also be sequestered when injected underground for “tertiary” oil recovery, also known as 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 injected for geological sequestration or EOR. For additional information on the technical aspects of CCS, see CRS Report R44902, *Carbon Capture and Sequestration (CCS) in the United States*.

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 is 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 a carbon oxide that would have been released into the atmosphere if not for the qualifying equipment. To claim a tax credit, the emissions must be measured at the point of capture as well as at the point of disposal, injection, or other use. If the captured carbon oxide is intended to be sequestered, 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.” The taxpayer has to repay the tax credit (credit recapture) 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>	
\$23.82 in 2020. Inflation-adjusted annually.	\$31.77 in 2020. Increasing to \$50 by 2026, then inflation-adjusted.
<i>Geologically Sequestered CO₂ with EOR</i>	
\$11.91 in 2020. Inflation-adjusted annually.	\$20.22 in 2020. Increasing to \$35 by 2026, then inflation-adjusted.
<i>Other Qualified Use of CO₂</i>	
None.	\$20.22 in 2020. 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 1/1/2026.
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 June 2020 (the last data available), the Internal Revenue Service (IRS) reported that the credit had been claimed for approximately 72 million metric tons, or 96% of the limit.

Legislative and Regulatory Background

A credit for CO₂ sequestration was added to the tax code in the Energy Improvement and Extension Act of 2008 (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. Changes included (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 CO₂ utilization 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. The deadline to begin construction was extended for two years, to January 1, 2026, in the Taxpayer Certainty and Disaster Tax Relief Act of 2020 (Division EE of the Consolidated Appropriations Act, 2021; P.L. 116-260).

In January 2021, the IRS issued final regulations for claiming Section 45Q credits (26 U.S.C §45Q). Among the issues addressed in these regulations were requirements for “secure geological storage,” credit recapture, and taxpayers eligible to claim the credit.

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 November 2020, the Joint Committee on Taxation (JCT) estimated that tax expenditures associated with the Section 45Q credit would be less than \$50 million per year (the de minimis amount) through 2024, or about \$0.1 billion over the 2020-2024 five-year period. The Department of the Treasury February 2020 tax expenditure estimates for Section 45Q tax expenditures were \$0.6 billion during the 2019-2023 five-year period, or \$2.3 billion from 2020-2029, suggesting an expected increase in tax credit claims in later years. The variation in these estimates reflects, in part, uncertainty regarding the speed of CCS deployment. Neither of these estimates reflects the additional reduction in federal tax revenue from the credit’s two-year extension in P.L. 116-230, which JCT estimated to be of \$0.6 billion over the 2021-2030 budget window.

CCS in the United States

According to the Global CCS Institute (GCCSI), 12 projects capturing and injecting CO₂ are operating in the United

States. One project, Illinois Industrial Carbon Capture and Storage, has injected large volumes of CO₂ (over 1 million metric tons) from an ethanol production plant for geologic sequestration into an underground sandstone formation. The other 11 projects, according to GCCSI, are capturing and injecting CO₂ for EOR after using CO₂ from natural gas processing, hydrogen production, or fertilizer production operations. The Petra Nova facility in Texas was the first industrial-scale coal-fired electricity generating plant with a CCS system in the United States and used the captured CO₂ for EOR. The facility suspended CCS operations in 2020, however, citing economic challenges.

In the near term, most CCS projects will likely continue to capture and inject CO₂ for EOR, in part to generate revenue and offset the costs of capture. The U.S. Department of Energy, as well as governments and private companies in several global regions, are currently conducting CCS research, development, and deployment activities. These include research projects for large-scale (over 50 million metric ton) saline formation sequestration and applications at industrial facilities that emit CO₂, such as ethanol, cement, and chemical production plants.

Issues for Congress

Issues in the 117th Congress related to the Section 45Q tax credit might include oversight or potential legislation to modify the statute. In recent years, some Members of Congress have raised concerns about potentially fraudulent Section 45Q tax credit claims. In April 2020, the IRS Inspector General for Tax Administration responded to a series of questions from some Members regarding the taxpayers claiming the credit; monitoring, reporting, and verification requirements; and potential enforcement options in cases of fraudulent claims. Congress may consider whether the IRS has adequately addressed concerns about improper claims through its responses to Congress, guidance, and recent Section 45Q regulations.

There are differing perspectives regarding tax credits for EOR. Some support tax credits for EOR as a mitigation strategy to reduce CO₂ emissions into the atmosphere, while others view policies promoting EOR as subsidizing the continued development and use of fossil fuels. Congress may address policy issues regarding the Section 45Q credit for CO₂ sequestered during EOR and related statutory and regulatory requirements. There are a range of options for modifying and expanding the credit, should a greater tax incentive for CCS be sought. For example, an elective payment could be provided as an alternative to the tax credit, making it easier for projects with limited tax liability to benefit from the incentive. Another option would be to expand the credit for certain technologies, such as DAC.

Tax policy is an option Congress may use for supporting EOR, DAC, and CCS technologies and projects. Tax incentives may be considered in conjunction with other legislative options such as CCS R&D and appropriations to agencies and programs involved in CCS.

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