Summary of Carbon Storage Incentives and Potential Legislation: East Sub-Basin Project

Task 3.1 Business and Financial Case Study

Topical Report

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CARBONSAFE ILLINOIS EAST SUB-BASIN

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Executive Summary

The CarbonSAFE Illinois – East Sub-Basin project is conducting a pre-feasibility assessment for commercial-scale CO_2 geological storage complexes. The project aims to identify sites capable of storing more than 50 million tons of industrially-sourced CO_2. To support the business development assessment of the economic viability of potential sites in the East Sub-Basin and explore conditions under which a carbon capture and storage (CCS)[1] project therein might be revenue positive, this document provides a summary of carbon storage incentives and legislation of potential relevance to the project.

I. Introduction

The CarbonSAFE Illinois – East Sub-Basin project is conducting a pre-feasibility assessment for commercial-scale CO_2 geological storage complexes. The project aims to identify sites capable of storing more than 50 million tons of industrially-sourced CO_2. To support the business development assessment of the economic viability of potential sites in the East Sub-Basin and explore conditions under which a carbon capture and storage (CCS)[2] project therein might be revenue positive, this document provides a summary of carbon storage incentives and legislation of potential relevance to the project.

At the Federal level, tax credits for carbon capture and storage under 26. U.S. Code § 45Q constitute the greatest incentive targeted at CCS projects. The amendment to these credits put forth in the Bipartisan Budget Act of 2018 substantially increases the per-ton incentive for carbon capture and storage.[3] Previous incentives were limited to $20 per ton of CO_2 not used as an injectant or $10 per ton of CO_2 used as an injectant and limited to a cap of 75 million metric tons for which the credits could be claimed. Under the Bipartisan Budget Act of 2018, the incentives have escalated to $12.83 per ton to $22.66 per ton in tax year 2017 and up to $35 per ton to $50 per ton in tax year 2027.[4] In addition, the Act removed the "cap" on tons of qualified carbon oxide eligible for the

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[3] 26 U.S. Code § 45Q, as amended by H.R. 1892 – Bipartisan Budget Act of 2018, Sec. 41119. Enhancement of Carbon Dioxide Sequestration Credit, wherein Sec. 41119(a) establishes amendments to Section 45Q, Credits for "Carbon Oxide Sequestration" [sic].

[4] 26 U.S. Code § 45Q, as amended by H.R. 1892 – Bipartisan Budget Act of 2018, Sec. 41119, Enhancement of Carbon Dioxide Sequestration Credit. The Act states that the credit shall be: (1) the dollar amount established by linear interpolation between $22.66 and $50.00 for each calendar year after 2016 and before 2027 per metric ton of qualified carbon oxide, which is captured and disposed of in secure geological storage and not used as a tertiary injectant; and (2)

credit, increasing the certainty of the availability of these credits in future years. Facilities eligible for the 45Q tax credits include:

1) Electricity-generating facilities that capture at least 500,000 metric tons of qualified carbon oxide in a taxable year;

2) Other types of facilities, including direct air capture facilities that capture at least 100,000 tons of qualified carbon oxide in a taxable year; and

3) Facilities that capture between 25,000 and 500,000 metric tons of qualified carbon oxide during the taxable year and use the captured carbon oxide for non-tertiary injectant uses as detailed in 26 U.S. Code § 45Q(f)(5).[5]

In addition, the Federal government offers tax credits under 26 U.S. Code § 48A and 48B. The investment tax credits therein apply to qualifying advanced coal projects, including those that capture and store qualified carbon dioxide. These credits must be applied for on a competitive basis, and are awarded by the Secretary of the Treasury, potentially limiting the extent to which they can be relied upon for an affirmative business case.[6] Notably, the 48A and 48B tax credits have in-service deadlines of five years and seven years, respectively, constraining the types of projects that may be able to receive these credits.[7]

Table 1 summarizes the current Federal incentives under 26. U.S. Code §§ 45Q, 48A, and 48B.

Several bills raised in the 115th Congress, if passed into law, may provide additional incentives that enhance the profitability, and by extension the affordability, of CCS projects. Some aspects of these bills have been incorporated into the Bipartisan Budget Act of 2018; but, others, if passed into law,

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the dollar amount established by linear interpolation between $12.83 and $35.00 for each calendar year after 2016 and before 2027 per metric ton of carbon oxide [sic] which is captured and used as a tertiary injectant in an enhanced oil or natural gas recovery project and disposed of in secure geological storage.

[5] Because 26 U.S. Code § 45Q(f)(5)(A)(iii) reads that one of these "other uses" is "the use of such qualified carbon oxide for any other purpose for which a commercial market exists (with the exception of use as a tertiary injectant in a qualified enhanced oil or natural gas recovery project), as determined by the Secretary," this indicates that any other use of captured carbon oxide aside from enhanced oil recovery (EOR) may qualify for the credit pending Secretary determination, so long as the facility captures between 25,000 and 500,000 metric tons during the taxable year.

[6] 26 U.S. Code, § 48A(e)(3) outlines the priority and selection criteria for awarding 48A credits. These include giving highest priority to projects with the greatest separation and storage percentage of total carbon dioxide emissions, and also instructing the Secretary of the Treasury to determine which, and give "high priority" to, projects include: (i) greenhouse gas [sic] capture capability, (ii) increased by-product utilization, (iii) a research partnership with an eligible educational institution, and (iv) "other" benefits. The priority and selection criteria for awarding 48B credits are found in 26 U.S. Code, § 48B(d)(4), and similarly require that the Secretary of the Treasury give "highest priority" to projects with the greatest separation and storage percentage of total carbon dioxide emissions, and give "high priority" to applicant participants with a research partnership with an educational institution.

[7] 26 U.S. Code §§ 48A and 48B. In-service deadlines for the 48A tax credit are located in 26 U.S. Code § 48A(d)(2)(E), which states: "An applicant which receives a certification shall have 5 years from the date of issuance of the certification in order to place the project in service and if such project is not placed in service by that time period then the certification shall no longer be valid." 26 U.S. Code § 48B does not provide a placed-in-service requirement, but the Congressional Research Service noted in 2014: "For Section 48B credits allocated starting in 2009, there is a seven-year placed-in-service requirement." See Peter Folger and Molly F. Sherlock, "Clean Coal Loan Guarantees and Tax Incentives: Issues in Brief," Congressional Research Service, August 19, 2014, https://fas.org/sgp/crs/misc/R43690.pdf.

could further expand the incentives for CCS, or the types of projects eligible for incentives. These bills are summarized in Table 2.

At the State level, the Illinois Clean Coal Portfolio Standard (CCPS) of 2009 is the only legislation that exclusively targets CCS project development and deployment.[8] The CCPS provides tax credits for facilities that capture at least 50 percent of their total CO_2 emissions. However, high capital costs and a utility rate cap (at roughly two percent) that limits the proportion of CCS-associated costs that can be passed through to consumers have prevented facilities from meeting the stated goals.[9] Table 3 summarizes the CCPS and other State-level incentive programs in Illinois. Note, some of the listed programs may be defunct or inactive as of 2018.
Any business case for a project using an East Basin site should consider the value of the increased tax credits under 26 U.S. Code § 45Q, especially given the Bipartisan Budget Act of 2018's revision increasing the per-ton tax credit over time. A business case also should evaluate the feasibility of the project to qualify for 26 U.S. Code § 48A or 48B tax credits, to the extent the project is capable of meeting the year-in-service deadlines for carbon capture and storage associated with these credits. Preliminary research suggests that no meaningful tax credits or R&D incentives for CCS exist at the state-level that would be relevant to an East Basin site business case. Research suggests that any revenue-positive business case for an East Basin site likely will need to be supported by Federal tax credits, and the sale of CO_2 for enhanced oil recovery (EOR).

The 2009 Midwest Governor's Association did not show any Indiana incentives for CCS. We did not do a business case study for Indiana because of the lack of incentives.

Table 4 summarizes additional Federal and State legislation potentially relevant to an East Basin site, and which may yield support for a revenue-positive business case, beyond that which evolves from the Federal 45Q credits.

[8] Illinois Public Act 095-1027, available online at: http://ilga.gov/legislation/publicacts/95/PDF/095-1027.pdf, codified within Illinois Combined Statutes, Chapter 20, Section 3855, Articles 1-5, available online at: http://www.ilga.gov/legislation/publicacts/95/095-1027.htm.

[9] Pursuant to Illinois Combined Statutes, Chapter 20, Section 3855, Sec. 1-75(d)(E), there is a limit of 2.015 percent on any increase to be paid by electric service customers as a result of energy purchases constituent with the Clean Coal Portfolio Standard.

Table 1. Federal Incentives for CCS

Incentive	Regulatory Citation	Incentive Amount	Eligibility	Potential Limitations	Notes	Hyperlink
45Q: Credit for Carbon Oxide Sequestration	26 U.S. Code § 45Q *As amended by the Bipartisan Budget Act of 2018*	$22.66 to $50 (established by interpolation between 2017 and 2027) per metric ton of CO_2 that is captured and disposed of by the taxpayer in secure geological storage, and not used by the taxpayer as an injectant *or* $18.32 to $35 (established by interpolation between 2017 and 2027) per metric ton of CO_2 that is captured and used by the taxpayer as a tertiary injectant in a qualified enhanced oil or natural gas recovery project, and disposed of in secure geological storage.	1) Electricity generating facilities not covered under that capture no less than 500,000 metric tons during the taxable year; 2) Other types of facilities, including direct air capture facilities, that capture no less than 100,000 metric tons during the taxable year; and/or 3) Facilities that capture between 25,000 and 500,000 metric tons during the taxable year and use the captured carbon oxide for non-tertiary injectant uses, as detailed under 26 U.S. Code § 45Q(f)(5); Eligible facilities must have had construction begin before January 1, 2024.	Tax-exempt electric cooperatives and municipal utilities not incentivized to participate in CCS projects.	Prior tax credit for CO_2 captured and disposed of by the taxpayer in secure geological storage, and not used by the taxpayer as an injectant was $20 per metric ton. The Bipartisan Budget Act of 2018 revised this to $22.66 to $50 (established by interpolation between 2017 and 2027). Prior tax credit for CO_2 captured and used by the taxpayer as a tertiary injectant in a qualified enhanced oil or natural gas recovery project, and disposed of in secure geological storage. was $10 per metric ton. The Bipartisan Budget Act of 2018 revised this to $18.32 to $35 (established by interpolation between 2017 and 2027).	https://www.appropriations.senate.gov/imo/media/doc/Bipartisan%20Budget%20Act%20of%202018.pdf
48A: Qualifying Advanced Coal Project Credit	26 U.S. Code § 48A	Investment tax credit of 30% of advanced coal-based electricity generation technologies (ACBGT) project costs within a tax year, subject to a $1.25 billion total allocation.	Taxpayers who complete the construction / reconstruction of an eligible project, or acquire property and commence qualifying advanced coal projects.	Credits awarded by the Secretary of the Treasury on competitive basis – uncertainty on whether a given project will receive credits. 5-year in-service deadline, i.e., projects certified as eligible for the credit must be placed into service and capture and store carbon by the deadline.	When credits are awarded, highest priority must be given to projects with the greatest capture and storage of CO_2 emissions. Further research is necessary to determine whether any CCS projects have received 48A credits.	https://www.law.cornell.edu/uscode/text/26/48A
48B: Qualifying Gasification Project Credit	26 U.S. Code § 48B	Investment tax credit of 30% of project costs for qualifying gasification projects which include equipment that captures and stores at least 75 percent of such project's total CO_2 emissions within a taxable year, subject to a $250 million total allocation.	Same as 48A, but for qualifying gasification projects.	Credits awarded by the Secretary of the Treasury on competitive basis – uncertainty on whether a given project will receive credits. 7-year in-service deadline, i.e., projects certified as eligible for the credit must be placed into service and store carbon by the deadline.	When credits are awarded, highest priority must be given to projects with the greatest capture and storage of CO_2 emissions. Unclear whether any CCS projects have received 48B credits.	https://www.law.cornell.edu/uscode/text/26/48B

Table 2. Pending or Potential Federal Legislation that May Affect CCS Incentives

Bill	Description	Potential Impact	Notes
2018 H.R. 3354: Department of the Interior, Environment, and Related Agencies Appropriations Act	Provides FY2018 appropriations, including up to $2 billion for the principal amount of direct and guaranteed loans for the construction, acquisition, or improvement of fossil-fueled electric generating plants (whether new or existing) that use carbon capture and storage systems.	Would provide additional funding towards CCS project development in the form of loan guarantees.	Passed House. Read in Senate for a second time, then placed on Senate Legislative Calendar under General Orders. Future status unclear.
S.1535: Furthering carbon capture, Utilization, Technology, Underground storage, and Reduced Emissions – FUTURE Act	Expands the credit for carbon dioxide capture and storage by including taxpayers with other air capture facilities, all carbon oxides, other carbon oxide uses besides EOR, allowing taxpayers to claim credits for 12 years, and allowing the transfer of credits.	Extends the eligibility of the 45Q credits.	Read twice in the Senate and referred to the Committee on Finance on July 12, 2017. Partially addressed by the revisions to 45Q as part of the Bipartisan Budget Act of 2018, including the expansion to all carbon oxides and the allowance of credit claims for 12 years.
H.R. 3761: Carbon Capture Act	Lowers the eligibility threshold for the 45Q tax credits from 500,000 tons to 100,000 tons of CO_2 per year to allow ethanol and fertilizer plants to participate. Extends 45Q credits to include other carbon oxides. Extends 45Q credits beyond the 75 million ton cap. Increases the credit to $35 per ton over 10 years. Authorizes the assignment of the credit to other entities responsible for managing or storing CO_2 to allow tax-exempt electric co-ops and other project developers without significant tax liability to use the incentive.	Extends the eligibility of the 45Q credits and increases their amount.	Originally H.R. 4622 in 114th Congress, then reintroduced for 115th Congress. Referred to the House Committee on Ways and Means on September 13, 2017. Partially addressed by the revisions to 45Q as part of the Bipartisan Budget Act of 2018, including the expansion to all carbon oxides, the increase in the credit, and the removal of the 75 million ton cap. Critically, the Bipartisan Budget Act of 2018 did not lower the eligibility threshold from 500,000 tons.
S.843: Carbon Capture Improvement Act of 2017	Amends the Internal Revenue Service (IRS) Code to authorize the issuance of tax-exempt facility bonds for the financing of qualified CO_2 capture facilities.	Promotes access to lower-cost financing for private businesses that are purchasing CCS equipment through tax-exempt bonds; would provide an alternative pathway for CCS financing not presently available.	Read twice in the Senate and referred to the Committee on Finance on April 5, 2017. Future status unclear.
H.R. 2014: Tax Pollution, Not Profits Act	Amends the IRS Code to impose an excise tax on certain greenhouse gas [sic] emissions, equal to $30 per metric ton of CO_2 or CO_2 equivalent in 2018, increasing each subsequent year at 4% above inflation.	Incentivizes CCS to avoid tax penalties associated with CO_2 and increasing the effective tax savings from CCS when combined with 45Q credits.	Referred to the House Committee on Education and the Workforce on April 6, 2017. Future status unclear.

Table 3. Policies and Incentives for CCS in the State of Illinois

Program or Policy	Description	Potential Impact	Notes
Illinois Public Act 095-1027: Clean Coal Portfolio Standard Law, effective 2009 Illinois Combined Statutes, Chapter 20, Section 3855, Articles 1-5: http://www.ilga.gov/legislation/publicacts/95/095-1027.htm	A statewide framework for developing clean coal facilities that recapture at least 50 percent of their total CO_2 emissions and comply with the limits for other regulated pollutants. Requires electric utilities and suppliers in Illinois to purchase up to 5% of electricity from clean coal facilities; stipulates that Illinois should get 25% of its electricity supply from clean coal by 2025. Guarantees 30-year electricity purchase agreements to clean coal facilities.	Guarantees demand for electricity from clean coal facilities. Impact limited due to rate increase cap of 2.015% on electric utility customers due to CCS investments.	While the law is still active and codified in Illinois statutes, it does not appear that Illinois' electricity is being generated by clean coal facilities to the extent required. As of 2016, Energy Wire reported that no electricity within the state had been generated by a facility with CCS: https://ilcleanjobs.org/4516-ill-clean-energy-standards-slipping-away-as-policy-stalemates-drag-on-report-says/.
Illinois Coal Demonstration Program	**Program no longer appears to be active.** Partial funding for large-scale demonstrate and deployment of advanced coal systems for electric utility and industrial use, including clean coal/CCS technology.	N/A	If program active, funding not restricted to CCS projects only; CCS projects would need to complete with other eligible projects for funding.
Illinois Coal Revival Program	**Program no longer appears to be active.** Provides grants for the development of new coal-fueled electric generation and gasification facilities, including those using CCS.	N/A	If program active, funding not restricted to CCS projects only; CCS projects would need to complete with other eligible projects for funding.
Southern Illinois University Clean Coal Review Board	**Program no longer appears to be active.** Oversees development and implementation of projects funded from a $25 million grant for clean coal projects and programs.	N/A	Last Board meeting was in 2014.

Table 4. Additional Programs, Policies, or Incentives Informing the CCS Business Case

Program or Policy	Description	Potential Impact	Notes
Federal Programs			
Clean Coal Power Initiative (CCPI)	Cost-shared partnership between government and industry to develop and demonstrate advanced commercial-scale coal-based power generation technologies, including CCS.	Subsidy for CCS research and development, unlikely to be relevant to East Basin project.	Funding is limited. Administered by National Energy Technology Laboratory (NETL), part of DOE.
Energy Policy Act of 2005, Section 1703 Loan Guarantee	DOE supports innovative clean energy technologies that are typically unable to obtain conventional private financing, so long as those technologies avoid, reduce, or store air pollutants or emissions of greenhouse gases.	Potentially-favorable financing for CCS projects.	Only two projects have received Section 1703 loan guarantees to date, both of which focused on nuclear power.
Pending or Potential Federal Legislation			
H.R. 589: Department of Energy Research and Innovation Act	Instructs DOE to allow specified DOE National Laboratories to use funds authorized to support technology transfer within DOE to carry out early stage and pre-commercial technology demonstrations to remove technology barriers limiting private sector interest and demonstrate potential commercial applications of research and technologies arising from activities of the national laboratories, including CCS.	Continuance of activities similar to those DOE has undertaken with its CarbonSAFE initative.	Passed House, received in Senate, read twice, referred to Committee on Energy and Natural Resources on January 30, 2017.
H.R. 2010, H.R. 4857, S.1663	Revise requirements for secure geological storage of CO_2 for tax credits.	Not a credit in and of itself, but clarifies the requirements surrounding qualification for 45Q tax credits.	--
H.R. 2296	Directs DOE to carry out research and development technology to improve the conversion, use, and storage of CO_2 from fossil fuels.	Promotes CCS research and development, but not directly relevant to East Basin project.	--
S.1406, H.R. 2995	Establish a U.S. Green Bank to provide financial support to assist regional, state, and local institutions financing clean energy projects or energy efficiency projects that reduce energy use or substantially reduce greenhouse gas emissions, including CCS.	Potentially-favorable financing for CCS projects.	--