National and Regional Collaborative Efforts to Develop CCUS Projects / 45Q and other updates

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1972: Val Verde Gas Processing Plants in Texas
1982: Koch Nitrogen Company Enid Fertilizer Plant in Oklahoma
1986: Exxon Shute Creek Gas Processing Facility in Wyoming
2000: Dakota Gasification’s Great Plains Synfuels Coal Gasification Plant in North Dakota
2003: Core Energy/South Chester Gas Processing Plant in Michigan
2009: Chaparral/Conestoga Energy Partners’ Arkalon Bioethanol Plant in Kansas
2010: Occidental Petroleum’s Century gas processing plant in Texas
2012: Air Products Port Arthur Refinery Hydrogen Production in Texas
2012: Conestoga Energy Partners/PetroSantander Bonanza Bioethanol Plant in Kansas
2013: ConocoPhillips Lost Cabin Gas Processing Plant in Wyoming
2013: Chaparral/CVR Energy Coffeyville Fertilizer Gasification Plant in Kansas
2014: SaskPower Boundary Dam Coal Power Plant Post-Combustion Capture Retrofit in Saskatchewan
2015: Shell Quest hydrogen production at bitumen upgrader in Alberta
2016: Emirates Steel’s Mussafah direct reduction iron plant in the United Arab Emirates
2017: NRG Petra Nova Coal Plant Post-Combustion Retrofit in Texas
2017: Archer Daniels Midland large-scale ethanol capture in Illinois

Carbon Capture Works: Nearly 50 Years of Commercial Experience

There are nearly 5,000 miles of CO₂ pipeline infrastructure in the U.S.
Carbon Capture is Scalable and Delivers Domestic Energy Production, Jobs & Emissions Reduction Benefits

- U.S. oil industry has purchased, transported and injected nearly 1.5 billion tons of CO₂ over the past half century with no fatalities, serious injuries, or major environmental incidents (~65 million tons of CO₂ annually; nearly 4 percent of U.S. oil production).

- ~37% net lifecycle emissions reductions achieved through geologically storing industrial and power plant CO₂ through **enhanced oil recovery (EOR)**, including the additional oil produced (IEA analysis).

- Saline geologic storage of CO₂ has been demonstrated successfully at scale (e.g. ADM in Illinois and Equinor in the North Sea) and achieves even greater lifecycle emissions reductions, including potentially atmospheric carbon removal for negative emissions.

- Over a century’s worth of U.S. annual stationary source emissions can be stored in oil and gas fields; thousands of years’ worth in saline formations.

- Carbon capture provides direct economic and fiscal benefits from oil and other related energy production, and it protects and creates good-paying, highly-skilled jobs across the value chain of capture, transport, use and storage.

Source: IEA
“All hands on deck” to achieve economywide deployment of carbon capture
Unique, Unprecedented National Energy Coalition

• 70+ members, including industry, NGO and labor interests
• Unites very diverse interests
• Non-partisan, technology agnostic
• Working to achieve economywide deployment of carbon capture to foster domestic energy production, support jobs and reduce emissions

To learn more and view our complete membership list, visit www.carboncapturecoalition.org.
Unparalleled Bipartisan Support for Reform of 45Q Tax Credit

Key Changes of Reformed 45Q Tax Credit

- **Increases credit values.**
- **Expands eligibility** to include other beneficial uses of captured carbon (in addition to EOR), projects that capture CO and direct air capture projects.
- Creates **greater financial certainty** by lifting the credit cap and providing clear timing for eligibility.
- **Expands eligibility to more industries** by lowering the annual carbon capture threshold and expanding definitions for qualified facilities and qualified carbon.
- **Enables the owner of the capture equipment to transfer the credit** to another party that stores or puts the CO2 or CO to beneficial use.

45Q Tax Credit Amount: Depends on Project Type

There is a 10-year ramp up to the following dollar per ton amounts, with the value depending on project type as shown below.

- $35/ton for CO₂ stored geologically through EOR.
- $35/ton for other beneficial uses of CO₂ or CO such as converting carbon emissions into fuels, chemicals, or useful products like concrete.
- $50/ton for CO₂ stored in other geologic formations and not used in EOR.
Shaping U.S. Treasury’s 45Q Tax Credit Guidance

Reformed 45Q included in Bipartisan Budget Act

Coalition urges Treasury Department to act swiftly to implement 45Q

Treasury Department expected to release draft rule for 45Q implementation

Coalition submits model guidance to Treasury Department

Coalition submits additional comments to Treasury Department in response to RFI

Key Recommendations

Ensure flexible contractual assurance and transferability of the tax credit

Define commence construction and continuous construction for projects

Limit investor risk of credit recapture by establishing a safe harbor

Provide an equivalent ISO-based monitoring and reporting program (in addition to the Subpart RR Greenhous Gas Reporting Program) for demonstrating secure geologic storage through CO₂-enhanced oil recovery
Federal Policy Agenda Going Forward

- Ensure effective implementation of 45Q by the U.S. Treasury to provide the investment certainty and business model flexibility intended by Congress;
- Provide a portfolio of federal carbon capture policies to complement 45Q, similar to wind and solar;
- Incorporate CO$_2$ pipeline infrastructure into national infrastructure legislation, including measures for federal financing of extra capacity; and
- Support a robust U.S. Department of Energy budget for carbon capture, utilization, removal and storage R&D, demonstration and deployment to ensure that lower-cost next-generation technologies enter the market.
Carbon Capture Coalition
Federal Policy Blueprint

✓ First-ever policy blueprint on federal carbon capture policies
✓ Promotes economywide deployment of carbon capture technologies
✓ Represents consensus of Coalition’s more than 60 energy, industrial and technology companies, labor unions, and conservation, environmental, clean energy and agricultural organizations
NEXT Ten Years for Carbon Capture: How do we reach “Threshold Scale”

Reform of the 45Q tax credit is a significant accomplishment and provides a foundation for the broader suite of policies needed to scale commercial deployment of carbon capture, similar to what has benefitted other low and zero-carbon technologies.
Current Bipartisan Legislative Priorities

**USE IT Act**
- Supports demonstration of direct air capture technologies and R&D of next generation carbon utilization technologies to transform CO$_2$ into a beneficial resource and economic opportunity, while reducing emissions
- Facilitates planning, siting and permitting of pipeline infrastructure to transport CO$_2$

**Carbon Capture Modernization Act**
- Corrects program design flaws to make companies eligible to access existing Section 48A tax credits for retrofitting currently operating US coal-fired power plants with carbon capture technology

**Senate EFFECT Act/House Fossil Energy R&D Act**
- Expands and retools the U.S. DOE fossil energy research, development and demonstration (RD&D) objectives and programs to help meet the challenge of reducing our nation’s carbon emissions and sustaining U.S. leadership in carbon capture, utilization, removal and storage technologies
Current Bipartisan Legislative Priorities

Carbon Capture Improvement Act of 2019
• Authorizes use of tax-exempt private activity bonds to help finance the purchase of carbon capture equipment for installation at power plants and industrial facilities.

Financing Our Energy Future Act
• Makes carbon capture and utilization projects eligible for tax-advantaged master limited partnerships to reduce the cost of equity and provide project developers with access to capital on more favorable terms.

Clean Industrial Technology Act
• Directs the Secretary of Energy to establish an Industrial Emissions Reduction Technology Development Program aimed at developing innovative low- and zero-emissions technologies, including carbon capture.
Forthcoming: Federal CO₂ Transport Infrastructure Legislation

Coalition working with Rep. Bustos (D-IL) to develop and introduce legislation this month to **advance CO₂ transport recommendations in Coalition’s federal policy blueprint:**

- Low and zero-interest federal loans to help finance extra pipeline capacity and realize economies of scale;
- Federally-supported flagship CO₂ trunk line demonstration projects in key regions; and
- Encourage state and local governments to consider anthropogenic CO₂ pipelines as “pollution control devices” to facilitate state and local ad-valorem and property tax abatement.
Additional Focus on Carbon Capture in the Industrial Sector

• Roughly one-third of global carbon emissions come from the industrial sector, and industrial emissions are growing at twice the rate of emissions as a whole.

• Over half of industrial emissions occur in just three sectors: steel, cement and basic chemicals.

• Steel production has the largest share at 3.2 billion metric tons (GtCO₂) per year, followed by cement (2.5 GtCO₂) and chemicals (1.9 GtCO₂).

• These sectors rely on chemical processes in which carbon emissions are inherent and cannot be eliminated through efficiency or electrification with low and zero-carbon power.

• About half of all emissions associated with steel production represent such direct emissions.
Industrial Sector: Near-Term Opportunities to Catalyze Action

Further development of industrial decarbonization strategy:
- Most neglected aspect of broader climate agenda, especially carbon capture component.
- We must urgently deploy large-scale industrial capture while the 45Q tax credit remains authorized, or we run risk of not scaling deployment economywide by 2050.

Industrial decarbonization next steps:
- September steel delegation to the UAE, Belgium, and the Netherlands.
- Potential cement delegation to Belgium and perhaps other European locations in Q1 or Q2 2020.
- Prioritization of industrial carbon capture in CO₂NNECT 2020
Integrated Federal, Regional & State Policy are Key to Success

Federal
45Q +
complementary suite of policies

Regional
Infrastructure buildout
Stakeholder engagement

State
Tax optimization
Regulatory Policies
Financial Incentives

= Economywide Deployment of Carbon Capture
- Midwest & Western regions
- Significant analysis and modeling
- Broad state and stakeholder engagement
- Materials development and forthcoming website to share information
- Policy teams in states to drive legislative to support deployment

- Broad, bipartisan coalition
- Work streams:
  - Legislation
  - 45Q implementation
  - Regulatory Issues
  - Appropriations
  - Future policy development
  - Markets
  - Public/stakeholder education
  - Industrial sector

- State leadership
- State policy research and development
- Networking and idea sharing
Four Major Work Group Deliverables To Date

- Putting the Puzzle Together: State and Federal Policy Drivers for Growing America’s Carbon Capture and CO2-EOR Industry
- Electricity Market Design and Carbon Capture Technology: The Opportunities and the Challenges
- Capturing and Utilizing CO₂ from Ethanol: Adding Economic Value and Jobs to Rural Economies and Communities While Reducing Emissions
Interest in State Carbon Capture Work Group and Midwest/Western Regional Deployment Initiatives Continues to Grow

- Formed in 2015 by then Governor Mead (R-WY) and Governor Bullock (D-MT)
- Actively recruiting additional states to participate (light green)
- Even more states participate in Regional Carbon Capture Deployment Initiatives. State representation and industry, labor and NGO participation growing.
- Nearly complete: Regional modeling of candidate carbon capture and storage projects and associated pipeline infrastructure, including facility-by-facility analysis of capture costs (~1.5-year effort)
- Forming state policy teams to develop tailored policy recommendations informed by analysis to complement 45Q for 2020 legislative sessions and beyond.
- Developing policy checklist and inventory, state-by-state factsheets and other materials to support state policy development and advocacy.
Regional Deployment Initiatives: Western & Midwest Regions
Regional Deployment Initiatives: Where We are in the Process

**Phase I**

Preliminary Analysis (January-September 2018)

Mapping of industrial facilities and power plants and CO₂ storage opportunities, initial cost analysis, and preliminary pipeline modeling.

**Phase II**

Convening State Officials and Stakeholders (October 2018)

Launched Initiative in Columbus, OH and Salt Lake City, UT.

**Phase III**

Supporting State Policy Development and Projects (Underway)

Identify priority feasible projects and state policies to complement 45Q tax. Prepare for 2020 state legislative sessions.
EPA GHGRP & eGRID
US DOE EIA
ABB / Energy Velocity

Stanford
NETL, IEA
National Petroleum Council

Advanced Resources International

NETL & USGS
Los Alamos National Lab
Indiana University
Ohio State

NETL
Los Alamos
Princeton
Industry Consulting

CO2 Supply
Industrial & Power

Capture Costs

EOR
Potential Demand

Saline
Storage Potential
SCO2T

Pipeline Costs

SimCCS
Los Alamos

GPI
Coordinated Team

Economic buildout at break even – identify early mover capture projects

Regional scale transport infrastructure to maximize utilization with financing support
Most efficient regional infrastructure to prioritize maximum capture potential
Developing Communications & Educational Tools in States

We will work with state policy teams and other stakeholders to engage with the public and media in 2020.
Class VI Primacy: Top Priority in Several States

Assisting and elevating states Class VI efforts as critical element for enabling saline storage under current authorization of 45Q.

Other priorities: Individual outreach to states reveals various stages of legislative readiness for the 2020 legislative sessions. Examples:

- Kansas to introduce legislation related to carbon capture and storage
- Wyoming to seek policy directive to allow PSC “innovative rulemaking” for carbon capture
- MT to have legislative recommendations next summer

State policy teams established and meeting in several states; several others forthcoming this fall.
Legislative Readiness: Policy Approaches & Best Practices

Developing print and online policy checklist for states, combined with updated state-by-state inventory of existing policies:

- Regulatory Policies
- Rules for Long Term CO₂ Storage
- Rules for CO₂ Transport and Storage Space
- Rules for Clarifying the Purpose of CO₂ Injection
- Financial Incentives for Carbon Capture
- Tax Incentives/Optimization
Building Out Web Presence and Tools for States and Policymakers

- Analysis and model results for states Midwest and Western regions
- State-level fact sheets detailing carbon capture opportunities
- Best practices for states to ensure they are “carbon capture ready”
- Detailed information on policies already implemented in states
- Additional resources, including one-page primers on carbon capture, 45Q and the federal policy landscape
CO$_2$NNECT 2019: 2$^{nd}$ Event in Jackson Hole, WY

- Held at Jackson Lake Lodge, May 20-22
- Broad cross-section of over 200 leaders from industry, finance and investment, state and federal government, environmental, clean energy and agricultural organizations, organized labor, philanthropy, the media and other sectors.
- Themes: industrial decarbonization, broader federal policy agenda for economywide deployment, and state leadership.

CO$_2$NNECT 2020 in New Mexico

- June 7-9, 2020 – Tamaya Resort & Spa, Santa Ana Pueblo, NM
- Continued emphasis on industrial decarbonization.
- Global leadership component, involving ADNOC, ArcelorMittal and perhaps others.
- Broader engagement of state leadership.
Thank You

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