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Carbon Capture Use and Storage 2017 Policy Opportunities

Fatima Maria Ahmad

C2ES Solutions Fellow



C2ES.ORG

- About C2ES
- National Enhanced Oil Recovery Initiative (NEORI)
- Federal Policy Update
- State Policy Update

- **Independent, nonpartisan, nonprofit organization**
- **Mission: To forge practical solutions to reduce greenhouse gas emissions, expand clean energy, and strengthen resilience to climate impacts.**
- **A key objective is a national market-based program to reduce emissions cost-effectively.**
- **Brings city, state, and national policymakers together with businesses and other stakeholders.**
- **Ranks regularly among the top environmental think tanks in the world.**

Business Environmental Leadership Council (BELC)



JPMORGAN CHASE & Co.

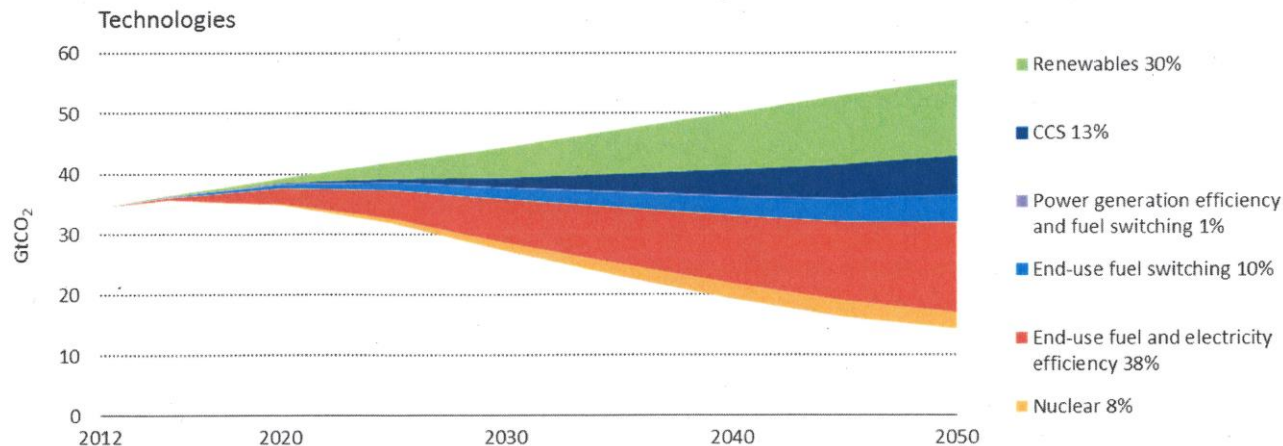


RioTinto



Carbon Capture is an Essential Technology

- IEA Analysis: CCS can provide 13% of cumulative emissions reductions needed by 2050.



Source: IEA Energy Technology Perspectives 2015

- IPCC Analysis: More than 1/2 of the models failed to limit warming to 2C without CCS. For those that could, costs rose 138%.
- It is the only practical solution to achieve deep decarbonization in the industrial sector (18% of U.S. CO₂ emissions).



Photo by U.S. Department of Energy

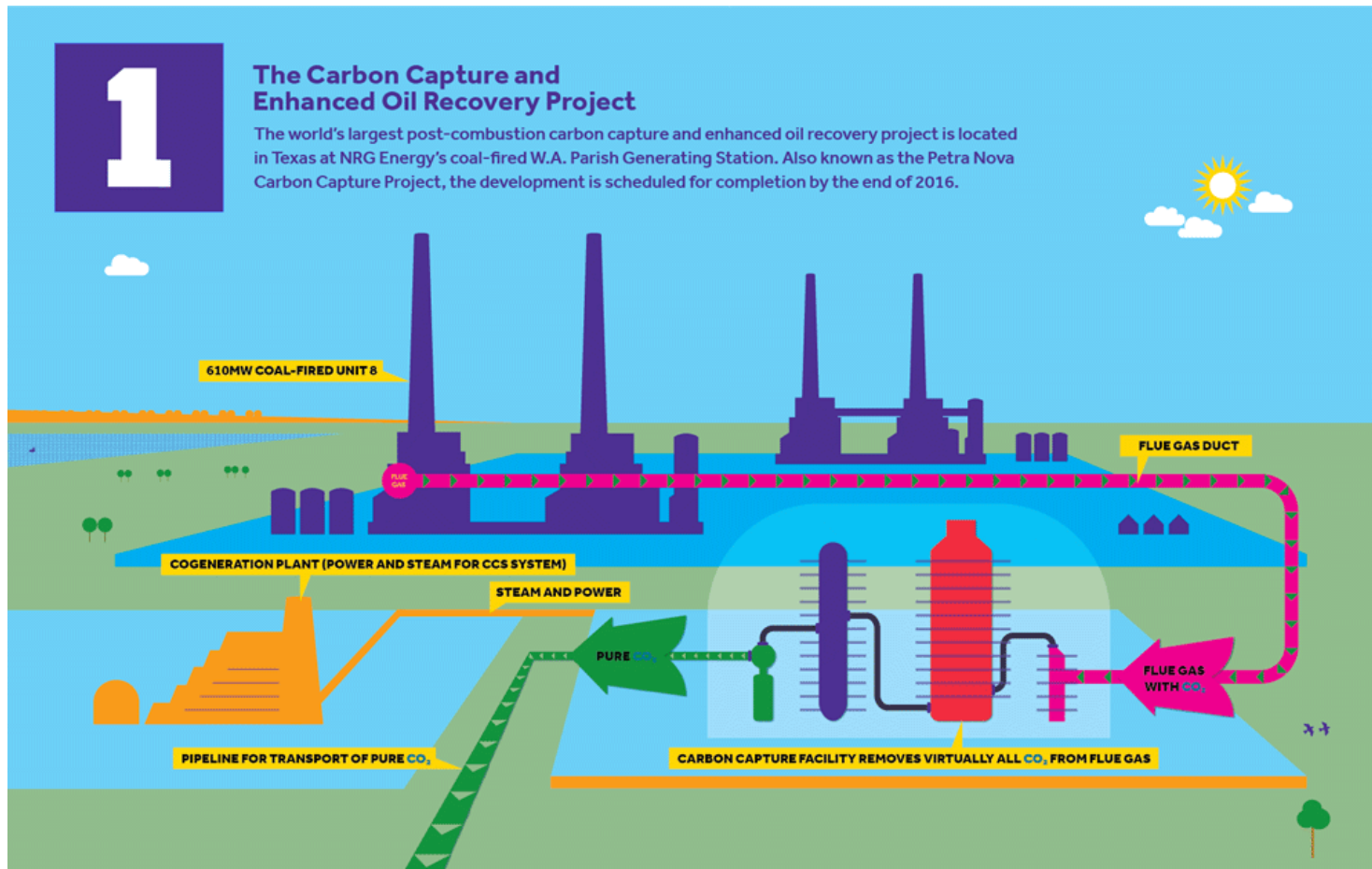
- **Clean Air Task Force analysis**

- Net storage benefit of 0.19 metric tons of CO2 per barrel of oil produced (includes emissions from the oil).
- EOR using power plant CO2 results in a 63% net reduction of the total injected volume of CO2 or a 37% reduction in the life cycle emissions from oil.

- **Negative Emissions: Bioenergy with Carbon Capture and Storage (BECCS)**

- First step is carbon capture on ethanol plants - ADM (April 2017)

NRG Petra Nova project (near Houston, Texas)



Coal Producers

- Arch Coal
- Cloud Peak Energy
- Peabody Energy

Electric Power Generators

- Great River Energy
- NRG Energy
- Summit Power Group
- Tenaska Energy

Industrial CO₂ Suppliers and Technology Vendors

- Air Liquide
- Air Products
- Archer Daniels Midland
- GE Oil & Gas
- Jupiter Oxygen
- Linde
- Praxair

Project Developers

- Lake Charles Methanol

Environmental NGOs

- Center for Carbon Removal
- Clean Air Task Force
- Natural Resources Defense Council

Labor Unions

- AFL-CIO
- International Brotherhood of Boilermakers
- International Brotherhood of Electrical Workers
- SMART Transportation Division
- United Mine Workers of America
- Utility Workers Union of America

Oil Companies

- Occidental Petroleum
- Core Energy

Observers

- Chaparral Energy
- Interstate Oil and Gas Compact Commission
- Enhanced Oil Recovery Institute, University of Wyoming
- Mitsubishi Heavy Industries of America
- Tellus Operating Group



**National Enhanced
Oil Recovery Initiative**

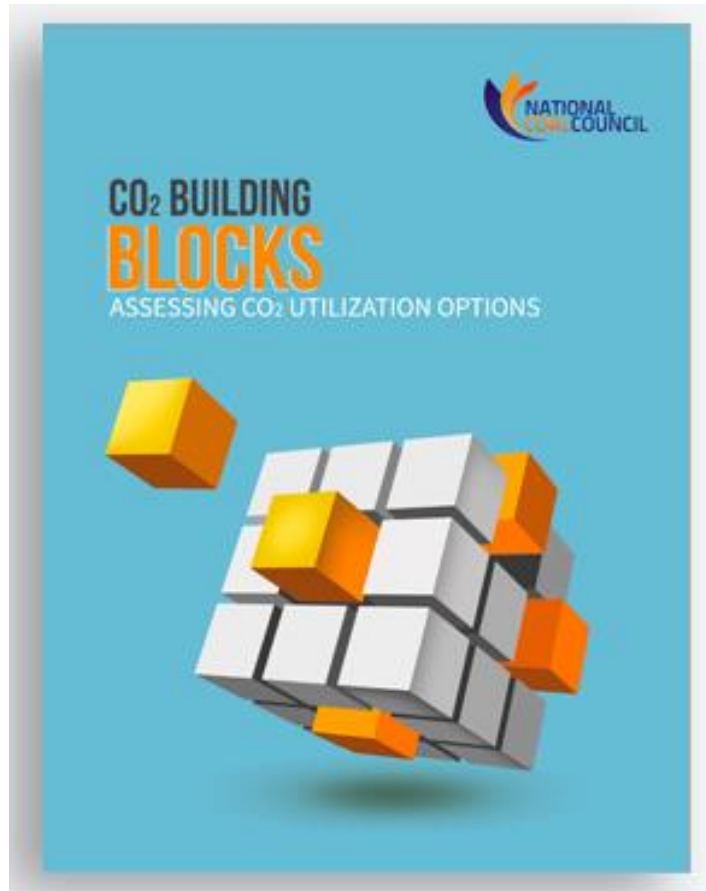
- **H.R. 4622, the Carbon Capture Act (2016)**
 - Permanent tax credit
 - \$30/ton for EOR; \$30/ton for saline storage
 - 150,000 ton threshold for power sector and industrial sector
- **S. 3179, the Carbon Capture Utilization and Storage Act (2016)**
 - 7 year commence-construction period; 12 year tax credit
 - \$35/ton for EOR and other utilization; \$50/ton for saline storage
 - 100,000 ton threshold for the industrial sector

- **Private Activity Bonds**

- The Carbon Capture Improvement Act (2017)
- S. 843: Introduced by Sens. Portman (R-OH) and Bennet (D-CO)
- H.R. 2011: Introduced by Reps. Curbelo (R-FL) and Veasey (D-TX)

- **Master Limited Partnerships**

- S. 1656; H.R. 2883, the Master Limited Partnerships Parity Act (2016).



National Coal Council (Aug. 2016)

- **Oct. 2016: 27 Semifinalist Teams Announced**

LATEST UPDATES



Photo by NRG COSIA Carbon X-Prize

- **Nov. 2017: 2 \$2.5 million Prizes announced**
- **Mar. 2020: 2 \$7.5 million Grand Prizes announced**

- **Research into potential uses of manmade CO2 is ongoing.**



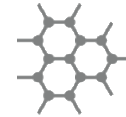
Construction Materials

- Cement and concrete
- Asphalt
- Aggregate
- Timber/super hardwood



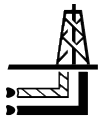
Fuel

- Synthetic (methanol, butanol, natural gas, syngas, etc.)
- Micro-algae fuel
- Macro-algae fuel



New materials

- Carbon fiber
- Carbon nanotubes and fullerenes
- Graphene



Industrial gas & fluids

- Enhanced oil recovery
- Enhanced coal bed methane recovery
- Enhanced water recovery
- Semiconductor fabrication
- Power cycles



Polymers

- Polyurethane foams
- Polycarbonate (glass replacement)
- Acrylonitrile butadiene styrene
- Many more



Agriculture & food

- Algae-based food or animal feed
- Microbial fertilizer
- Biochar, bio-pesticides, bio-cosmetics



Chemicals

- Preservatives (formic acid)
- Medicinal
- Antifreeze (ethylene glycol)
- Carbon black
- Many more

Source: CO₂-based products market analysis by McKinsey and Company and CO₂ Sciences



Financial Incentives for CCS

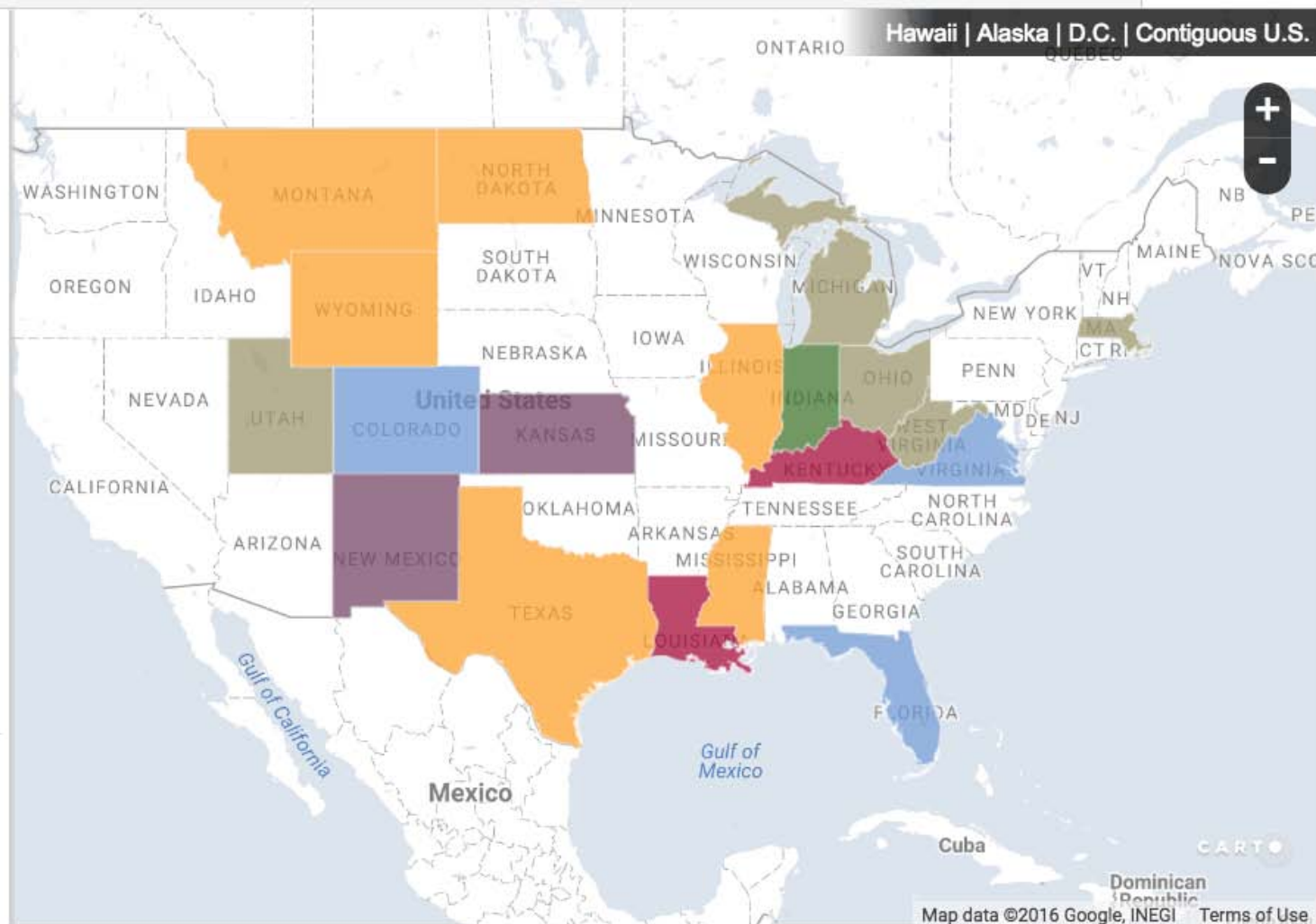
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LEGEND

▼ ☒ Policy category

- Tax Incentives
- Off-Take Agreements
- Utility Cost Recovery Mechanisms
- Carbon Capture and Storage Eligibility in Portfolio Standards
- Liability Assumption for Stored Carbon
- Multiple Policies

[View data table](#)



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FOR MORE INFORMATION

C2ES.ORG

AhmadF@C2ES.ORG