FOA 2614 Round 4 Kickoff

Decarbonization of Industrial Processes Using Oxygen-Based (Oxy-combustion and Chemical Looping) Approaches

NATIONAL ENERGY TECHNOLOGY LABORATORY

Solutions for Today | Options for Tomorrow

Thursday, August 8, 2024

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U.S. DEPARTMENT OF ENERGY

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Fossil Energy and Carbon Management

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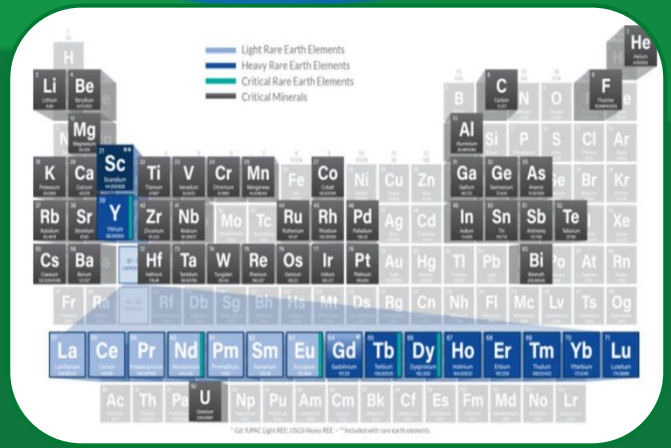
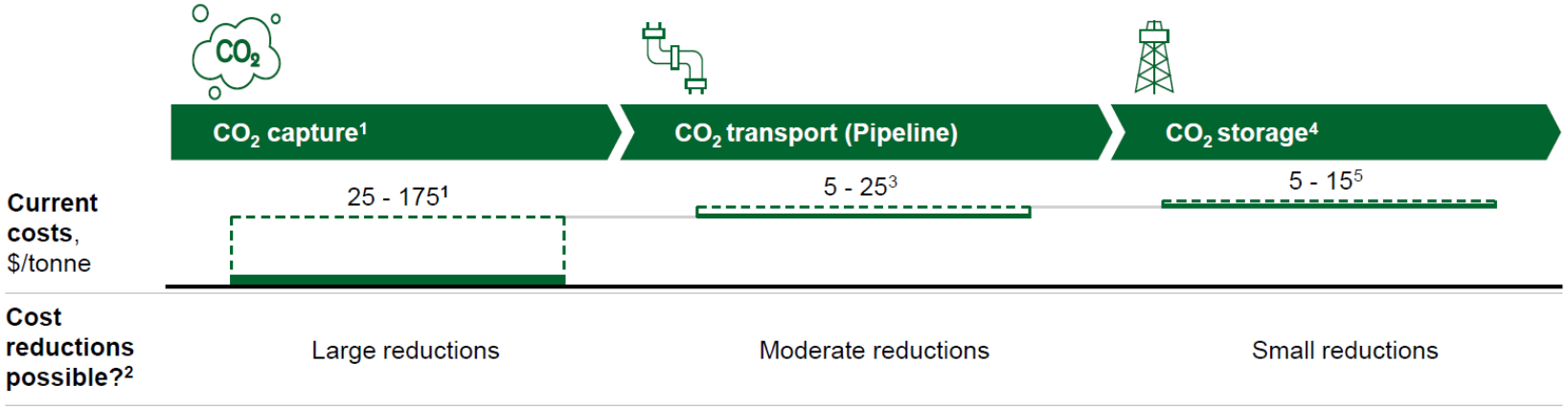


CCS is Essential to Address Industrial CO_2 Emissions

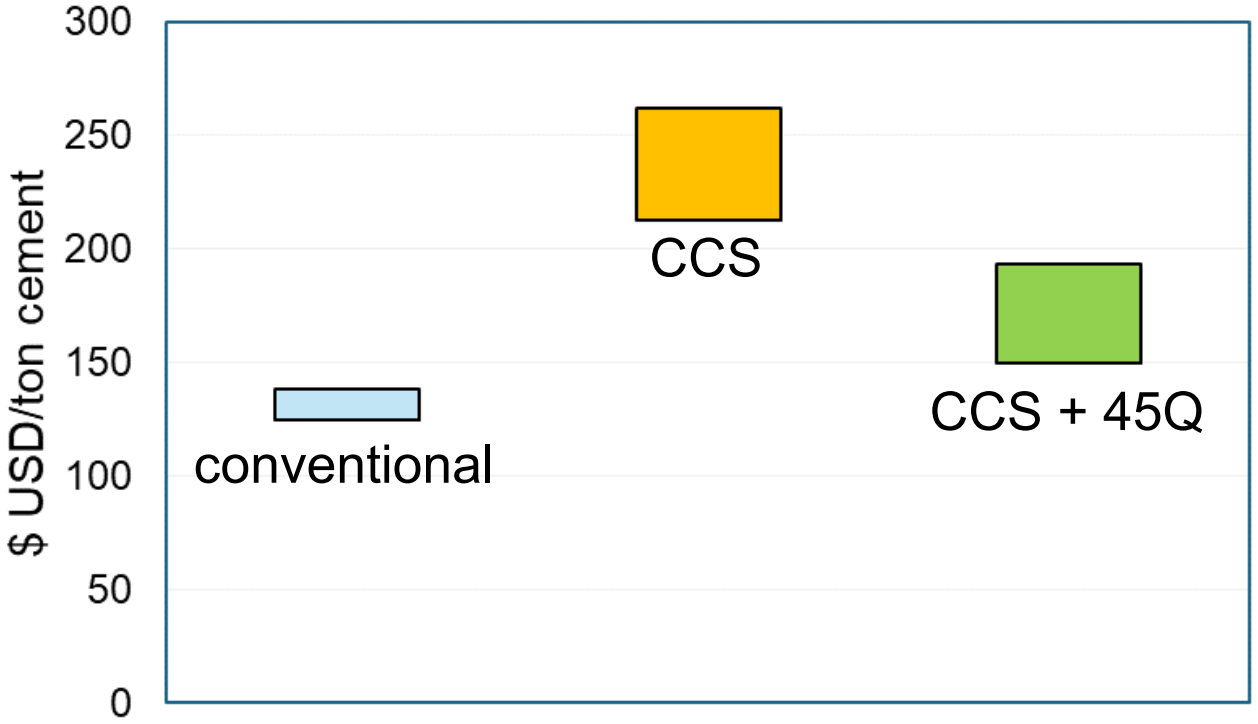
- Despite the importance of CCS for achieving clean energy transitions, deployment has been slow to take off.
- Cost of Capture is one of the key factors for the slow deployment of CCS.



- PSC Program - Invests in transformational technologies to further reduce the cost of CO_2 capture and spur the deployment of carbon capture for power and industrial applications.

Cost of Cement – w/ and w/o CCS

CCS adds $120 -160 per tonne of CO2 without 45Q (equivalent to ~70 -90% premium per tonne of cement)

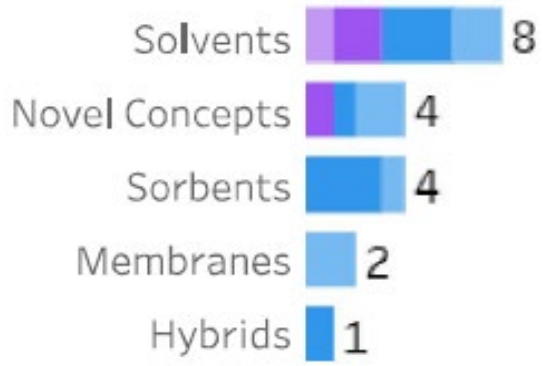


Pathways to Commercial Liftoff: Low-Carbon Cement

- CCS has difficult economics and still must be demonstrated at commercial scale for industrial applications
- Even with 45 Q tax credit ($85/ton of CO_2 stored), CCS would still add an additional ~$25-55 per tonne of cement (equivalent to ~20 - 40% premium)
- Capture cost reduction is critical to achieve cost parity

Investing in Transformational Capture Technologies

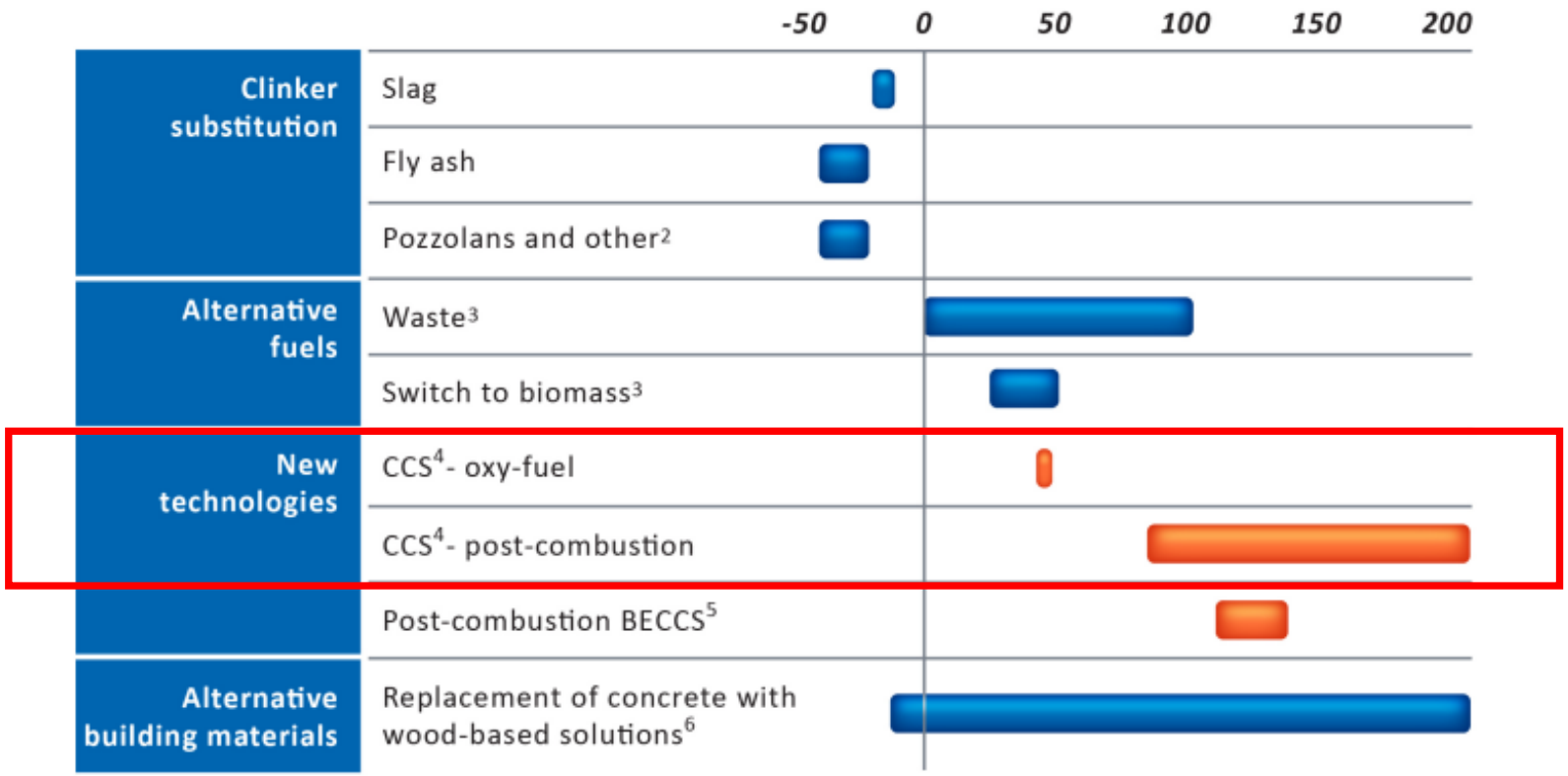
- Capture Media:
  - Amine-based solvents – most common and mature
  - Advanced solvents – water-lean solvents
  - Membranes
  - Cryogenic
  - Solid Sorbents



- Measuring, monitoring, and controlling CCS-related environmental impacts
- Process intensification; heat integration; modular capture units; mobile capture units; reactive capture
- Oxygen-based approaches (Oxy-combustion and Chemical Looping)

Oxygen-based Approaches with CCS Offer Significant Cost Reduction Potential

Figure 6: Cost Comparison for CO_2 Abatement in the Cement Sector ($/t$CO_2$)



1 Globally assumed cost, can vary locally.
2 Limestone, kaoline and other.
3 Depending on availability, quality of material and cost to dispose.
4 Carbon capture and storage.
5 Bioenergy with carbon capture and storage.
6 Includes abatement coming from displacement from steel.

Source: McKinsey & company (2020). Laying the foundation for zero-carbon cement.

Department of Energy (DOE)
Office of Fossil Energy and Carbon Management (FECM)

CARBON MANAGEMENT (ROUND 4)

Funding Opportunity Announcement (FOA) Number: DE-FOA-0002614
FOA Type: Modification 000010
Assistance Listing Number: 81.089 - Fossil Energy Research and Development

FOA Issue Date:	09/21/2023
Submission Deadline for Full Applications:	11/20/2023 / 8:00 PM ET
Expected Date for Selection Notifications:	04/15/2024
Expected Date for Award:	08/26/2024

AOI-3D: Decarbonization of Industrial Processes Using Oxygen-Based (Oxy-combustion and Chemical Looping) Approaches

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Thank You!

Questions?

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