Department of Energy activities in CCS and summary of ‘CCS in Energy Modelling Workshop’

IEA-ETSAP Meeting

July 10, 2017
Advancing Clean Coal Technologies

Making Coal Plants More Efficient

Gasification, Advanced Turbines, Advanced Combustion, CBTL, and Fuel Cells

Capturing More CO₂

Cost-effective carbon capture for new and existing power plants

CO₂ Utilization and Storage

New pathways to utilize captured CO₂

Safe use and permanent storage of CO₂ from power generation and industry

Bringing it All Together

Crosscutting technology development program
Carbon Capture technology examples

Advanced $CO_2$ capture technologies: Many pathways to success

Novel Solvents

Advanced membranes

Transformational concepts and Advanced Compression

Solid sorbents
Pathway for Technology Commercialization

Probability of successful outcome relies on large number of potential options!

Large number of potential options

Laboratory/Bench-Scale

Small Pilot-Scale

Large Pilot-Scale

Demonstration

Commercial

Limited number of successful outcomes

= Technology Options
Major Project Demonstrations

- ADM Ethanol Facility
  Decatur, IL

- Kemper CCS Project
  Kemper County MS

- Petra Nova CCS Project
  Thompsons TX

- Air Products Facility
  Port Arthur, TX
CCS Activities in the U.S. – Historically Focused on Technology Development and Market Mechanisms

**Technology Push**

- R&D focused on: cost (capture) and confidence (storage)
- Demos (integration and learning)

**Market Pull**

Domestic Oil Supplies and CO₂ Demand (Storage) Volumes from “Next Generation” CO₂-EOR Technology**

- Existing Market Mechanisms: Enhanced Oil Recovery (EOR)
  - 65 million tons per year of CO₂ to produce nearly 300,000 barrels of oil per day.
- Regulatory Framework
- Financing (Tax Credits and Loan Guarantees)
A review of energy-economic models in the context of carbon capture and storage (CCS) and advanced fossil fuel technologies.

Goal

Bring together:

- IAM Modellers from policy, industry and academia
- CCS technology experts, CCS data providers, CCS process engineers and relevant stakeholders

Assess the representation of CCS

open discussion of data sources, development, and methodologies energy modeling

Assess methodologies, inputs, and assumptions for CCS representation in the energy-economic modeling capabilities we use to provide insights to inform policy direction, regulatory processes and program justifications.

Outcome

identification of gaps and opportunities for development.
45 attendees, 15 models represented

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Workshop Conclusions

• Many IAMs have simplistic representation of CCS transport and storage costs, with variation among capture costs depending upon representative CCS technologies utilised.

• Wider distribution and understanding of NETL baseline CCS datasets critical to developing detailed state of the art cost curves for CCS capture, storage, and transport that can be used for CCS calibration in IAMs.

• Communication between CCS technology experts and IAM modellers needs to be enhanced.
  • This should include a regular meeting,
  • Accessible, open and transparent data sharing is a critical necessity.
Action items

• Schedule a series of NETL-led webinars on their baseline data and other products. Time frame for this to be June, such that information is shared prior to next meeting.

• Establish a email list for communication and information exchange on CCS in energy-economic modeling

• Provide a list of (and links to) NETL products, baseline evaluations and data

• Review database of industrial sources (also NEMS documentation) to make available

• Prepare a glossary of CCS/advanced fossil terminology to promote technical consistency (i.e. retrofit=what’s included/required/etc, baseplant=definition and boundaries)

• Develop a survey of models

• Continue discussion at ETSAP and IEW July 10-14
Upcoming Webinars:

NETL Cost and Performance Baseline for Fossil Energy Plants (tentative date: July 25)

NETL CCS Retrofit Cost and Performance Data (tentative date: August 8)

References:

https://www.netl.doe.gov/research/energy-analysis/baseline-studies

- Volume 1: Bituminous Coal and Natural Gas to Electricity
- Volume 2: Coal to Synthetic Natural Gas and Ammonia (Various Coal Ranks)
- Volume 3: Low-Rank Coal to Electricity
- Volume 4: Bituminous Coal to Liquid Fuels with Carbon Capture
Interested?

Please feel free to contact me.

Send an email requesting addition to the mailing list.

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