NETL Carbon Utilization Project Review Meeting

International Test Center Network

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Purpose

- ITCN shares knowledge on operating test facilities
- Facilitate collaboration on technology development and proposal response
- One technical focus are per year
  - Analytical techniques
  - Amine carry-over
  - Support of CCSI
  - Open access technology
  - Alternative baselines to MEA
Framework for Collaboration

• Since the ITCN is a network of neutral test facilities, the emphasis is on optimizing the capture processes of technology developers

• Since deployment of technologies will depend on successes in marketing, policy and investment strategy, all the facilities can support a wide range of collaboration such as FEED studies, knowledge sharing, road maps, policy development

• A brief summary of the 12 facilities will be given which will only touch the surface of their capabilities. Each facility encourages you to propose working together. A collaboration is possible no matter how specialized your project becomes.
Overview
• China’s first power plant PCC (3000 t/a)
• Transportable PCCC test platform
• China’s first gas-fired capture pilot plant
• Technology demonstration, application research, theoretical research

Overview
• Supply of CO2 and different storage options for research and testing
• State of the art Monitoring & Verification
• Capture Skid for testing advanced capture technologies
• Future focus includes utilization and H2
• Multiple collaboration pathways available for national and international collaboration

Learning by Doing - Pilots
• AGL Loy Yang
• China Huaneng (Beijing and Chanchun)
• Delta Energy
• Stanwell

Learning by Searching – R&D
• Amines, sorbents, membranes
• Novel Process
• Environmental Impacts
• PICA solvent program with IHI and AGL
Test Center
• Phase 1 – solvent and membrane units are built. 20,000 t/a CO2.
• Additional test interface is available for advanced capture processes.
• In 2021, a six-month Open Access MEA Testing Campaign is planned
• GCCT is committed to jointly explore innovated ways of CO2 utilization with domestic and foreign partners.

KIER dry sorbent bench unit (15 kW)
• Sorbent CO2 capture tech developed
• Tested various potassium-based sorbents.
• Tested PEI-based sorbents of Univ. of Nottingham and KAIST.

KOSPO dry CO2 capture pilot (10 MW)
• 10 MW dry CO2 capture process operated and optimized since 2014
• CO2 compression and liquefaction facility installed.

Overview
• Demonstration-scale test facility at Shand Power Station
• Enables long-term technology evaluation utilizing up to 120T/day of CO2
• TRL 4 to 7 may be tested
• Hitachi and Cansolv solvent tested and Boundary Dam process dev ongoing
• Available for 3rd party use next year
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<tr>
<td>Beijing, China</td>
<td>Kyoto, Japan</td>
<td>Trondheim, Norway</td>
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### Overview
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### Focus: CCUS role for coal power in China
- Validate emerging tech under field conditions
- Understand dynamic operating requirements
- Clarify cost distributions in Chinese context

### Facilities
- 0.1 MWₑ (400 to 500 kg/hr) slipstream
- 3 test pads (solvent skid + 2 open bays)
- MEA baselining complete
- Evaluation of 3rd party solvent and membrane technologies in progress

### Overview
- Developing solvents, sorbents, membranes, processing tech, systems.

### Technologies
- Developed high perf sorbents; one being chosen for commercial use in Japan
- Developing energy eff solid sorbents and large-scale synthesis technology
- Long-term program advancing pre-combustion membranes

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Overview
- Vendor proprietary campaign (20,000 hrs)
- Non-proprietary campaign (14,000 hrs)
- Advisory to project development

Benefits
- Comprehensive open-access datasets and industrial-scale baseline
- Close partnerships with the industry.
- No claims to intellectual property rights

Accomplishments
- 5,500 operation hours and 20+ campaigns at bench scale
- 4,580 operational hours at pilot scale and 8 solvents

Planned Testing
- Packing evaluation
- Absorption process intensification
- 3rd generation solvent development
- Feed-forward process control
- Large pilot CCS demonstration at Wyoming ITC

Overview
- 1 tonne per day amine PCC plant

Accomplishments
- Novel solvent development
- BECCS development
- Solvent oxidative degradation and mitigating strategies R&D
- PACT has in excess of 11000 hours of testing from 10 countries
- 4 technologies have scaled up
- Involvement in: Align, Newest-CCUS, Launch and Member ECCSEL

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Wyoming Integrated Test Center
Gillette, Wyoming

- Can deliver 20 MWe of coal derived flue gas from power plant.

**Current developers**
- Carbon Upcycling UCLA, Dimensional Energy and TDA Research

**Future developers**
- GTI
- Kawasaki – Partnership with JCOAL
- GreenOre – Partnership with JCOAL
- MTR
- University of Kentucky CAER
Thank You

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