

Carbon Sequestration leadership forum

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Update from Capture Technologies Working Group

George Guthrie (USA)



Capture Technologies Working Group Membership

- **European Commission**
(Jeroen Schuppers)
- **Italy**
(Giuseppe Girardi)
- **IEAGHG**
(Mohammad AbuZahra)
- **Korea**
(Chang-Keun Yi)
- **Mexico**
(José Miguel González Santaló)
- **South Africa**
(Arno Neveling for Fred Goede)
- **United States**
(George Guthrie)
- **CANMET Energy**
(Kourosh Zanganeh)
- **Doosan Babcock**
(Peter Holland-Lloyd)
- **IEA Clean Coal Centre**
(John Topper)
- **University of Leeds**
(Mohamed Pourkashanian)



Proposed Path

- ***Assess current gaps identified in the checklist (and project form)***
 - Responses back from working group
 - Cross check of current list with CSLF projects (done by PIRT)
- ***Evaluate progress on closing the gaps relative to CSLF portfolio***
 - (next step)

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Post-Combustion Capture	CSLF Portfolio
Optimise capture/process systems	5 projects
Improved solvent systems	3 projects
Power plant concepts to integrate CO ₂ capture	6 projects
CO ₂ capture pilot plant	6 projects
Fully integrated demonstration plant	3 projects
Develop better solvents	3 projects
Advance organic / inorganic non-precipitation absorption systems	1 projects
Identify advantages and limitations of precipitating systems (e.g., carbonates)	0 projects
Develop better understanding of the assessment of environmental impacts of capture technologies	1 project
Improved process contractors (membranes, packing materials)	?
Advance solid sorbent systems	?
Power plant with CO ₂ capture (flexibility, operability, control)	?
Power plant and CO ₂ capture integration and heat recovery	?
New capture process engineering concepts (flash units, high/low pressure regeneration, vapor compression, split flow,...)	?
Full scale capture plant risk analysis (technical, financial, emissions , ...)	?
Post-combustion capture from NG plants	?

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Pre-Combustion Capture	CSLF Portfolio
Hydrogen-rich turbines	4 projects
Improved air separation processes	3 projects
Improved water-gas shift	3 projects
Improved H ₂ /CO ₂ separation	5 projects
Membrane separation and integrated systems	?
Power plant concepts to integrate CO ₂ capture	5 projects
Polygeneration optimization	2 projects
Advance integration and optimization of components for power station applications	2 projects
Coal and liquid petroleum gasification, natural gas reformer, syngas cooler	3 projects
Improve CO ₂ separation and capture technologies	5 projects
Develop high efficiency and low emission H ₂ gas turbines	3 projects
Fully integrated demonstration plant	3 projects

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Oxyfuel Combustion	CSLF Portfolio
Boiler design	4 projects
Improved air separation processes	2 projects
Oxy-fuel gas turbines	3 projects
Combustion science	3 projects
Power plant concepts to integrate CO ₂ capture	4 projects
CO ₂ capture pilot plant	4 projects
Fully integrated demonstration plant	3 projects
High temperature turbines	2 projects
CO ₂ /N ₂ separation technology for industrial processes	1 projects
Research into material selections	2 projects
Cryogenic air separation	1 project
Membrane technologies for air separation	?
CO ₂ purification process (final product conditioning process)	?
Other emissions (NO _x , SO _x , metals)	?

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Industrial Applications	CSLF Portfolio
Capture from non-power industrial processes	6 projects

Emerging and new concepts for CO₂ capture	CSLF Portfolio
Research into Post-combustion carbonate looping cycles	1 project
Research into Gas separation membranes and adsorption processes for CO ₂	7 projects
Research into Ion-transport membranes for O ₂ separation	2 projects
Research into Chemical looping	3 projects

Generation Efficiency	CSLF Portfolio
Support initiatives to improve efficiency of electricity generation plant	7 projects
Develop high efficiency gas turbines and support new cycle concepts	3 projects
Develop alternative power generation processes that have the potential to produce improved economics when paired with absorption capture	4 projects
Develop a common approach for comparison of alternative concepts	?