



CSLF Task Force on Non-Enhanced Hydrocarbon (EHR) Utilization Options

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Background



**CSLF Conference of Ministers Key actions,
“Exploring new utilization concepts beyond CO2
enhanced oil recovery (CO2-EOR) that have the
potential to add commercial value”**

**CSLF TG Meeting in April 2018 – Discussion on CO2
mineralization and utilization and revisit non-EOR
options; re-constitute the task force.**

Previous CSLF Task Force



Timeline

- Beijing, P.R. China, September 2011: Utilization Options for CO₂ Task Force was created.
- Perth, Australia, October 2012: Phase 1 Report completed. Options for further evaluation in Phase 2 discussed and selected.
- Washington, DC, October/November 2013, Phase 2 report completed.

Scope

- EHR, fuels and chemicals, building materials/aggregate, working fluid

Key Messages

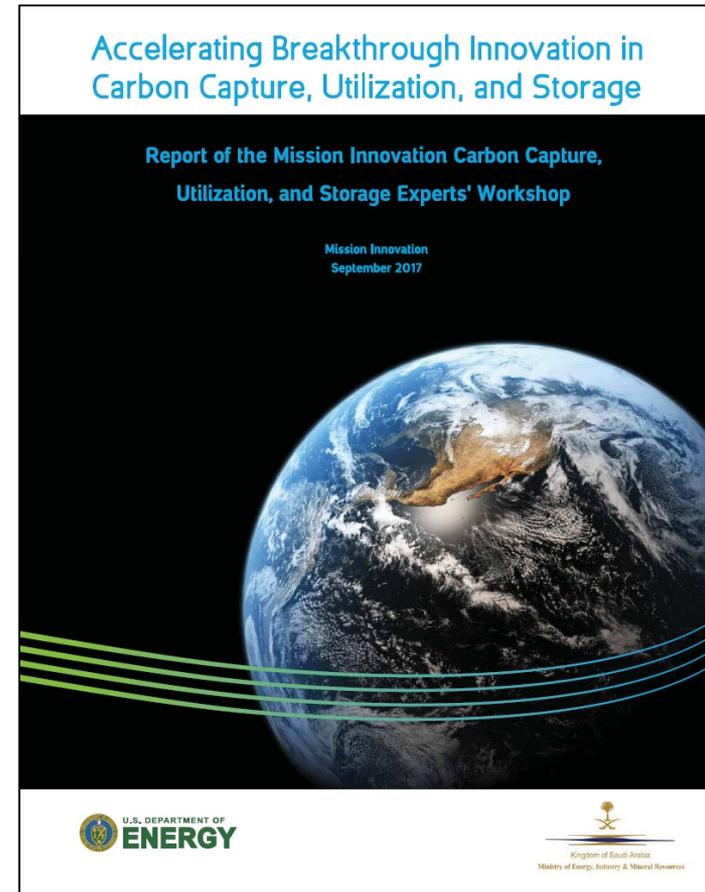
- Number of CO₂ utilization options available - mechanism for deployment and commercialization.
- EOR is the most near-term utilization option.
- Non-EOR CO₂ utilization options are at varying degrees of commercial readiness and technical maturity.
- Early R&D or pilot-scale activities should focus on: addressing key techno-economic challenges; independent tests to verify the performance; and support of small, pilot-scale tests of first generation technologies and designs.
- More detailed technical, economic, and environmental analyses should be conducted.



Some efforts since then (not all-inclusive)...



- Carbon X-Prize – launched in September 2015, 10 finalists
- Oil and Gas Climate Initiative (OGCI) investments:
 - Solidia Technologies – CO₂ utilization in concrete (October 2017)
 - Econic – CO₂ into polyols (September 2018)
- Reports:
 - UK report (May 2017) by Imperial College and ECOFYS: *Assessing the Potential of CO₂ Utilisation in the UK*
 - Mission Innovation report (September 2017) on CCUS: *Accelerating Breakthrough Innovation in Carbon Capture, Utilization, and Storage*
 - US National Academy of Sciences – Report due in October 2018 – *Developing a Research Agenda for Utilization of Gaseous Carbon Waste Streams*
- Policies:
 - US: 45Q tax credit revision (2018). \$35/ton for converting into fuels, chemicals, or other useful products (e.g., cement).



IEAGHG Reports on GHG Accounting for CCU Technologies



Scope

- Characterize CCU technologies and emissions reduction pathways
- Determining CCU facility-level GHG emissions
- Developing a composite life-cycle GHG emissions profile for CCU activities
- Assessing GHG accounting options
- Four different CCU case studies: renewable methanol, carbon aggregate, algae ethanol, CO₂-EOR (All with NGCC capture)

Conclusions

- Potential benefits for some are proven but are highly dependent on circumstances (how can those be scaled up/replicated?)
- Monitoring, reporting and verification (MRV) of CCU facility-level energy and carbon flows is well established
- GHG reduction policy is not yet major driver for CCU activities
- Near-term need for establishing consistent, transparent and comparable methodologies for CCU accounting
- CCU accounting guidelines v1.0 developed

Outcomes published as IEAGHG Technical Review Trilogy. Work continuing with aim of producing an integrated accounting framework for CCS and CCU.



Conferences (not all-inclusive)



Title	Location	Dates	Participants
International Conference on Carbon Dioxide Utilization	Rio de Janeiro, Brazil (16 th)	August 27-30, 2018	Mostly Academia
	Aachen, Germany (17 th)	June 23-27, 2019	
Carbon Dioxide Utilisation Summit	Manchester, UK (11 th)	September 26-27, 2018	Industry focused
	Houston, Texas (12 th)	February 27-28, 2018	
International Overview of CO ₂ Utilisation	Paris, France	July 2, 2018	Industry, government, research institutions
7 th Conference on Carbon Dioxide as Feedstock for Fuels, Chemistry, and Polymers	Cologne, Germany	March 20-21, 2019	Industry, associations, government
CO ₂ Reuse Summit	Zurich, Switzerland	May 16-17, 2018	Industry, research institutions, university, academia

Some Major Conferences with carbon/CO₂ utilization sessions: GHGT series (global, varying locations), Carbon Management Technology Conference (US), Annual CCUS Conference (US).

CSLF-Recognized Project: SABIC CCU Project



- Recognized November 2015 Ministerial Meeting in Riyadh, KSA
- Located in Jubail, KSA at SABIC's affiliate UNITED, Jubail
- Up to 1,500 tonnes/day of CO₂ captured and transported via 25-km pipeline
- Used as feedstock for production of methanol, urea, oxy-alcohols, and polycarbonates



Photo of CO₂ capture and purification plant at SABIC's affiliate, UNITED, located in Jubail industrial city. courtesy of SABIC as presented at CSLF Ministerial meeting, November 2015.

Only Non-EHR CO₂ Utilization Project Recognized by CSLF.

Proposed Action Plan for the Task Force



- Main Goal: Add value and not re-invent
- Status check on where we are today
 - Reports, projects, conferences, activities, projects and major players
 - Government initiatives
- Summarize and develop recommendations for next meeting

Proposed Task Force Activities



Activity	Date
Task 1. Reports	
1a. Develop a catalog/library of reports over the past five years on CO2 Utilization	December 2018
1b. Identify and summarize technical and policy barriers; potential market sizes/volumes; findings; and recommendations.	March 2019
Task 2. Government Activities	
2a. Prepare and release template to CSLF delegates	December 2018
2b. CSLF delegate responses returned	February 2019
2c. Responses consolidated and summarized	March 2019
Task 3. Identify major conferences and activities	January 2019
Task 4. Identify major CO2 utilization demonstration or commercialization projects and key players	February 2019
Task 5. Prepare summary report and recommended next steps of task force or CSLF TG action	CSLF mid-year meeting 2019 (April-June 2019)

Thank you



Task Force Team: United States (chair), Australia, Canada, France, Netherlands, Saudi Arabia