“International Collaborations in Advancing CCS”

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Bureau of Economic Geology
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COP 25 – Chile/Spain

Gulf Coast Carbon Center

- > 15 years experience in geological CO_2 storage research and implementation
- Develop and implement monitoring programs for geological CO_2 storage sites
  - ✓ Site selection and permitting
  - ✓ Regulatory compliance
  - ✓ Technology transfer and education
- Monitored >9 demonstration projects
- Actively monitored over 10 million tonnes of CO_2 in the ground

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Facilitating climate action through international co-operation

"Climate change is a global problem and extensive international cooperation is critical for effective solutions."

UNFCCC

Bureau of Economic Geology

Workshops Connect Individual Knowledge and Experience

- Sharing individual experiences.
- Identifying key areas of interest
- Amplifying, modifying, and clarifying concepts through discussion
- Building a community of trust

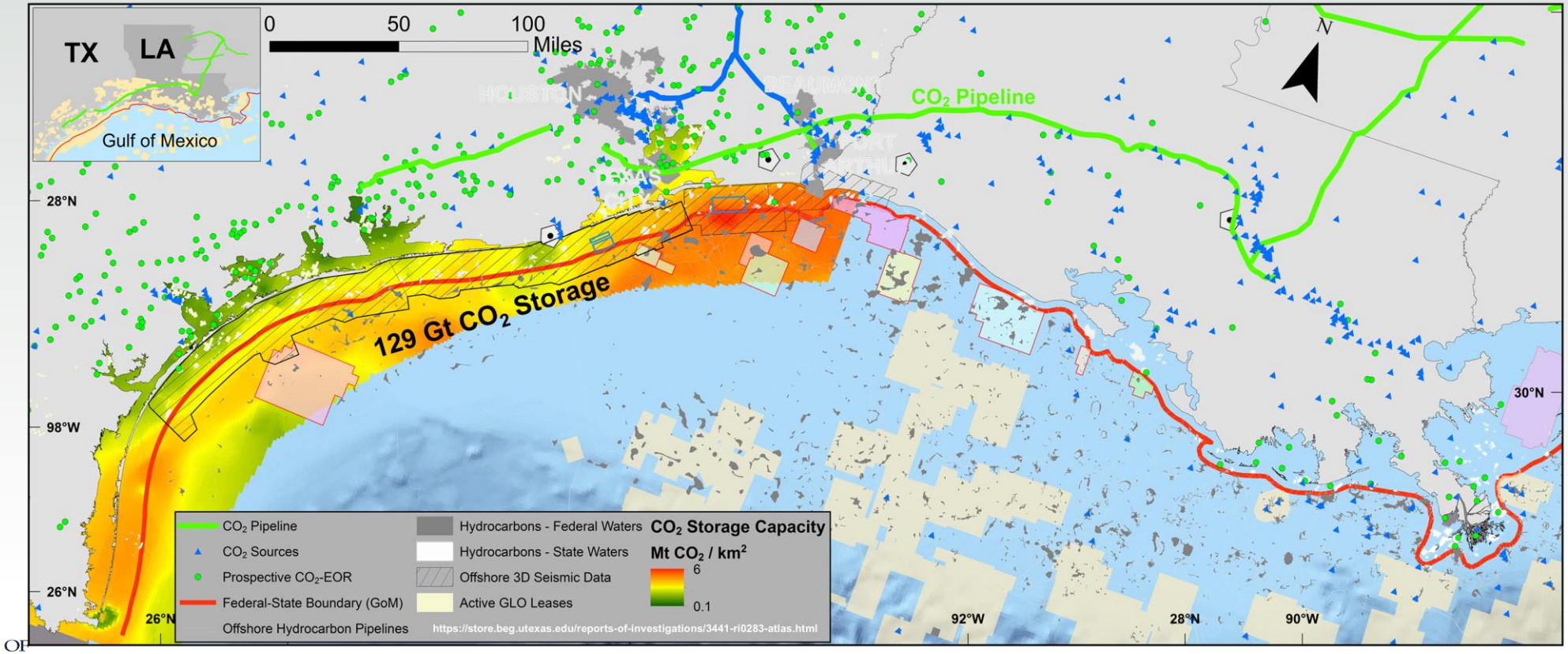
Going Further - Learning through International Collaboration

- Simply sharing within the community cannot ensure success.
- Need to create experiences, actions, and strategic choices that will facilitate a higher level of learning.
- Collaborative learning by doing
  - Common experiences
  - Share cost burden
  - Effective technology and knowledge transfer
  - Create consensus of ideas and enhances understanding

The International Space Station is an example of international collaboration

U.S. Seeking Technology Transfer from Japan in Offshore CCS

Local CCS Potential in Offshore Gulf of Mexico



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Tip Meckel

Field Validation of MVA Technology for Offshore CCS, Tomakomai, Japan

Tip Meckel, Ramon Trevino, & Katherine Romanak

U.S. Department of Energy

National Energy Technology Laboratory

Project Number DE-FE0028193

Bureau of Economic Geology

TEXAS Geosciences
Bureau of Economic Geology
Jackson School of Geosciences
The University of Texas at Austin

Gulf Coast Carbon Center

Goals & Objectives - Seismic

Goal: Validate technologies to enhance MVA

Objectives:

1) Acquire UHR3D seismic dataset and validate MVA technology at an operational CCS field demonstration project
2) Validate untested dynamic acoustic positioning techniques
3) Define CO_2 plume boundaries
4) Provide insight into subsurface field conditions informed by UHR3D
   - Link shallow subsurface seismic structures to geochemical signatures
   - Advance techniques for attribution of leakage signals in marine environment

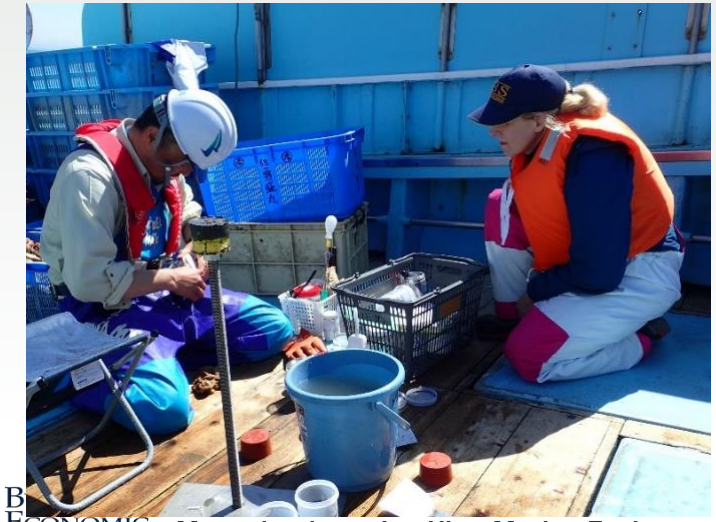
Goals & Objectives - Environmental

Goal: Validate technologies to enhance MVA

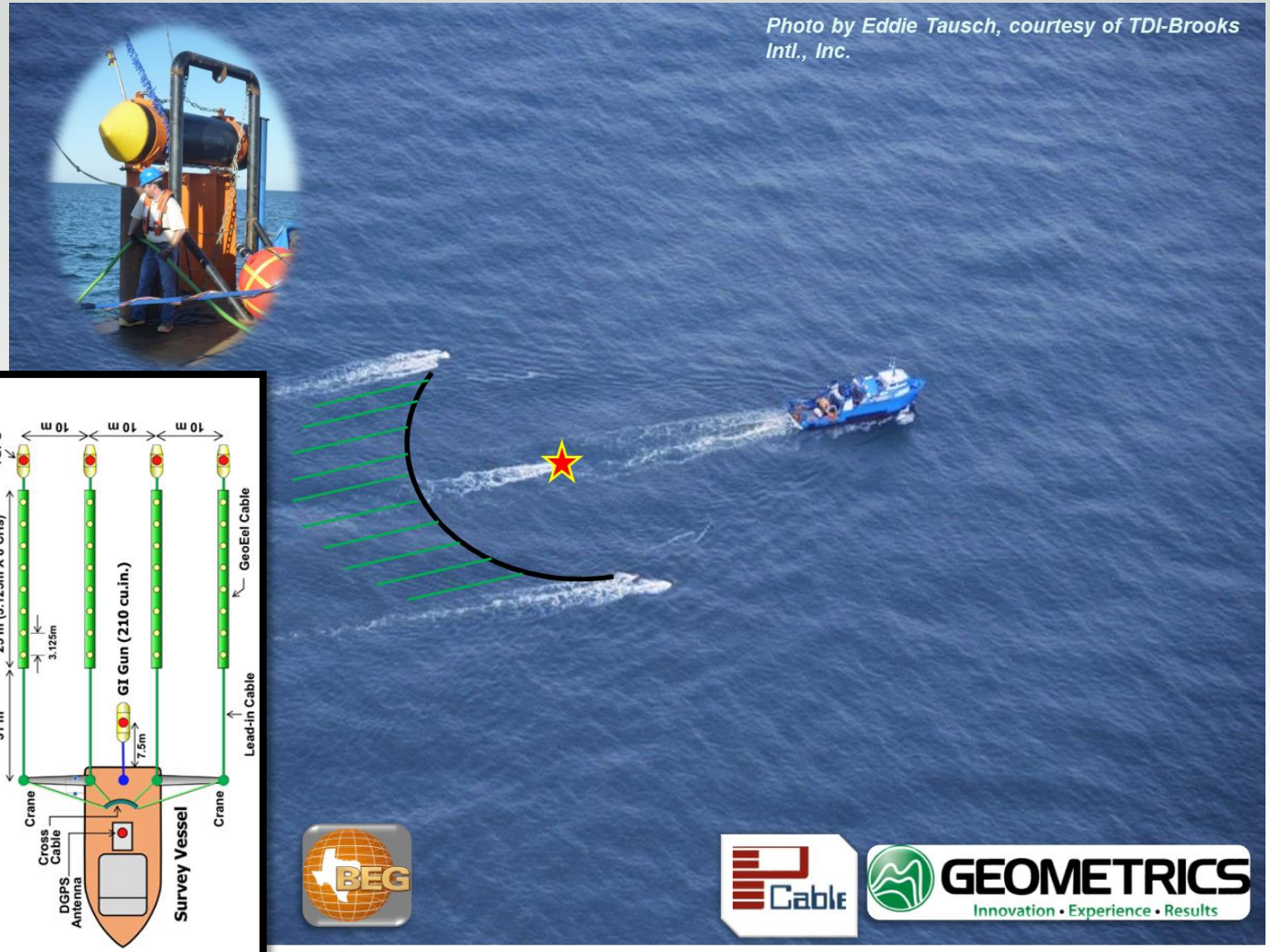
Objectives:

- Participate in routine monitoring
- Learn methods and protocols for marine environmental monitoring
- Integrate new analyses with current monitoring parameters and methods
- Link shallow subsurface seismic structures to geochemical signatures
- Advance techniques for attribution of leakage signals in marine environment

Environmental Monitoring May 2017



UHR3D Acquisition August 2017



Many thanks to Jun Kita, Marine Ecology Research Institute and Japan CCS

Lessons Learned

- International deployment was demonstrated
  - Overseas shipping transport, contracts, costs, production rates
  - Vessel modifications
  - International communications
- Real-time modifications of survey acquisition
  - Data coverage, density
- Processing techniques – hybrid commercial + other
- Local stakeholders consultation very important
- Marine environmental monitoring is challenging!

Thank you to our Japanese colleagues!

U.S. DEPARTMENT OF ENERGY NETL

Japan CCS Co., Ltd.

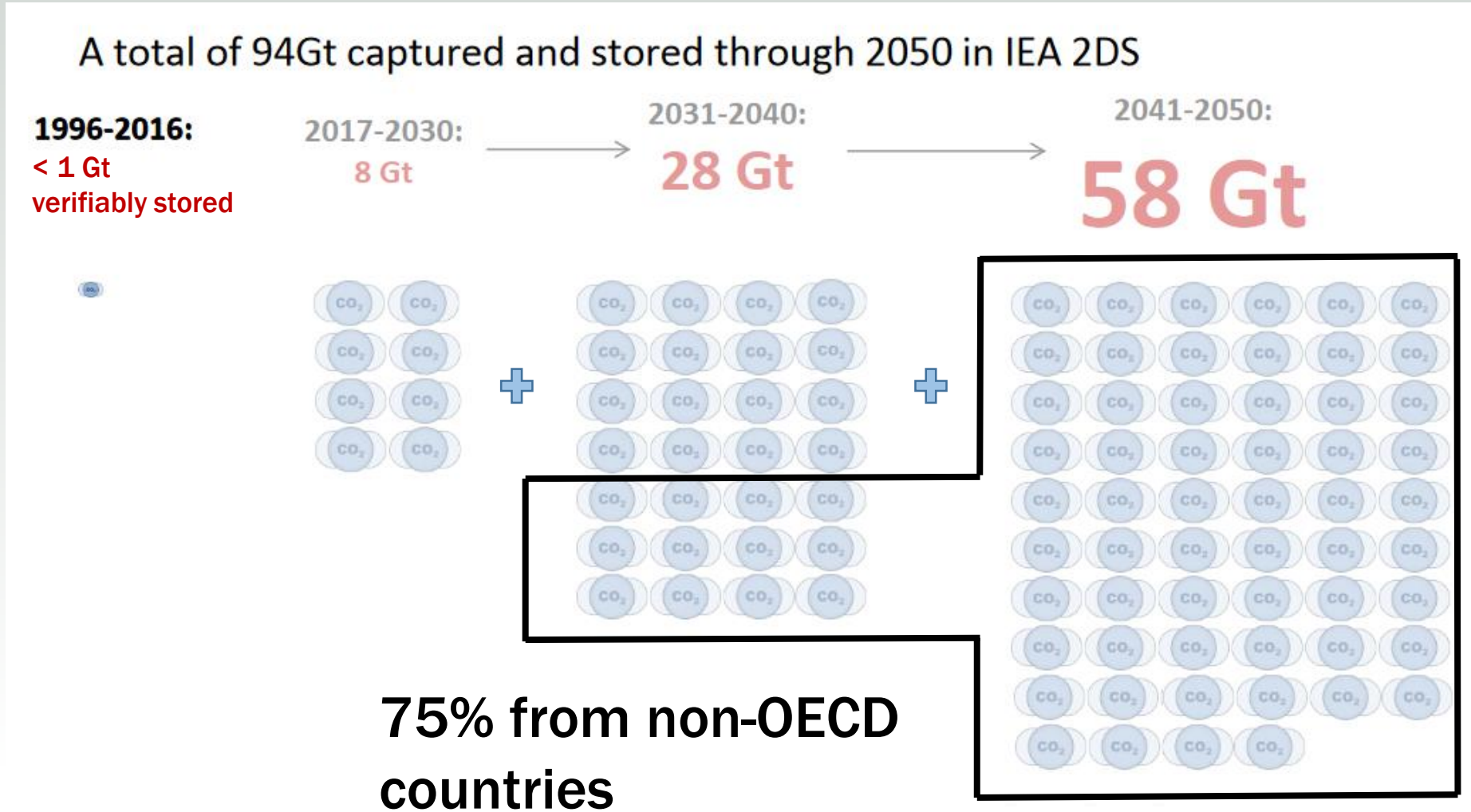
METI Ministry of Economy, Trade and Industry

RITE Research Institute of Innovative Technology for the Earth

MERI MARINE ECOLOGY RESEARCH INSTITUTE

JGI JGI, Inc.

Developing Countries-Why is it important?



Modified from Jean-François Gagné, IEA, 2016 GHGT-13

Inviting Countries

An Invitation

- Opportunities are available at all levels for "getting on the path" to CCS.
- Explore your potential for geological CO_2 Storage.
- Do a needs assessment survey
- Utilize new funding mechanisms to build your capacity in CCS – e.g. CTCN
- Become involved in the CSLF
- Explore memberships with experienced organizations

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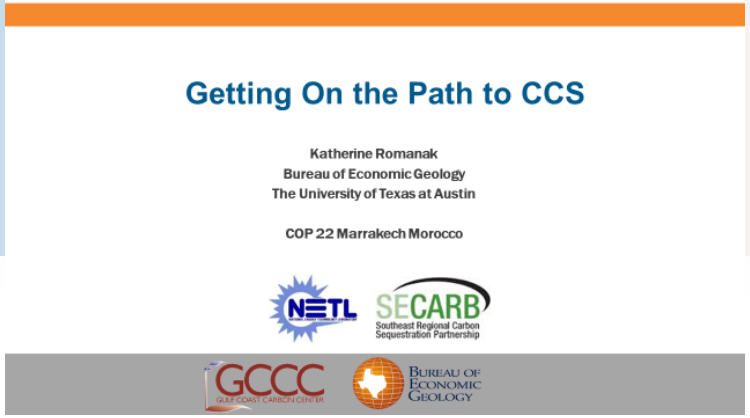


upstream

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Nations urged to consider offshore storage

SHARE STORY

COUNTRIES were this week urged to work together to develop offshore storage for carbon dioxide emissions.

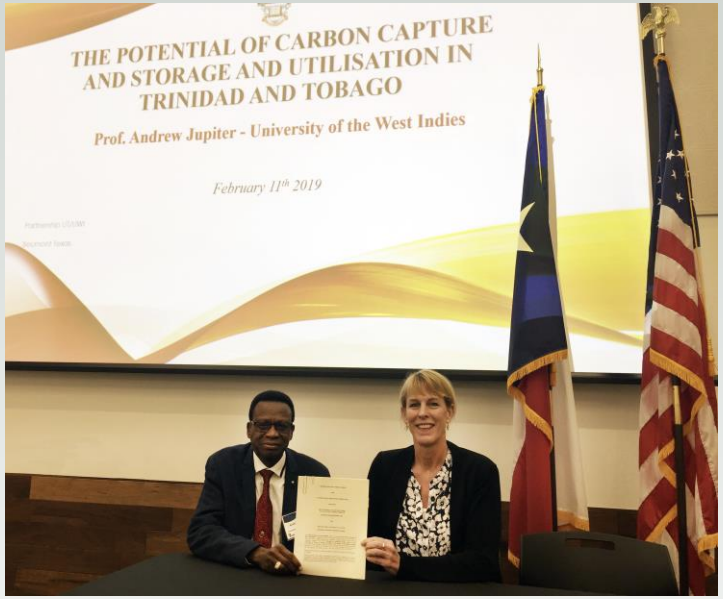
Katherine Romanak, research scientist at the University of Texas Gulf Coast Carbon Centre, invited participants at a packed meeting during COP 21 climate talks in Paris to attend a workshop in Texas organised by the Carbon Sequestration Leadership Forum (CSLF) next summer to discuss international collaboration on offshore storage.

She displayed a map of the world showing a match between large point sources of CO2 and potential storage basins, but added there are only three operational offshore projects — the two Statoil projects, Sleipner and Snovhit off Norway, and Petrobras' use of CO2 at the pre-salt Lula field in the Santos basin off Brazil.

The US, Australia, Japan, the Netherlands, Norway, the UK and China are part of the CSLF's offshore storage technologies taskforce, which in September published a scoping document.

"We [in the CSLF taskforce] see a great potential for storage capacity offshore. Most of the fixed sedimentary basins that will hold CO2 are located offshore, yet most demonstration projects have been onshore, so we have lots of experience in onshore but not much offshore," Romanak said.

Trinidad and Tobago



GEOLOGY

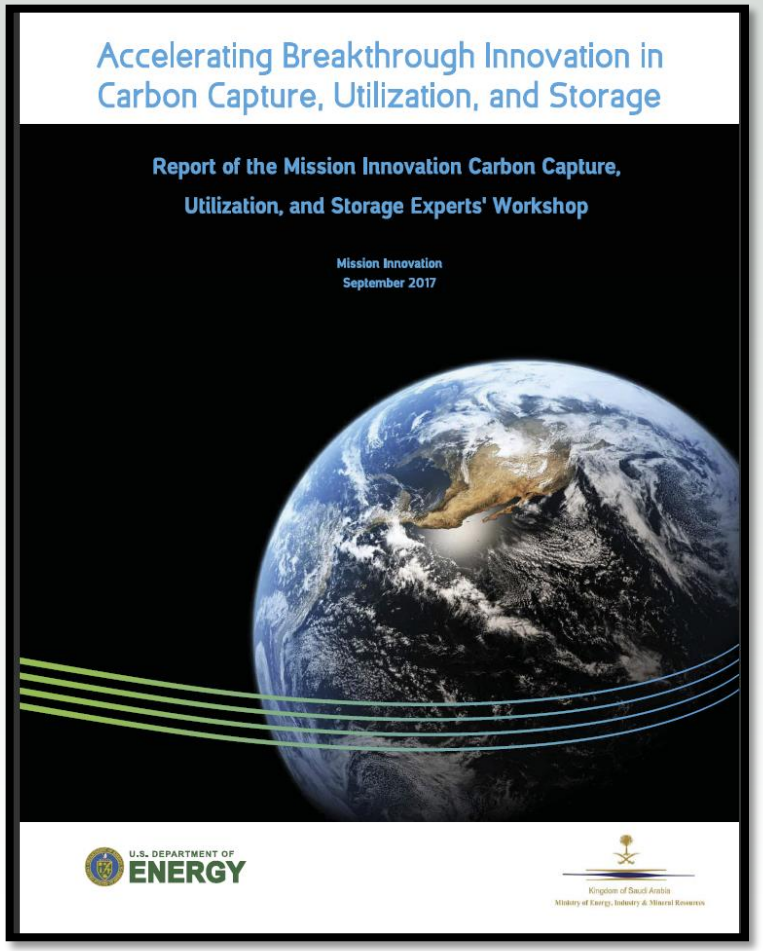
Honorable Camille Robinson Regis, Minister of Planning and Development Trinidad and Tobago

- "...The time is ripe for us to ... explore opportunities to **leverage international support.** The opportunities for **technology transfer**, and for **Trinidad and Tobago to join the technology leaders in CCS ...** is to be encouraged and supported...The Government of Trinidad and Tobago will ... set the policy framework and **support activities on carbon capture and storage... Our commitment to working collaboratively with you in this regard will remain unwavering.**"

Example- Mission Innovation - CCUS

- 20 countries and the EU
  - Mexico, Saudi Arabia, United Kingdom Australia, Canada, China, Denmark, European Commission, Finland, France, Germany, India, Indonesia, Italy, Japan, Netherlands, Norway, Republic of Korea, Sweden, United Arab Emirates, United States
- Workshop 2017 Houston, Texas,
  - Assess gaps
  - Identify Priority Research Directions
- Workshop 2019, Trondheim, Norway
  - Follow up on important work so far
  - Ensure continued progress towards full-scale implementation and commercialization

- ACT - Demonstrating the impact of international collaboration



ACT- Accelerating CCS

A new multinational funding scheme for research and innovation dedicated to CCUS. ACT envisages to launch additional calls and expand its network

11 Countries

- France
- Germany
- Greece
- the Netherlands
- Norway
- Romania
- Spain
- Switzerland
- Turkey
- UK
- USA

ACT- Accelerating CCS

- 8 projects in 2017 (€ 41 million)
- 12 projects in 2019 (€ 31 million)
- 2 projects include outside partners Australia, Iceland, Italy and Japan.
  - Capture, storage, monitoring, wells, utilization, mineralization
  - Outreach, knowledge sharing, and social aspects
- Plans for an ACT Call in 2020.

Thank you for your attention

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