TECHNOLOGIES FOR CARBON MANAGEMENT

A Founder Societies' Project Initiative

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IEEE-PES GENERAL MEETING (GM2012)

SAN DIEGO, JULY 24, 2012

IEEE★USA

IEEE Advancing Technology for Humanity

IEEE PES Power & Energy Society®

Grand Challenge Initiative

Project concept – 2008

- Carbon management – a grand challenge
- Engineering societies are active (e.g. joint meetings, policy statements, congressional briefings)
- Activities reflected engineering society interests
- ***Limited focus on an integrated systems view***

Recognition of need to

- Provide greater technical understanding to inform policy
- Dialogue across our traditional engineering borders
- Enable larger voice through collaboration

Launched April 2009

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Objective

TO CREATE AND MAINTAIN A FOCAL POINT FOR UNBIASED INTERDISCIPLINARY STATE-OF-THE-ART *ENGINEERING EXPERTISE* ON GREENHOUSE GAS MANAGEMENT OPTIONS

- **Provide a platform to integrate the knowledge, foster cross-society collaboration, and disseminate joint and separate society activities**
- **Provide a uniform basis for decision support (metrics, boundaries, techniques)**
- **Develop and maintain a premier bridge between engineering expertise in Carbon Management Technology and government and the public understanding of carbon management technologies**

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Conference

Carbon Management Technology Conference

***Engineering* Perspectives on Setting the Agenda for Carbon Management**

- **Papers**
- **Panels**
- **Working sessions**

http://www.carbonmgmt.org/

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Six Topics/Four Parallel Sessions

	Knowledge Gaps and Barriers	Technology Assessment	Carbon Dioxide Capture, Transport, Utilization and Storage		Energy Management and Efficiency Improvement	Quantification and Reporting of GHG Emissions		Adaptation to Climate Change
Tuesday 0800–1000								
Tuesday 1030–1200	Engineering Education	Carbon Management in the Power Sector				Business Risks of Carbon Counting		Issues for Adaptation to Climate Change
Tuesday 1330–1500	Workforce Development	Issues in Assessing CCS Economics				Carbon Counting Challenges		Adaptation Programs in Government and Industry
Tuesday 1530–1700	Gaps and Barriers: An International Perspective		CCS Case Studies			Counting Carbon Across Industry Sectors: Segment I		Climate Change Effects on Engineering Design Environments
Wednesday 0800–1000								
Wednesday 1030–1200	Legal/Regulatory Issues	Integrating Carbon Management Technologies Into the Power Grid				Counting Carbon Across Industry Sectors: Segment II	Counting Sequestered Carbon: CCS/EOR Conversion	
Wednesday 1330–1500		Issues in Assessing Electric and Hybrid Transportation	CO_2 Utilization for Enhanced Hydrocarbon Recovery		The Intersection of Energy and Carbon Management	Counting Sequestered Carbon: CCS		
Wednesday 1530–1700	Gaps in Technology Development	Sustainable Information and Communication Technology Metrics	CCS Regulatory and Policy		Managing Energy Across a Corporation			
Thursday 0800–1000	Barriers to Technologies Implementation		Effects of CCS on the Energy Water Nexus	Transport and Storage: Technology	Energy Management in the Industrial Setting			
Thursday 1030–1200		How Clean is Biomass?	Capture Program Overviews	Transport and Storage: Regional Assessments	Improving Energy Efficiency and Greenhouse Gas Management in Iron and Steel Production			
Thursday 1330–1500		Challenge of LCA Methods and Applications	Capture R&D	Transport and Storage: Modeling	Moving the Energy Performance of Industry Forward			
Thursday 1530–1700		Sustainability of Carbon Management	Capture Operations	Monitoring	Issues in Industrial Energy Management			

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Major Topics

- Knowledge Gaps and Barriers
- Technology Assessment: Methods, Metrics and Results
- Carbon Dioxide Capture, Transport, Utilization and Storage
- Energy Management and Efficiency Improvement (industrial)
- Quantification and Reporting of GHG Emissions
- Adaptation to Climate Change

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C Capture, Utilization and Storage

- Capture technology and operations
- Transport and geological storage
- Enhanced oil recovery and other carbon dioxide utilization technologies
- Regulatory and legal issues
- Economics, business models and risk management
- Monitoring applications and project case studies

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Knowledge Gaps and Barriers

- **Policies driving GHG emission reduction**
- **Identification and resolution of the principal knowledge gaps and implementation barriers to carbon management**
- **Regulatory complexity and streamlining**
- **Engineering education and workforce development in carbon management**

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Gaps & Barriers Workshop (2010)

- **Focus on promising technology options (Scorecard results)**
- **Define principal**
  - knowledge & technology gaps and
  - barriers to deployment at required pace and scale
- **Develop recommendations to address gaps and barriers**
- **Explore role for Engineering Societies**

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Gaps & Barriers Workshop (2010)

OBSERVATIONS:

- **Addressing the gaps and barriers requires solutions spanning technology, regulation, and policy**
- **Public and decision makers' expectations of the pace and scale of technology change are much higher than can realistically be achieved given the current state of technology, regulation and policy**

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Technology Assessment

Methods for assessing technology readiness and impacts, greenhouse gas life cycle analysis, and uncertainties often encountered in carrying out such assessments

- **Challenges of LCA Methods and Applications**
  - **Boundary definitions**
  - **Comparative assessments**
- **Issues in Assessing Electric and Hybrid Transportation**

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Electric and Hybrid Transportation

- **Heated discussions concerning the impact of these vehicles on energy efficiency and environment, including greenhouse gas emissions.**
- **Questions are being raised about the costs of various options relative to the benefits they create.**
- **Impact of the new vehicles on T&D and electric loads.**

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Adaptation to Climate Change

IPCC report: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*

- **Engineering societies may have to modify their standards and practices**
- **Owners, operators, … managing risks from climate change effects**
- **Engineering design environments**
  - **traditionally based on historical records (temperature, wind velocity, flood elevations, etc.)**
  - **approaches to defining design environment for safety and functionality in the future**

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Keynote Speakers

Katharine Jacobs, assistant director for the White House Office of Science & Technology Policy: "Climate Change Adaptation in the US"

Robert Fri, visiting scholar for Resources for the Future: "America's Climate Choices"

Workshops

- **Inclusion of Technology Barriers in Economic and Policy Analyses of Greenhouse Gas Mitigation (MIT, Carnegie Mellon)**

- **Sustainability Metrics for Carbon Management Technologies: Use of Life Cycle and Full Cost Accounting**

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Observations

- **No magic silver technology bullets (to make a significant difference within a reasonable time frame)**
- **Gaps in analysis methods, incl. technology treatment and assessment of sustainability**
- **The door to 2°C about to close**

  IEA: "Without further action, by 2017, all CO_2 emissions permitted by the 450 (ppm CO_{2eq}) Scenario will be locked in by existing infrastructure up to 2035."

- **Too slow to address adaptation**
- **Engineers' involvement limited**

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Conference Proceedings

Presentations for this inaugural event are now available on the project website:

http://fscarbonmanagement.org/

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Current Projects

- **Sustainability Metrics and Assessment Techniques for Energy Systems**
- **CCS Network**
- **GHG Measurement**
- **Adaptation**
- **Inclusion of Technology Barriers in Economic and Policy Analyses**
- **IPCC Expert Meeting**
- **Next Conference: October 2013 – Feb. 2014**

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More Information

Project website:

http://fscarbonmanagement.org/

Interested in participating?

More questions?

Contact:

carbonmanagement@foundersocieties.org

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