



# International Organization for Standardization (ISO) Technical Committee 265 (TC-265): Carbon Dioxide Capture, Transportation, and Geological Storage

Prepared for:

**Carbon Storage R&D Project Review Meeting  
Developing the Technologies and Infrastructure  
for CCS**

*Pittsburgh, PA*

Prepared By:

**Steven M. Carpenter, VP  
Chair & Head of Delegation, US TAG ISO TC-265**

13 August 2014

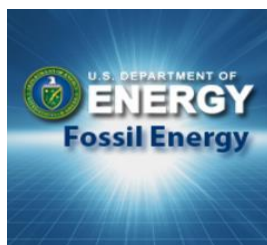


# Acknowledgement

**Traci Rodosta**, Director, Sequestration Division & Coordinator,  
Regional Carbon Sequestration Partnership – DOE-NETL

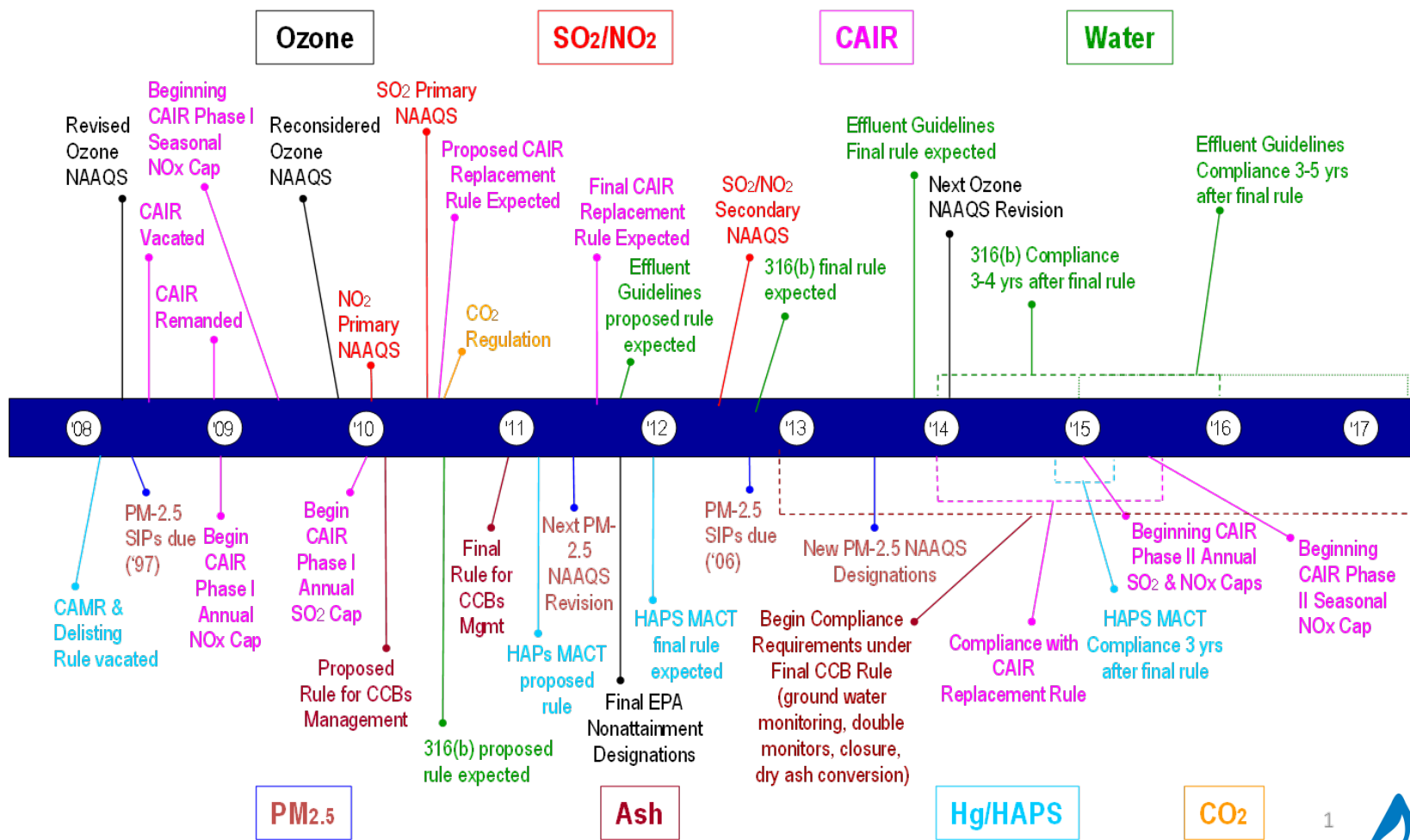
**Mark Ackiewicz**, Division of CCS Research –Program Manager,  
DOE-FE

**Jerry Hill**, Technical Advisor, SSEB



Advanced Resources  
International, Inc.

# Regulatory Uncertainty



# Issues Affecting CCUS

- Complying with EPA MRR Subpart RR & UU
- Categorization of CO<sub>2</sub> as a solid waste
- Possible characterization of CO<sub>2</sub> as a hazardous waste
- Potential conversion of State-based UIC Class II programs into UIC Class VI programs
- EPA's Prevention of Significant Deterioration (PSD)
- EPA's Best Available Control Technologies (BACT)





**One mechanism to address  
these issues...**

---

**...International Standards**

# What are Standards?

---

- Consensus based
- Designed as a rule, guideline or definition
- Can be revised & updated
- Voluntary
- Standards must fit to purpose:
  - Prescriptive based
  - Objectives based
  - Performance based
  - Principles based
  - Hybrids



# Must INCLUDE any and all...

- *UNFCCC - IPCC*
- *ISO*
- *EU European Directives*
- *USDOE*
- *USEPA*
- *NGO's (WRI, GCCSI, etc.)*
- *Federal, Provincial, State regulations*
- *Future expected directives*



All-Inclusive



Club Viva Fortuna



# Why Standards?

---

- Because they are not laws...
  - *Standards & regulations can work together*
- Not Mandated
- Typically initiated by industry...
  - *And therefore better received and used by industry because they are part of the process*
- Harmonize across jurisdictions





# Why Standards?

---

- Early access to information that could shape the market in the future
- Provides a voice for both industry and the public in the development of standards
- Streamline the regulatory process
- Demonstrate regulatory compliance



# Why Standards?

“**Standards**, smart local and global standards, are **essential** to the timely advancement of the technologies and equipment that will be necessary to make safe reliable power with the **capture of emissions** from hydrocarbon fueled power plants.”



Mike Monea, President  
*Carbon Capture & Storage  
Initiatives Saskatchewan Power  
Corporation - Boundary Dam –  
email to CSA Group*



Advanced Resources  
International, Inc.



# ISO TC 265: Carbon Dioxide Capture, Transportation, and Geological Storage

---

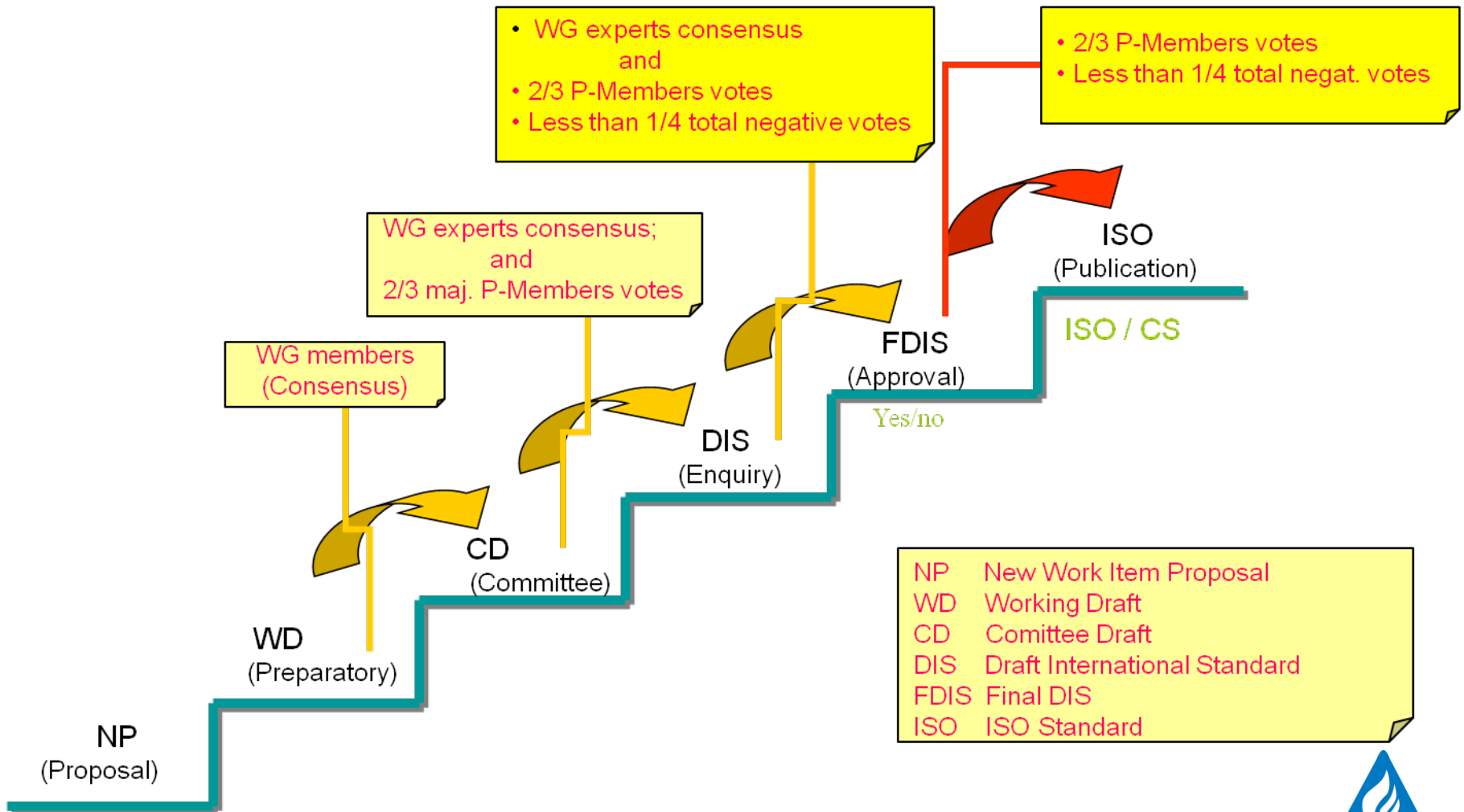


# ISO = A Global System

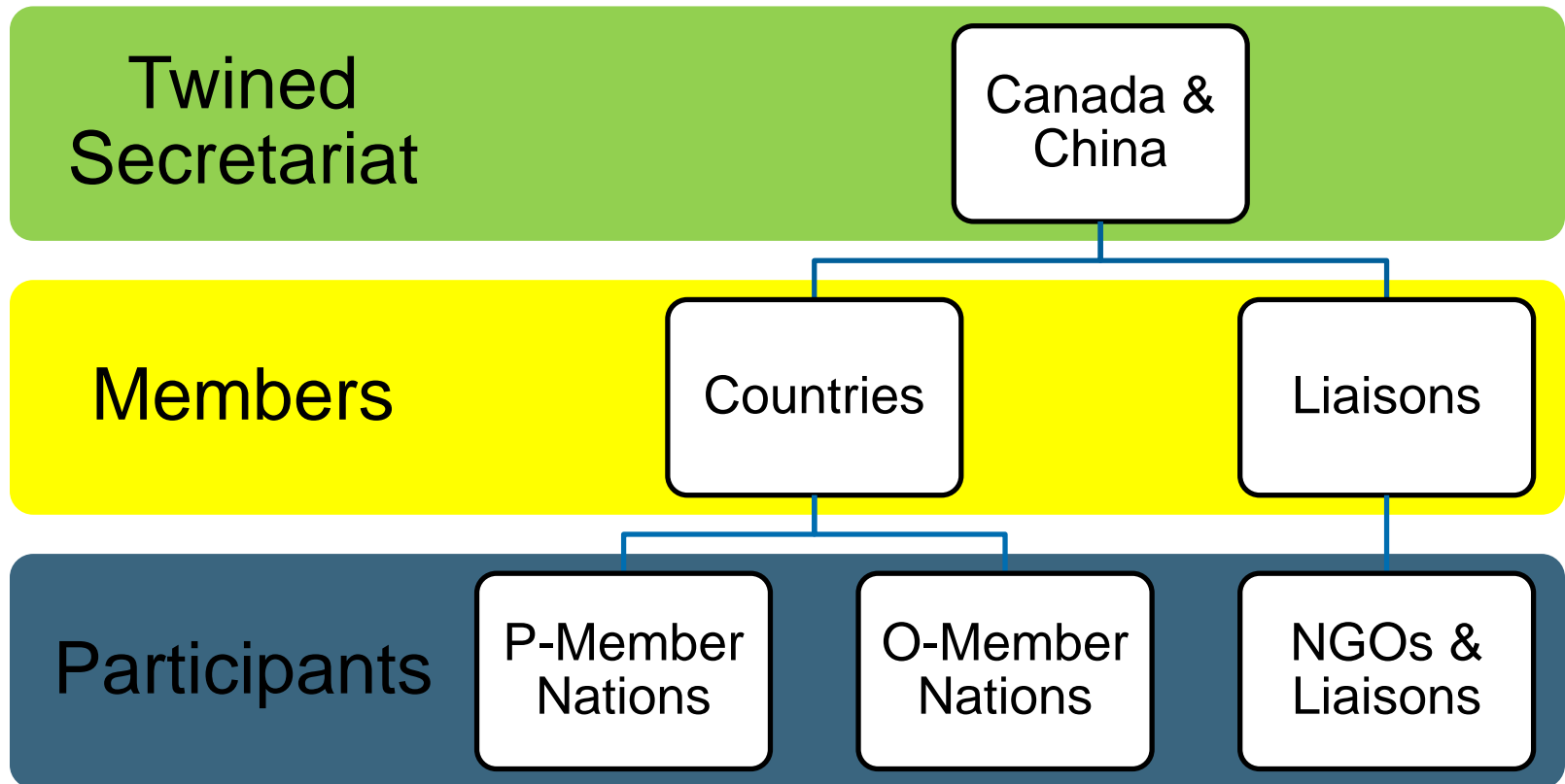
- *Based in Geneva, Switzerland*
- *163 Countries*
- *97% of the World's population*
- *>100,000 international experts*
- *>600 organizations in liaison*
- *>19,000 International Standards*



# ISO Standards Development



# ISO TC 265 – CCS Organization



# ISO TC 265: P-Members

## Participating Countries:

*Australia*

*Canada*

*China*

*France*

*Germany*

*India*

*Italy*

*Japan*

*Korea*

*Malaysia*

*Netherlands*

*Norway*

*South Africa*

*Spain*

*Sweden*

*Switzerland*

*United Kingdom*

*United States (ANSI)*

- Voting Members*
- Guaranteed International Expert Participation on all WGs*



# ISO TC 265: O-Members

## Observing Countries:

*Argentina*

*Iran*

*Brazil*

*New Zealand*

*Czech Rep.*

*Serbia*

*Egypt*

*Sri Lanka*

*Finland*

- Non-voting Members*
- May request International Expert Participation on all WGs*
- May upgrade to P-Member at any time*



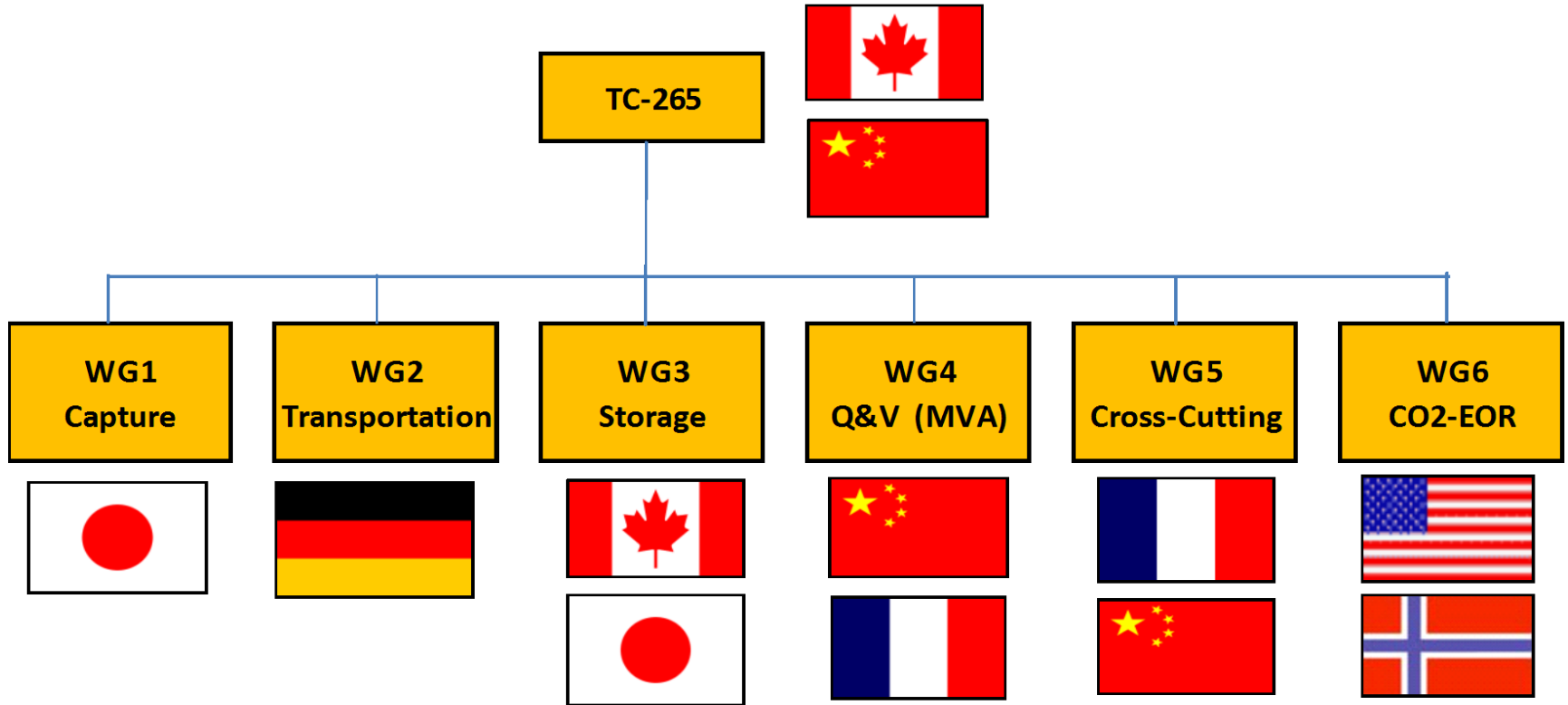


# ISO TC 265: Liaisons

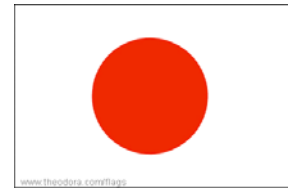
- *ISO TC207 Environmental Management*
  - *ISO TC67 Petroleum and Natural Gas*
  - *CEN/TC 234 Gas Infrastructure*
  - *IEAGHG*
  - *CO2 GeoNet*
  - *Carbon Sequestration Leadership Forum (CSLF)*
  - *European Industrial Gases Association (EIGA)*
  - *Global CCS Institute (GCCSI)*
  - *International Energy Association (IEA)*
  - *World Resources Institute (WRI)*
- ❑ *Non-voting Members*
  - ❑ *Guaranteed International Expert Participation on all WGs*



# TC-265 Working Groups



# WG1: Capture



## *Technical Report (TR):*

- Pre-, post-, & oxyfuel combustion capture
- Industrial processes
- Separation, purification
- Dehydration, compression and pumping
- Liquefaction, installation, operation, maintenance
- Quality of CO<sub>2</sub> streams
- Monitoring, management systems
- Plant retrofitting

- *4 US Members*
- *All have lead author roles*

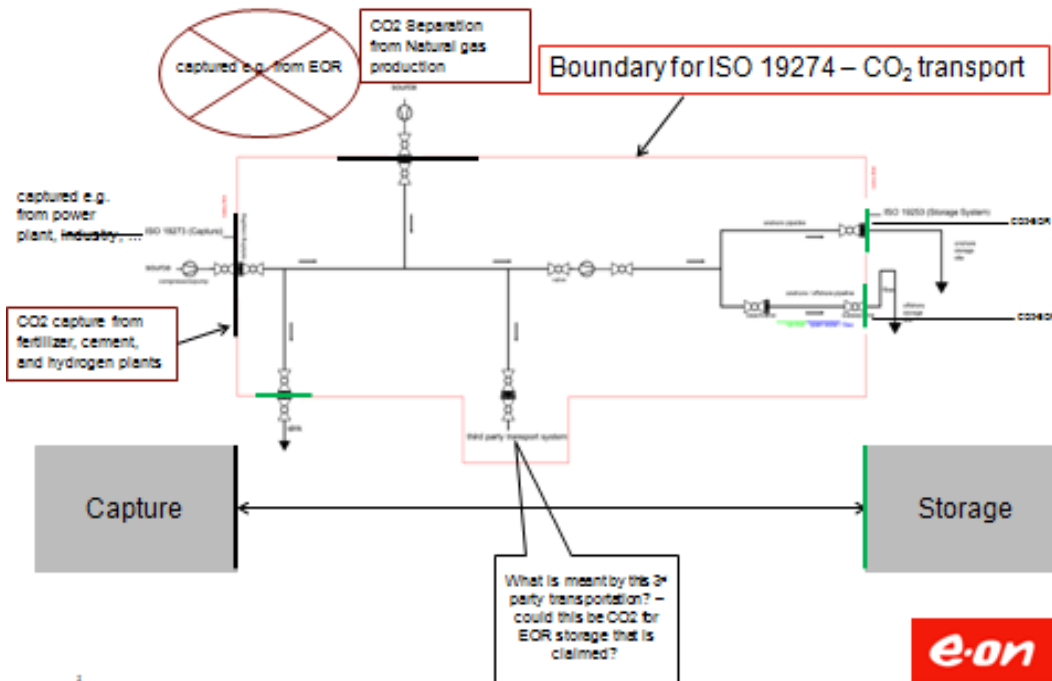


# WG2: Transportation



## Pipeline transportation systems boundaries:

### Definition of CO<sub>2</sub> Transport Boundaries

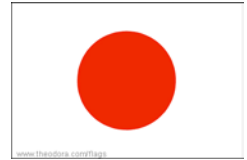


□ 2 US Members

- Pipelines not currently covered by existing ISO/TC-67 standards
- Health, safety and environment (HSE) aspects specific to transport
- Monitoring of CO<sub>2</sub>



# WG3: Storage



## *Geological storage of carbon dioxide; Canada (Onshore) Japan (Offshore):*

- Z-741-12 as seed document
- Site selection
- Site characterization
- Risk assessment & risk management
- Well construction
- Closure
- Post-closure

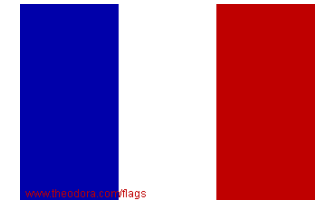
- *8 US Members*
- *Many have lead or co-lead author roles*



# WG4: Quantification & Verification

*Quantification & Verification Methodology (TR); Led by China, with support from France:*

- Project boundary & leakage
- CO<sub>2</sub> quantification
- Monitoring and reporting
- Third party verification
- Life Cycle Analysis

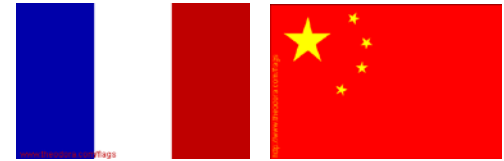


4 US Members



Advanced Resources  
International, Inc.

# WG5: Crosscutting Issues



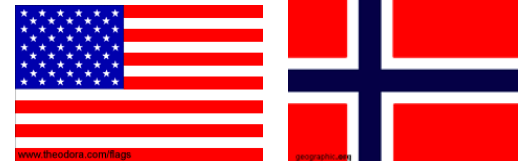
*Definitions & Vocabulary; Led by France, with support from China:*

- Terminology
- Definitions
- System Integration
- Public Participation & Engagement
- Mixing of gas streams from different sources

- 7 US Members
- Many have lead or co-lead author roles



# WG6: CO2-EOR



## Carbon Dioxide Storage using EOR; led by USA, with support from Norway:

- *Low-pressure subsurface oil field operating environments*
- *Reservoir & pore space management*
- *Manage known lateral stratigraphic traps in the target formation*
- *Coordination with WGs 1-5*

- ❑ *18 US Members*
  - ❑ *1 - Norway*
  - ❑ *5 - Canada*
  - ❑ *2 - China*
  - ❑ *2 - Japan*
  - ❑ *3 - UK*
  - ❑ *2 - IEA*
  - ❑ *24 Total Members*
- Expected:*
- *France*
  - *Liaisons*





# DOE-NETL RCSP = Membership



Advanced Resources International, Inc.

# DOE-NETL Expertise Globally

## Z-741-12 – Seed Document

- Jorg Aarnes, *DNV*
- Mike Blincow, *Denbury*
- Steve Carpenter, *ARI*
- Ian Duncan, *UT-BEG*
- Richard Esposito, *SoCo*
- Joe Kelly, *ADEM*
- Nino Ripepi, *VT*

➤ **3 of 8 Lead Authors**

➤ **19% of total expertise on the Panel**



Advanced Resources  
International, Inc.

# DOE-NETL RCSP Expertise Globally

## US TAG to TC-265 International WG Membership

- *WG1: Capture*
  - *WG2: Transportation*
  - *WG3: Storage*
  - *WG4: Q&V (MVA)*
  - *WG5: Crosscutting*
  - *WG6: CO<sub>2</sub>-EOR*
- >80% of total expertise  
on the US TAG**



# Next Steps...nexus in the USA

- 4 Plenary's to date – Europe & Asia
- September 2014 – US TAG – Cleveland
- October 2014 – GHGT-12 – Austin, TX  
*ISO TC-265 Panel discussion*
- January 2015 – *International WG & Full Plenary Meeting* – Birmingham, AL
- 26 Countries will engaged with ISO TC-265 twice in the USA within 4 months

- **GREAT OPPORTUNITIES TO SHOWCASE  
DOE-NETL RCSP EXPERIENCE & EXPERTISE**



Advanced Resources  
International, Inc.

# TC-265 Plenary...nexus in the USA

- Technology Transfer opportunity
- Best Practices shared and included
- Quadrennial Review details included
- Bi-lateral CCUS relationships with China, Korea, & Norway
- ISO TC-265 may be the single most productive process to increase exposure, use, and inclusion -- especially in Non-OECD economies, who are more likely to be the “first adopters” of ISO TC-265 Standards – of DOE-NETL experience and expertise



# Thank You



## Office Locations:

### **Washington, DC**

4501 Fairfax Drive, Suite 910  
Arlington, VA 22203  
Phone: (703) 528-8420  
Fax: (703) 528-0439

### **Houston, Texas**

11931 Wickchester Lane  
Suite 200  
Houston, TX 77043-4574  
Phone: (281) 558-6569  
Fax: (281) 558-9202

### **Cincinnati, Ohio**

1282 Secretariat Court  
Batavia, OH 45103  
Phone: (513) 460-0360  
[scarpenter@adv-res.com](mailto:scarpenter@adv-res.com)



Advanced Resources  
International, Inc.