Greenhouse Gas Emissions Quantification and Verification Strategies Workshop

Scripps Institution of Oceanography
La Jolla, California
June 2 and 3, 2010

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Workshop Objective and Organization

Objective

- **Examine metrics needed to evaluate the performance of a greenhouse gas emissions reduction and verification program for the United States**
- **Identify the inherent measurement, technology, and monitoring challenges posed by:**
  - **Market-Based Approaches, or**
    Harmonious carbon equivalent markets, i.e., asset fungibility
  - **Purely Regulatory Approaches**
    Equitable taxation basis

Steering Committee Co-Chairs

- **Maxine Savitz, Vice President**
  National Academy of Engineering
- **Bryan Hannegan, Vice President**
  Electric Power Research Institute
- **Quinlan Shea, Exec. Dir. Environment**
  Edison Electric Institute

Members List in Your Packet

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Approach and Organization

- **Attendees/Registrants (74) – Primarily Invited**
  - 37 Industry and Industry Associations
  - 6 Academia
  - 22 Government and National Labs
    - 8 NIST
    - 1 Foreign National Metrology Institute
- **Plenary Sessions and Working Group Breakouts**
  - Working Group Topic Areas
    - Industrial Generation
    - Power Generation
    - Global Monitoring: Regional and International Emissions
    - Distributed/Localized Sources and Sinks (including offsets)
    - Verification and Carbon Market Emissions Issues

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Crosscutting Themes

Karen Obenshain, EEI & Bryan Hannegan, EPRI

- **Reflections on Day One**

  Common Themes across the 5 Working Groups

  - **Regulatory/Legislative**
  - **Communication/Perception**
  - **Technology deficiencies/Data uncertainties**
  - **Funding**

Common Needs

1. **Catalog existing GHG measurement technologies for cost, applicability and error/uncertainty**

2. **Methods to independently test and validate different GHG measurement methods (including new approaches)**

3. **Improved GHG measurement techniques**
   - **Advanced sensors for continuous emitters**
   - **Improved fuel input-based approaches for combustion**
   - **Direct measurements for process emissions**
   - **Remote sensors for fugitive and distributed sources**

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Common Needs

4. **Design basis for integrated GHG monitoring system**
   - Make better use of what's already available
   - Fill network through strategic investment
   - Integrate and validate through process models
   - Provide data and products for decision support

5. **Gain sustained commitment to implementation**
   - Convince public, decision makers of "fundamental" need
   - Identify public and private sector "champions"
   - Invest in the necessary human resources
   - Determine who pays and how

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WG Reports & Follow-on Activities

- **Working Group Report Items**
  - Future Goals and Vision
  - Critical Technology Challenges
  - Technical/Measurement Challenges (Distributed Sources)
    - Communication failures: public-scientists-policy makers; recognize the urgency of action
    - Lack of coordination/communication among operational agencies and researchers
    - Lack of spatially resolved data; attribution of sources/sinks (difficulty with low s/n ratio)
    - Defining/enumerating unique characteristics of varied sources/sinks
    - Demonstrating cost/benefit of monitoring distributed sources
- **Reports**
  - Workshop Summary
    - Available in 6-7 weeks
  - Opportunities Document

Linking NIST Efforts to Other Government Science and Technology Programs

- USGCRP – North American Carbon & Carbon Cycle Science Programs
- Increased Collaborative Activities with NOAA – ESRL and Climate Service
- NASA through JPL and other Offices and Laboratories

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Dimensions of the Quantitative GHG Emission Reduction and Verification Challenge

Bottom – Up

Top – Down

- Electricity Gen.
- General Industrial Energy Generation

Stationary Sources

0.005 – 0.05 km

Agriculture

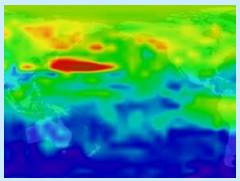
Estuaries & Coastal Ocean

Transport Fueling

Forests & Woodlands

Distributed or Area Sources

0.5 – 5 km



Regional

10 – 100 km

International

100 – 1000 km

Size or Extent

CEM Technology

- Gas Conc. Stds
- Stack Gas Velocity

Single Point Measurements

- Optical Reference Data
- Chemical Meas. Standards

Optical Remote Measurements

- Optical Spectral Ref. Data
- Advanced Measurement Tools & Methodologies

Atmospheric Monitoring

- Satellite Observations
  - Radiometry
  - Optical Spectral Reference Data
- Surface-based Networks
  - Gas Conc. Standards
  - Wind Velocity Standards

Measurement Tools, Standards Technologies & Methodologies

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