

# Charting a Course to Energy Independence

Providence, RI  
August 9-12, 2009

## INTRODUCTION TO FEDERAL GREENHOUSE GAS MEASUREMENT: I

*Matt Gray, FEMP*

*Rachael Jonassen, LMI*

*John Nangle, NREL*





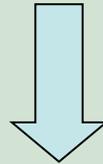
Summer Arctic Sea Ice  
Boundary in 1979

NASA/Goddard Space Flight Center Scientific Visualization Studio; thanks to Rob Gerston (GSFC) for providing the data



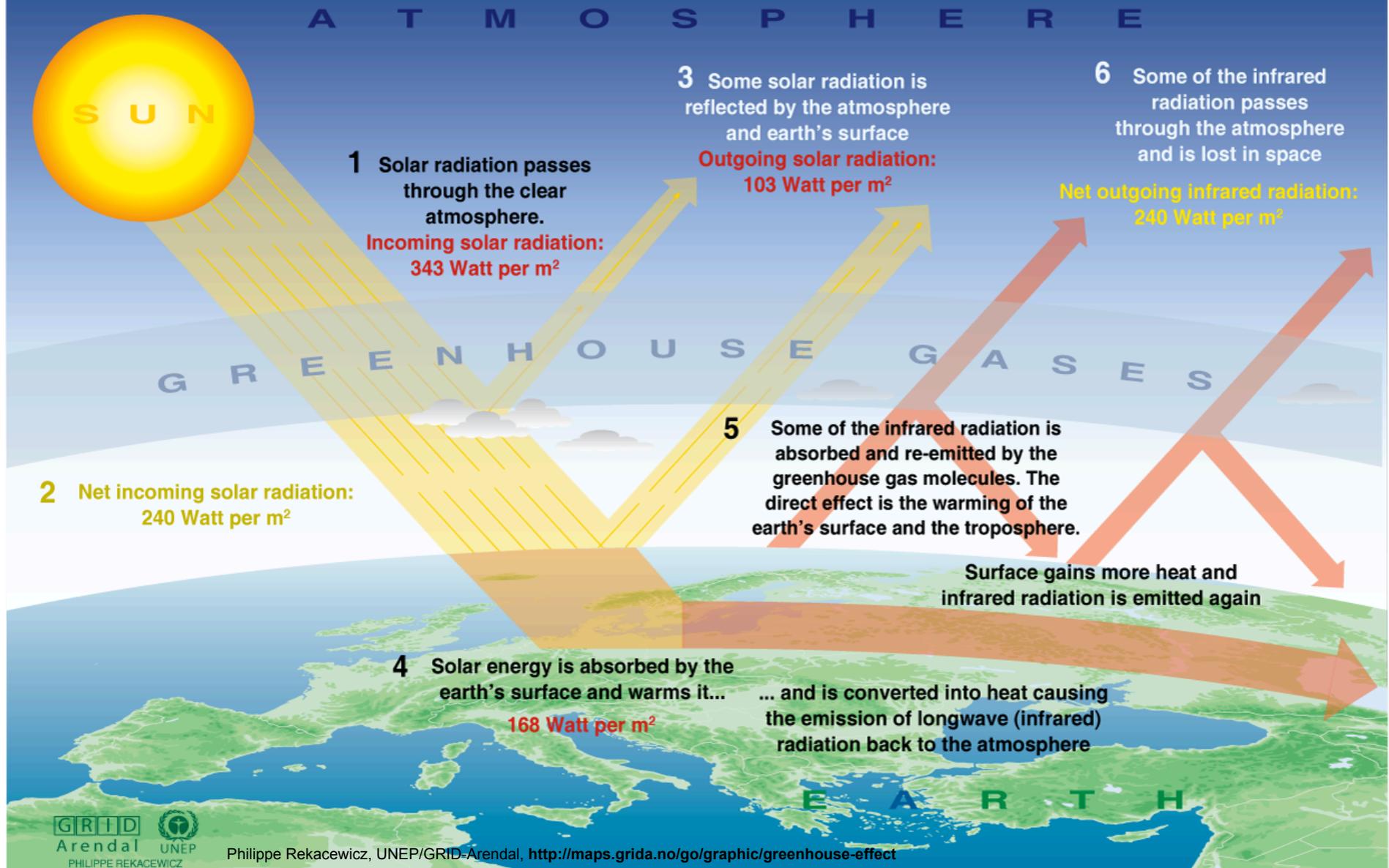
## Why Me?

**The U.S. must lead by example in reducing its GHG emissions, creating green jobs, and transitioning to a clean energy economy**



**To achieve this goal, the Federal government must exhibit leadership by example in managing and reducing its own emissions**

# The Greenhouse effect





# Regulated GHG Characteristics

| Greenhouse Gas                            | Pre-1750 Concentration | Current Concentration | Global Warming Potential* | Atmospheric Lifetime (yrs) |
|---|------------------------|-----------------------|---------------------------|----------------------------|
| Carbon Dioxide (CO <sub>2</sub> )         | 280 ppm                | 384 ppm               | 1                         | 50-200+                    |
| Methane (CH <sub>4</sub> )                | 700 ppb                | 1735–1857 ppb         | 25                        | 12                         |
| Nitrous Oxide (N <sub>2</sub> O)          | 270 ppb                | 320-321 ppb           | 298                       | 114                        |
| Sulfur Hexafluoride (SF <sub>6</sub> )    | 0                      | 6.03-6.40 ppt         | 22,800                    | 3,200                      |
| Hydrofluorocarbons (HFCs)                 | 0                      | 3.2-197 ppt           | 124–14,800                | < 15                       |
| Perfluorocarbons (PFCs)                   | 0                      | 77-246 ppt            | 7,390-12,200              | 50,000                     |
| Nitrogen Trifluoride (NF <sub>3</sub> )** | 0                      | .454 ppt              | 6,800                     | 550                        |

\*100 year time horizon

\*\*Not a Kyoto GHG, but regulated in Waxman-Markey



# Regulated GHG Sources

| Greenhouse Gas  | Sources  |
|-----------------|--|
| Carbon Dioxide  | Fossil fuel combustion, deforestation,   |
| Methane         | Enteric fermentation (cow exhaust), wastewater treatment, landfills, rice fields, biomass combustion, natural gas    |
| Nitrous Oxide   | Agriculture, mobile & stationary combustion, manure management, wastewater treatment, composting, waste incineration |
| PFCs            | Aluminum production, semiconductor manufacturing   |
| HFCs            | Refrigerant leaks, replacement of ODS (CFCs)   |
| SF <sub>6</sub> | Magnesium casting, transformers, electrical switchgear   |
| NF <sub>3</sub> | Semiconductor manufacturing  |



# Current Reporting

## **EPAct 1605(b)**

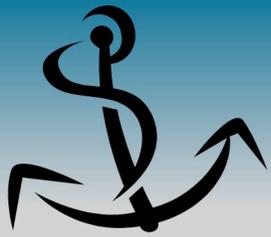
- Voluntary reporting program
- Report: emissions, reductions, sequestration
- Corporations, govt., non-profit, households, other public and private entities
- No reductions goals
- Reporting to create public record of GHG activities, initiate and inform debate



# Current Reporting

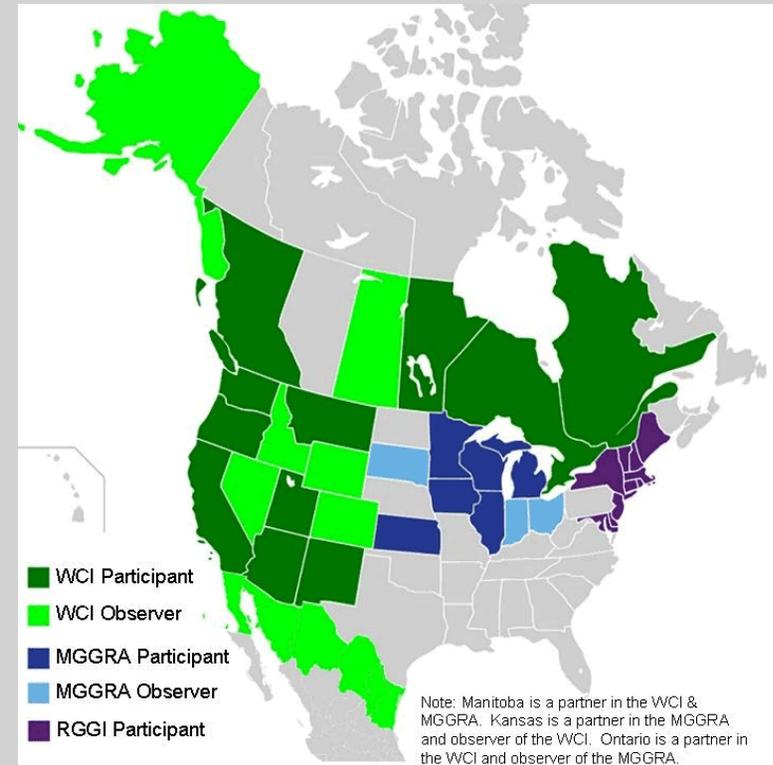
## EPA Climate Leaders

- Industry-government partnership
- Partners commit to reducing emissions
- Partners set reduction goals and report on progress
- Companies create credible public records of reductions efforts
- NREL is a partner, set and achieved two goals



# Reporting Federal GHG Emissions

- **FEDERAL:** With Annual Energy Report
- **NATIONAL:** American Clean Energy and Security Act of 2009 (ACESA) – Markey/Waxman
  - Stationary sources emitting more than 25k metric tons of CO2 equivalent per year
  - Facilities with on-site power plant or landfill must also report emissions
  - Emitters must report emissions in 2011 for 2007-2010, and quarterly thereafter
- **NATIONAL:** EPA proposed rule requiring GHG reporting; data collection in 2010, reporting begins 2011
- **REGIONAL:** e.g. RGGI, WCI
- **STATE and LOCAL:** e.g. California
- **GHG REGISTRIES:** e.g. Climate Registry



## Regional GHG Initiatives

Matt Gray, Rachael Jonassen, John Nangle

August 8, 2009





# Current Legislation/Regulation

- EPAAct 2005, EO 13423, EISA 2007: increased energy efficiency rules to reduce GHG emissions
- EO13423 (3a): required agency heads to implement within the agency sustainable practices for greenhouse gas emissions avoidance or reduction
- NDAA 2008: DoD must consider impacts of climate change on facilities, capabilities, mission
- Massachusetts v EPA 2008: EPA can regulate GHGs under CAA
- EPA 2009: California [+13 states, DC] can use stricter mileage standards to reduce GHG emissions beginning in 2010
- UNFCCC : US agreed to “adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases ... .”

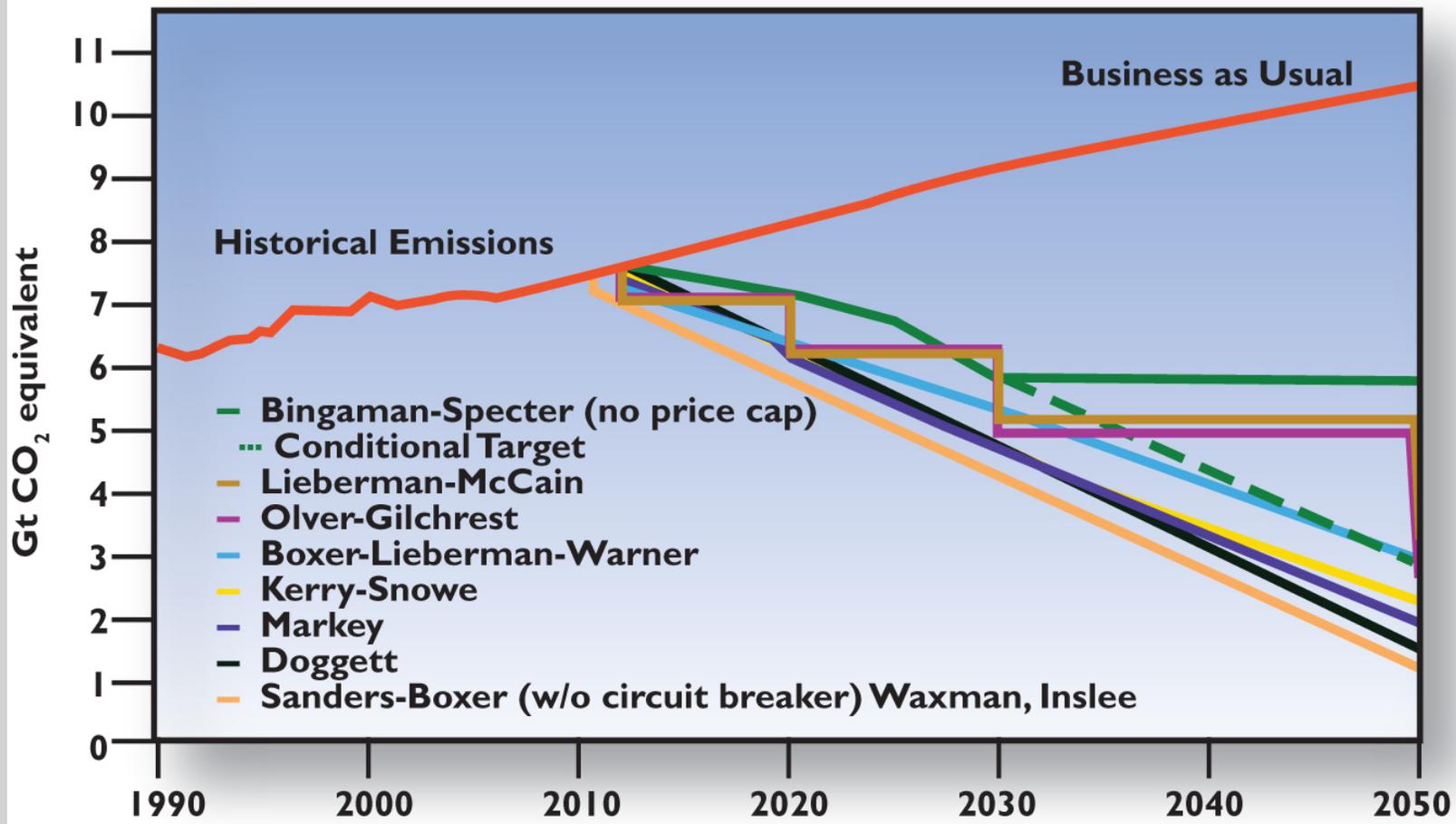


# Potential Requirements

- Pending
  - EPA: proposed GHG reporting rule
  - EPA: GHGs endanger public health/welfare (draft finding)
  - Renewable fuel standard – 36 billion gallons/year by 2022
  - Increased CAFE standards – 35.5 mpg average for light vehicles by 2016 MY
  - Executive Order requiring GHG reporting
- Legislative Activity in Congress
  - Waxman-Markey, cap and trade system (passed House 6/30/09)
  - Senate version of cap and trade



# Proposals for GHG Reduction





# Other Regulatory Experience

## Sulfur Dioxide Cap and Trade

- EPA Acid Rain Program
- Achieved 100% compliance in reductions
- Exceeded goal by 22% by banking allowances

## Montreal Protocol

- Regulates CFCs
- Met with industry resistance
- **Chicago Climate Exchange (CCX)**
  - Voluntary but legally binding
  - 300 members, including 7 municipalities, 2 states





# Other Regulatory Experience

## Regional and state lead Federal programs

- Some of these programs may become the standard
- Lieberman-Warner Climate Security Act specifies The Climate Registry for national reporting

## EU Emissions Trading Scheme

- Cap and Trade (CO<sub>2</sub> only, N<sub>2</sub>O and PFCs coming)
- Emissions trading market





# Organizational Boundaries

- Whose GHGs are these?
- Equity Share Approach
  - Reporting based on % of economic interest
- Control Approach
  - Operational Control
    - Introduce and implement operation policies
  - Financial Control
    - Direct financial/operating policies for financial gain



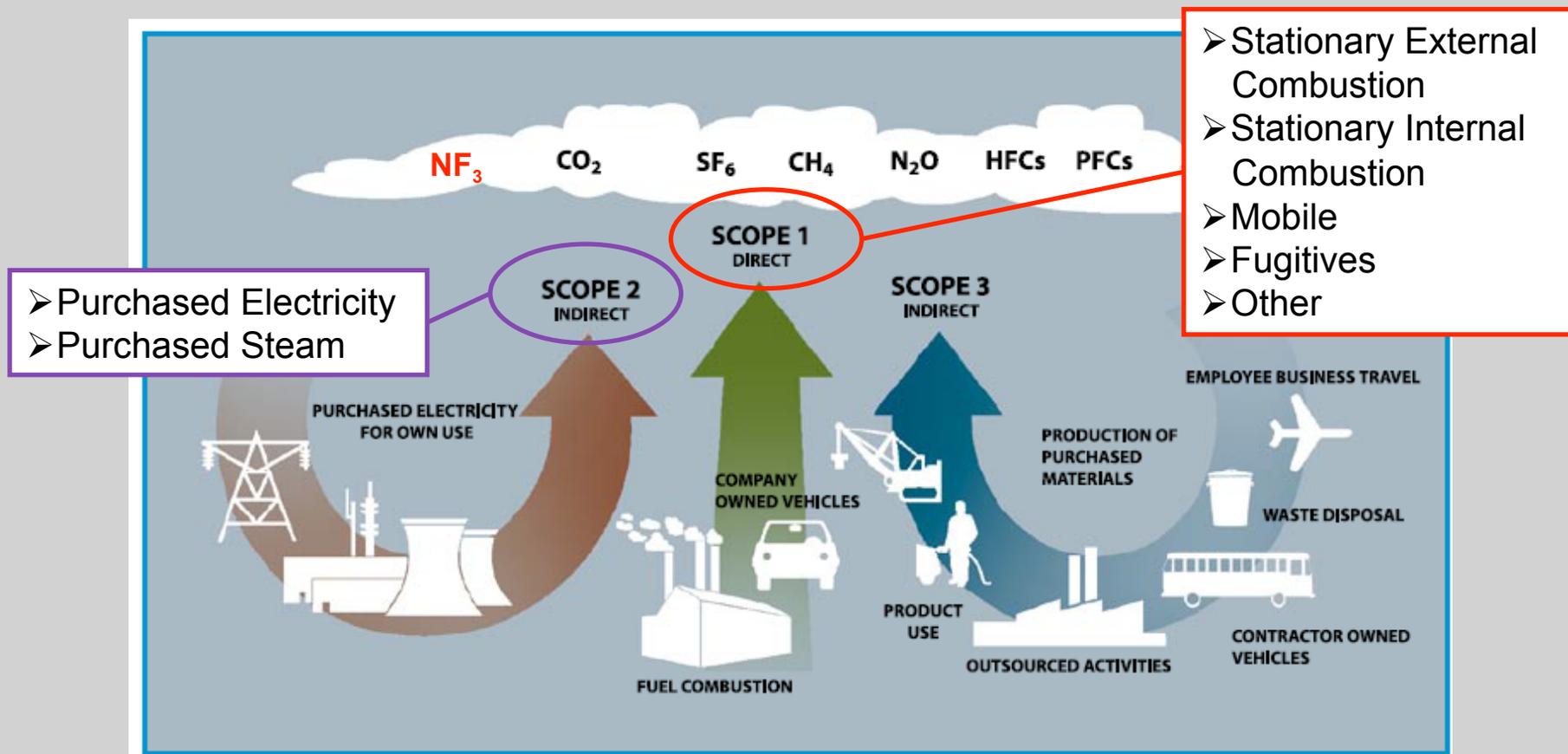
# Types of Federal Organizations

| Type           | Definition  | Financial   | Op.  | Equity      |
|----------------|---|-------------|------|-------------|
| GOGO           | Govt. Owned and Operated                                      | 100         | 100  | n/a         |
| GOCO           | Govt. Owned Contractor Operated                               | 100         | 100  | n/a         |
| POGO           | Privately Owned/Govt. Operated                                | 0           | 100  | n/a         |
| Quasi-govt.    | Hybrid organization   | % ownership | Var* | % ownership |
| Public-Private | Public-private partnership                                    | % ownership | Var* | % ownership |
| Grantee        | Parties have received grant for permanent use of right of way | 100         | 0    | n/a         |
| Permitee       | Parties granted short-term use of government land.            | 100         | 0    | n/a         |

\* Depends upon terms of contractual agreement.



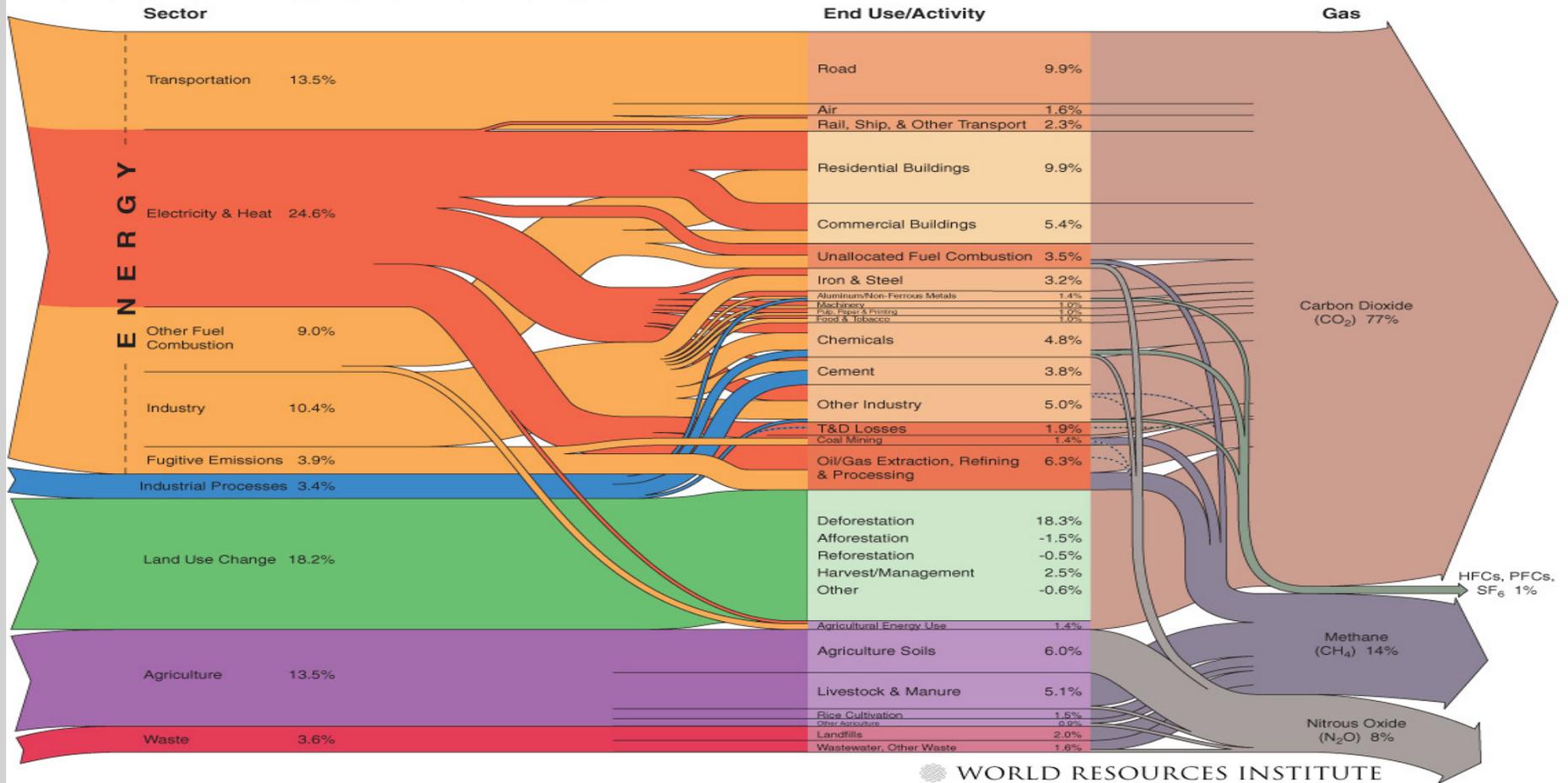
# Emission Sources (Scopes)





# World GHG Emissions Flow Chart

World GHG Emissions Flow Chart



WORLD RESOURCES INSTITUTE



# GHG Accounting Hierarchy

## Protocols

Policy-neutral framework to ensure consistent accounting approach (Public, Private, & Sector Specific)

*Examples:*

WRI/LMI  
GHG  
Protocol

## Policies and Regulations

Define targets and boundaries

Executive  
Order

## Federal Program

Implement regulation (e.g. targets and boundaries)

OFEE, OMB,  
EPA, FEMP

## Agency Plans

Organizational accounting approach

DOE

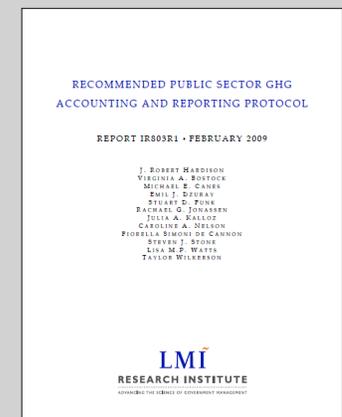
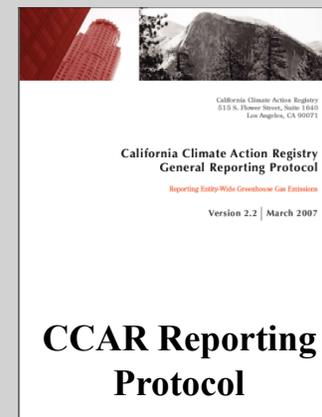
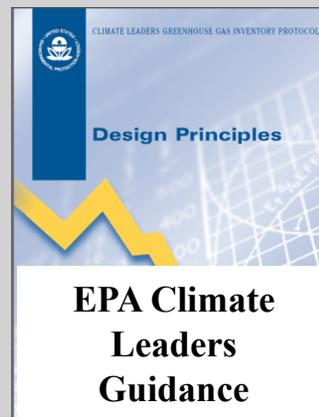
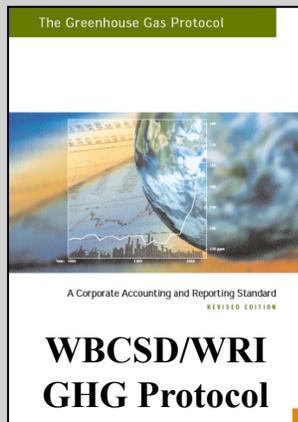
## Inventory

Organization or facility level account

NREL



# GHG Inventory Protocols/Guidance





# What is a Protocol?

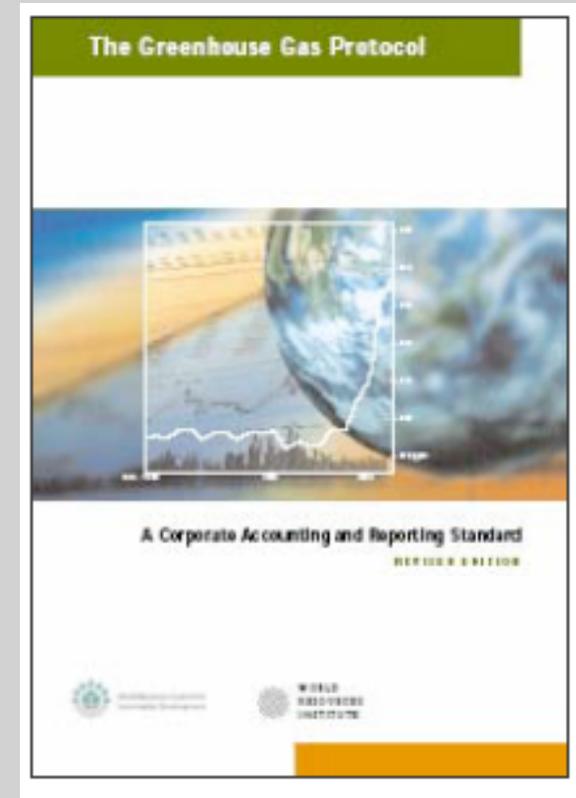
- **Accounting Principles**
- Goals & Inventory Design
- **Organizational Boundaries**
- **Operational Boundaries**
- **Tracking Emissions Over Time**
- Identifying and Calculating Emissions
- QA/QC
- **Reporting Emissions**
- Verifying
- Setting a Target



# WRI Corporate Standard

## Current Guidance for GHG accounting:

- The *Corporate Accounting and Reporting Standard* is the gold standard
  - Guidance for corporations, entity level
  - Developed by World Resources Institute and World Business Council for Sustainable Development in 2004 (began 1998)
  - Harmonization of GHG practices
  - Over 200 stakeholders
  - Used by ISO, the Climate Registry, EPA, and 1000s of companies worldwide (including 63% of Fortune 500)
  - Calculation tools available
  - Also a Project Standard





# Programs Based on GHGP



Confederation of Indian Industry  
CII Sohrabji Godrej Green Business Centre



CARBON DISCLOSURE PROJECT



Matt Gray, Rachael Jonassen, John Nangle

August 8, 2009



# Public Sector Protocol

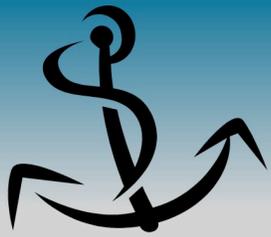
- Summary
  - Core GHG accounting principles from Corporate Standard applied to local, state and federal agencies
- Initial Stakeholder Process
  - LMI, WRI, EPA Climate Leaders, and OFEE
- 20 Federal Agency Stakeholders including:
  - Army
  - USPS
  - GSA
  - EPA
  - DOE
  - VA
  - COE
  - NASA
  - US Forest Service
  - US Park Service
  - and ... State of MD

RECOMMENDED PUBLIC SECTOR GHG  
ACCOUNTING AND REPORTING PROTOCOL

REPORT IR803R1 • FEBRUARY 2009

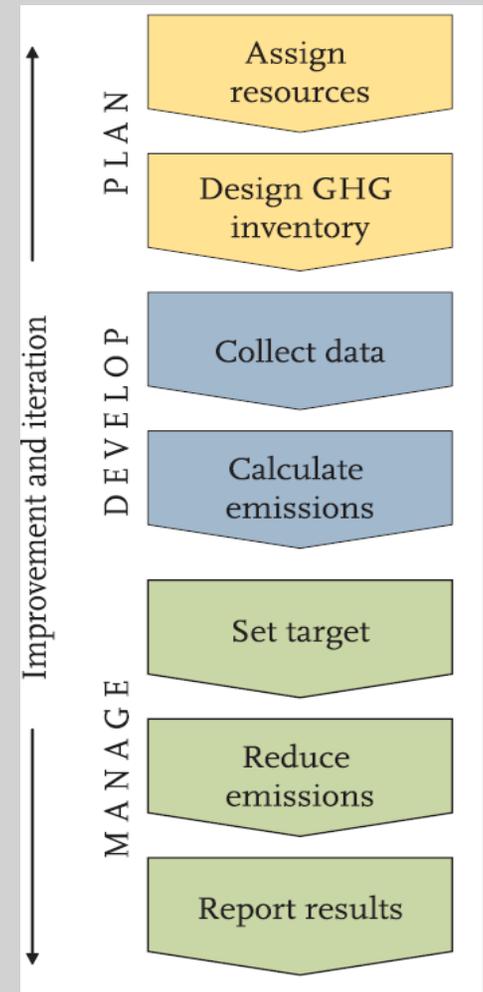
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# GHG Protocol in Context

- Accounting and Reporting Principles
- Organizational Boundaries
- Operational Boundaries
- Identifying and Calculating GHG Emissions
- Reporting GHG Emissions
- Setting GHG Targets





# Existing Inventories

- EIA/EPA reports to IPCC (one national report)
- Climate Leaders (280 corps., e.g. DuPont)
- ICLEI (cities, e.g. NYC)
- 1605b (221 in 2005; 118 entity level; 13% US CO<sub>2</sub>, mostly utilities; report projects)
- RGGI (i.e. specific utilities in 10 states)
- The Climate Registry (voluntary)
- Chicago Climate Exchange (membership/contract)



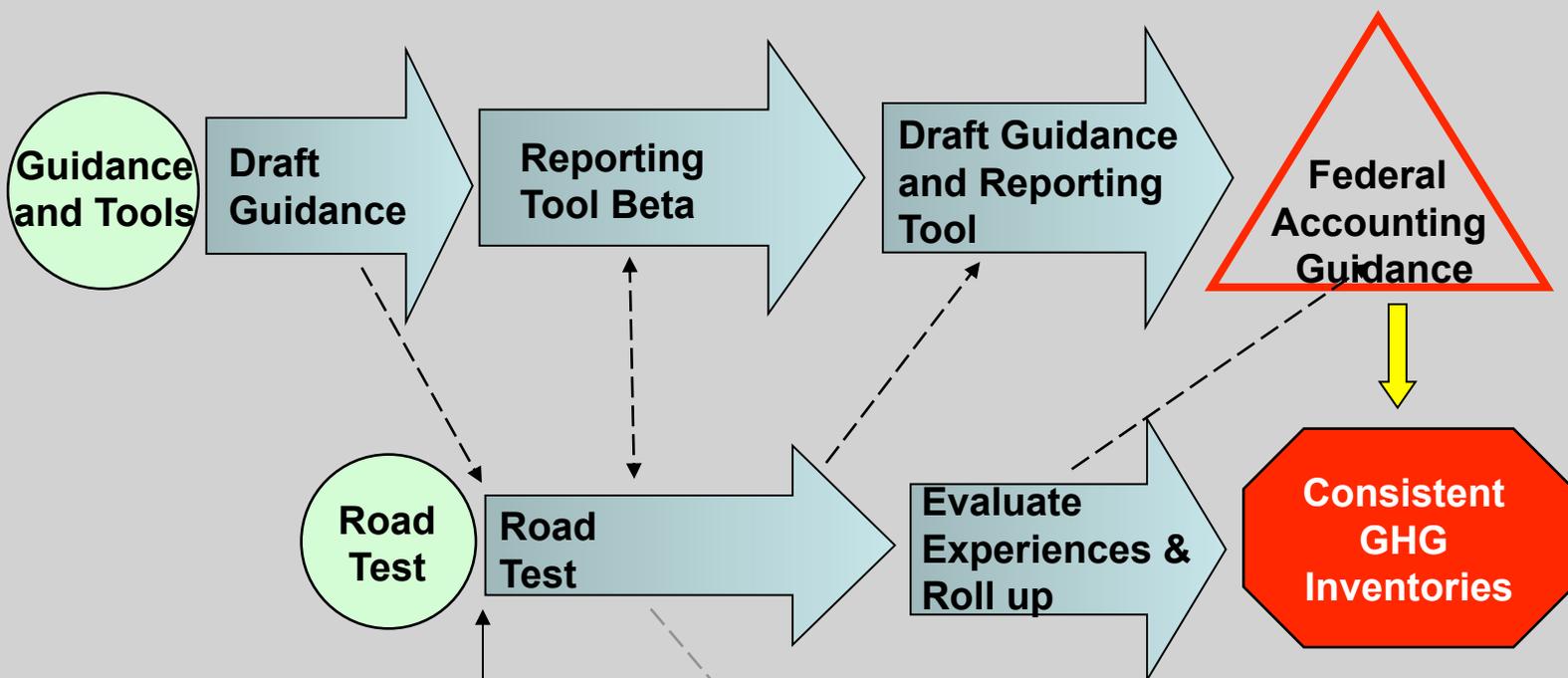
# Existing Federal Agency Inventories

- NASA (2 years)
- EPA
- Army
- Air Force
- USPS
- NOAA
- DHHS/NIH/Bethesda
- DOE Labs
  - NREL
  - PNNL
  - Sandia
- NPS
- USFS
- Greater Yellowstone Area

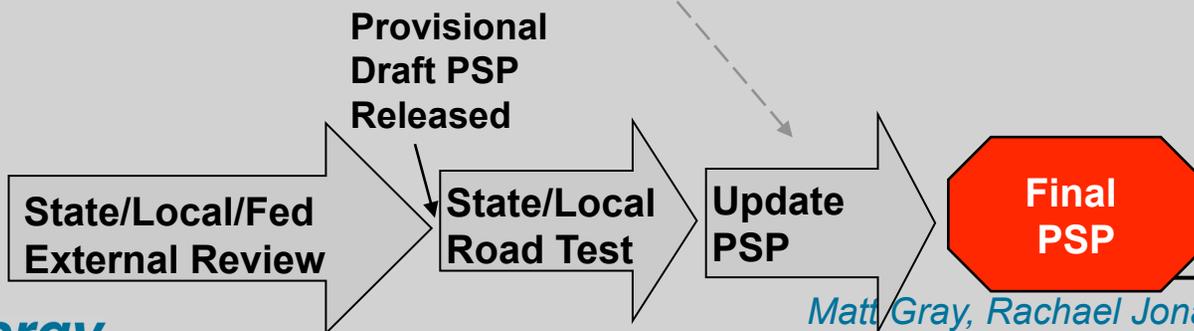


# Federal GHG Road Test

## Federal Process



## WRI /EPA Process





# Review Process



*Project website ([www.ghgprotocol.org/psp](http://www.ghgprotocol.org/psp))*

- Purpose
  - Gain critical insight into the application of core GHG accounting principles to public agencies
  - Incorporate shared examples, case studies into final text
  - Protocol will support reporting under Executive Order
- Expectations
  - Read through PSP drafts and questionnaire
  - Address specific questions posted on web site
  - Share comments with other agencies via group conference calls
- Rough Timeline
  - New Draft August 7
  - 2<sup>nd</sup> round of reviews by 21 August, conference calls end of August
  - **Provisional Draft** available beginning of September 2009



# Road Testing Process

- Purpose
  - Gain critical insight into practical implementation issues
  - Incorporate shared examples, case studies into final protocol text
  - Serve as the basis for EO implementation guidance
- Expectations
  - Develop key components of GHG inventory, but complete inventory **not required**
  - Federal road test coordinated by LMI
  - WRI available for one-on-one meetings
- Resources Needed
  - Depends on the availability of emissions data and the staff/resources... for top-down, between 10k -75 k
- Rough Timeline
  - Kickoff meeting, August 5 (10:30am to noon) at WRI
  - Feedback through mid-November
  - Final publication of Public Sector Protocol January 2010
  - Federal GHG accounting and reporting Guidance March 2010



# Current Federal Stakeholders

Department of Energy  
National Renewable Energy Lab  
Oak Ridge National Lab  
Pacific Northwest National Lab  
NASA  
DHS  
Environmental Protection Agency  
Greater Yellowstone Area  
USDA and USDA Forest Service  
National Park Service  
Department of Interior  
DOI Bureau of Land Management  
DOI Minerals Management  
DOI FWS  
DOI USGS

GSA  
DHHS and NIH/OD/ORF  
DOD OSD and Services, DLA  
Department of Justice  
Department of Labor  
Department of State  
USAID  
Veteran's Affairs  
US Postal Service  
Tennessee Valley Authority  
“an unnamed agency”



# Timeline

- 21 Aug – WRI completes 2nd round of stakeholder review
- 31 Aug – Provisional Draft Protocol issued
  
- Wk of 31 Aug – Road Testers and Guidance Group meeting (review draft Guidance)
- Wk of 5 Oct – Road Testers and Guidance Group meeting (feedback and share experiences)
- Wk of 2 Nov – Road Testers and Guidance Group meeting (compile and compare data)
  
- 2 Nov – Data collection complete for road test
  
- Wk of 30 Nov – Road Testers and Guidance Group meeting (feedback and share exp.)
  
- 18 Dec – Federal road test complete; draft inventories reported
- 1 Jan – Final Public Sector Protocol
  
- Wk of 4 Jan – GHG Guidance Group meeting
- Wk of 1 Feb – GHG Guidance Group meeting
  
- 15 Mar – Accounting and Reporting Guidance released



# Resources Involved

- Design inventory approach
- Source identification & data acquisition
  - Electricity consumption
  - Fuel use
  - Landfill emissions
  - Wastewater treatment
  - Fugitive emissions
  - Scope 3 data
    - Employee travel, commuter travel, contractor emissions, waste disposal, etc.

*Your resource requirements will depend on the extent of the inventory you choose to conduct and your access to the needed data.*



# Available Support

- Provisional Draft Public Sector Protocol
- Draft Guidance Document
- Coordination of effort, and monthly meetings – FEMP and LMI
- One-on-one assistance – LMI and WRI
- Inventory Tools – multiple sites, we will provide
- Reporting Tool – developed in parallel
- Emissions factors
- Examples and case studies
- Training – GovEnergy and other courses
- FedCenter – GHG Program Area (under dev.)

*Project website ([www.ghgprotocol.org/psp](http://www.ghgprotocol.org/psp))*



# Agency Enrollment in Road Test

## **PUBLIC SECTOR PROTOCOL FEDERAL ROAD TEST**

### PARTICIPANT INFORMATION

*August 5, 2009*

ORGANIZATION:

POINT OF CONTACT:

ADDRESS:

PHONE:

EMAIL:

FACILITIES INCLUDED:

PRIOR AGENCY EXPERIENCE WITH GHG INVENTORIES:

ISSUES/CONCERNS/SPECIAL NOTES:

RESOURCE/SUPPORT NEEDS:

***Due August 21!***



# *QUESTIONS?*