FEMP FIRST THURSDAY SEMINARS

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Federal Greenhouse Gas Accounting and Reporting

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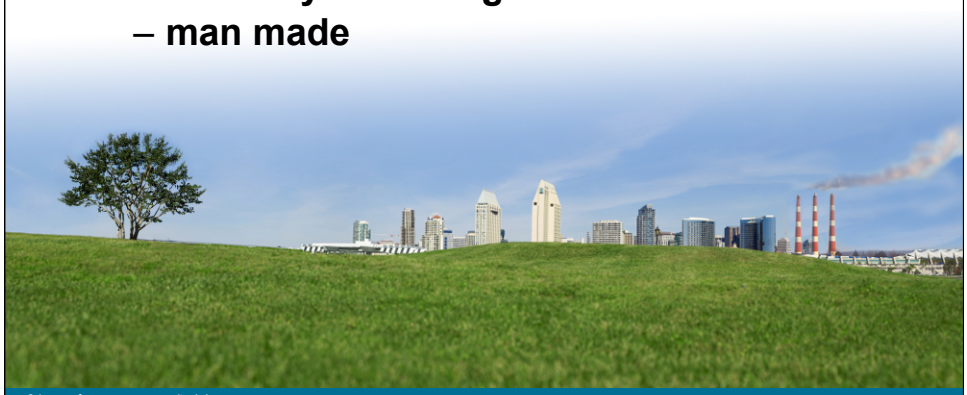
What are greenhouse gases?

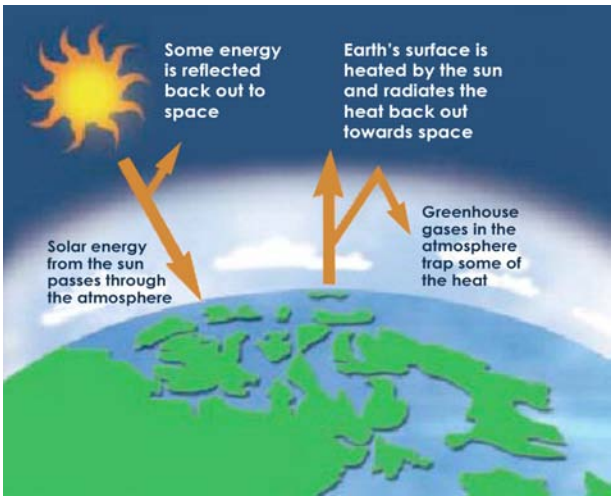
Greenhouse gases are defined in two categories:
- **naturally occurring**
- **man made**



What Are Greenhouse Gases?

- Concentrations of naturally occurring GHGs have remained fairly steady for thousands of years.
- Since the industrial revolution, human activity has drastically increased the atmospheric concentrations of these gases.

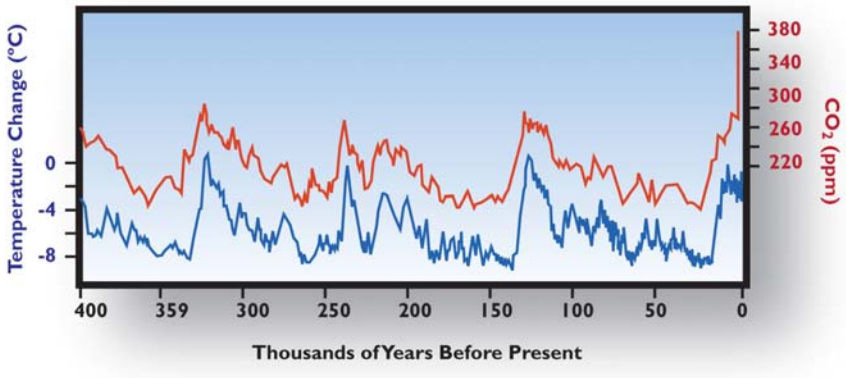
The Greenhouse Effect



Key Greenhouse Gases

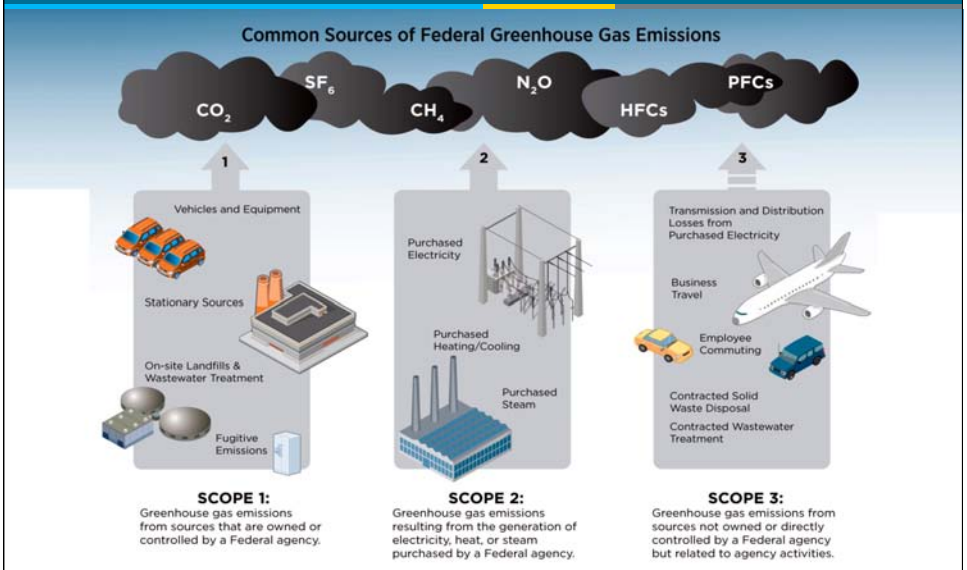
Greenhouse Gases	Common Sources/Uses	Global Warming Potential
Carbon Dioxide (CO_2)	Mobile and stationary combustion	1
Methane (CH_4)	Coal mining, fuel combustion	21
Nitrous Oxide (N_2O)	Fuel combustion, fertilizers	310
Hydrofluorocarbon group of gases (HFCs)	Refrigerants, fire suppressants, manufacturing processes	140-11,700
Perfluorocarbon group of gases (PFCs)	Electrical equipment, manufacturing processes, refrigerants, medicine	6,500 - 17,700
Sulfur hexafluoride (SF_6)	Electrical equipment, manufacturing processes, tracer in air modeling, medicine	23,900

Rising Temperatures in US



US Climate Policy

- "…climate change poses a grave and growing danger to our people."
  (President Obama at Copenhagen COP, December 2009)
- "The science behind climate change is settled, and human activity is responsible for global warming,"
  (EPA Administrator Lisa Jackson at Senate Environment and Public Works Committee hearing, February 2010)



President Obama Signed Executive Order 13514,
Federal Leadership in Environmental, Energy, and Economic Performance

Key E.O. 13514 Provisions Related to GHG Reporting

Section 1	• Policy
Section 2a:	• Goals for Agencies: Scope 1 & 2
Section 2b:	• Goals for Agencies – Scope 3
Section 2c.	• Goals for Agencies – Comprehensive Inventory
Section 8:	• Agency Strategic Sustainability Plan

Key E.O. 13514 Provisions

Section 9a - c:
- Recommendations for GHG Accounting and Reporting

Section 13:
- Recommendations for Vendor and Contractor Emissions

Section 17-18:
- Limitations and Exemption Authority

Relationship of E.O. to other GHG Reporting Requirements

- E.O. 13514, Section 13, requires GSA to provide recommendations… in tracking and reducing Scope 3 GHG emissions related to the supply of products and services to the government
- Federal Statutory and E.O. Requirements reference: www.eere.energy.gov/femp/regulations/regulations.html
- Agencies may also need to refer to EPA's Mandatory Reporting of Greenhouse Gas Rule

Relationship of E.O. to other GHG Reporting Requirements

- **State and Regional Programs –** some agencies are subject to state level GHG reporting or reduction requirements
- **International Reporting –** some agencies provide GHG information that is incorporated into the US Climate Action Report

Requirements Milestones

U.S. Public Sector Protocol

- Applies principles of the Corporate Standard to state, local, and Federal agencies
- Serves as a background for Section 9 Recommendations
- Designed to perform "entity-level" accounting of GHG emissions
- Stakeholder input and "road tested" by most Federal agencies
- www.ghgprotocol.org/psp

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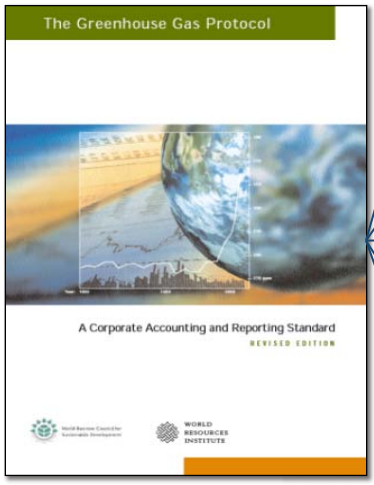
Public Sector Protocol



EPA Climate Leaders Guidance

ISO 14054 Standards

U.S. Public Sector Protocol

CCAR Reporting Protocol

Climate Registry Protocol

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GHG Accounting Hierarchy

	Key Agencies
Public Sector GHG Protocol *Framework for consistent accounting approach*	**EPA, all agencies**
Policies and Regulations *Establish GHG requirements (E.O. 13514)*	**CEQ, OMB**
Federal Guidance *Implement regulation, provide assistance*	**CEQ, DOE, DOD, DOI, EPA, GSA, DOC**
Agency Plans *Organizational approach*	**All agencies**
Inventory *Agency / Facility level account*	**All agencies**

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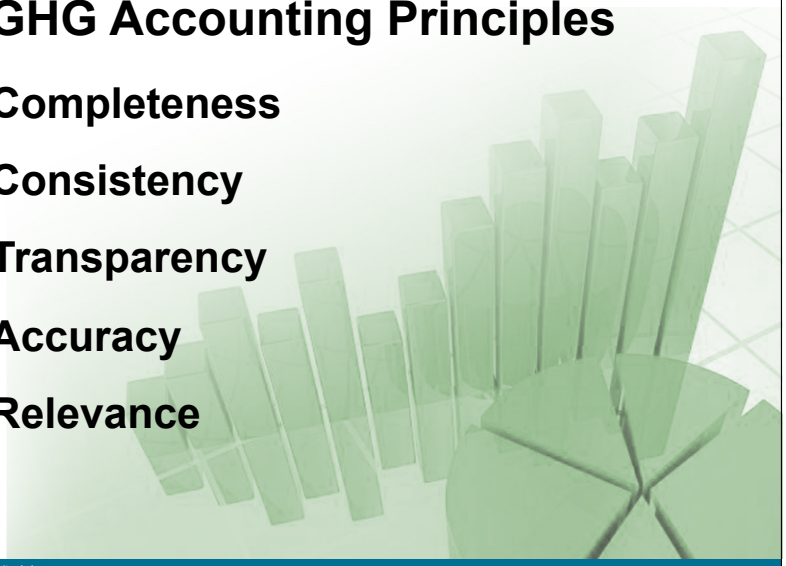
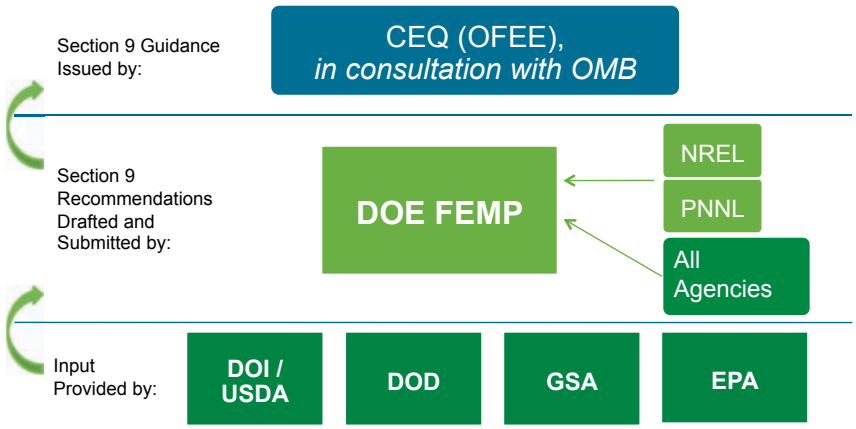
GHG Accounting Principles

- **Completeness**
- **Consistency**
- **Transparency**
- **Accuracy**
- **Relevance**



Section 9 Guidance Development Process



Overview of Recommendations

- Standardized procedures for reporting GHG emissions across the Federal Government
- Recommendations on Section 9 of E.O.13514 are under review
- The Council on Environmental Quality, in coordination with the Office of Management and Budget, will issue final Guidance

Overview of Recommendations

- Both headquarters and facility levels considered
- Top-down or bottom-up
- Some flexibility in how facilities/subordinate organizations report their emissions for roll-up to agency wide inventory
- Final GHG inventories represent agency-level emissions

GHG Inventory Topics

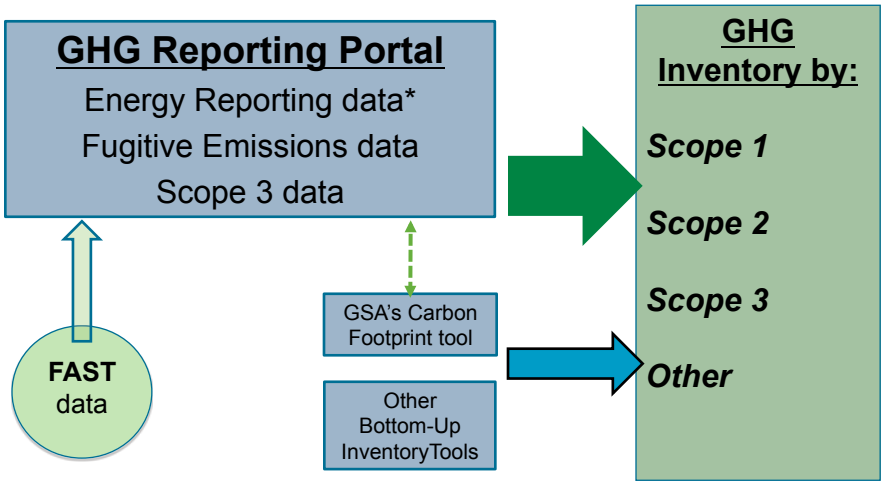
- Emissions sources to include in the comprehensive GHG inventory
- Treatment of land use, sequestration and agricultural emissions
- Use of renewable energy purchases, including RECs, and carbon offsets
- Reporting process, including procedure for inventory recalculations
- Validation and verification of emissions inventory

Organizational Boundaries

Energy Bill – The activities related to the operation of the facilities for which they directly pay utility bills

Purchase Fuel – The operation of mobile sources for which the agency purchases fuel.

Other Activities – All other scope 1 and 2 activities over which the agency has operational control.

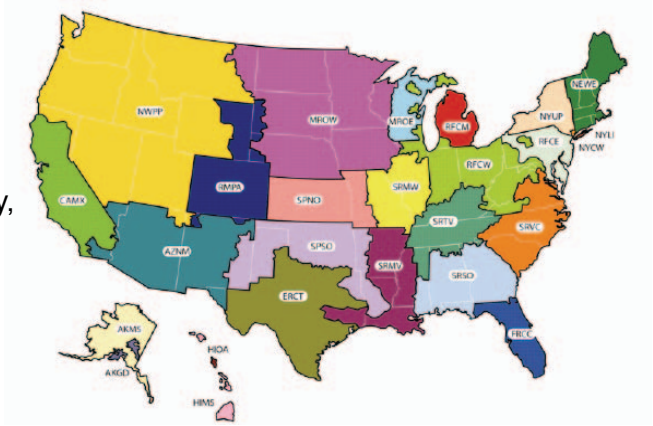


Scope 1 Emissions

Scope 1 Source	Description
Generation of electricity, heat, cooling, or steam	Emissions **from combustion of fuels in stationary sources**. This includes CH_4 and N_2O emissions from biomass combusted for production of electricity, heat, cooling, or steam.
Mobile Sources	Emissions from the **combustion of fuels in agency controlled mobile combustion sources.** This includes CH_4 and N_2O emissions from biofuel combustion.
Fugitive Emissions	Emissions **from intentional or unintentional releases of GHGs from within the agency's organizational boundary**
Process Emissions	Emissions from the **manufacture or processing of chemicals and materials**, and include on-site landfills, wastewater treatment plants, waste incinerators, and laboratory activities.

Scope 2 Emissions

Indirect emissions associated with consumption of purchased or acquired electricity, steam, heating, or cooling.



Scope 3 Emissions

- Because efforts to account for Scope 3 emissions are only recently emerging, a phased approach to developing Scope 3 inventories is recommended.
- Examples
  - Business travel (air, ground)
  - Employee Commuting
  - Contracted solid waste
  - Contracted wastewater treatment

Verification and Validation

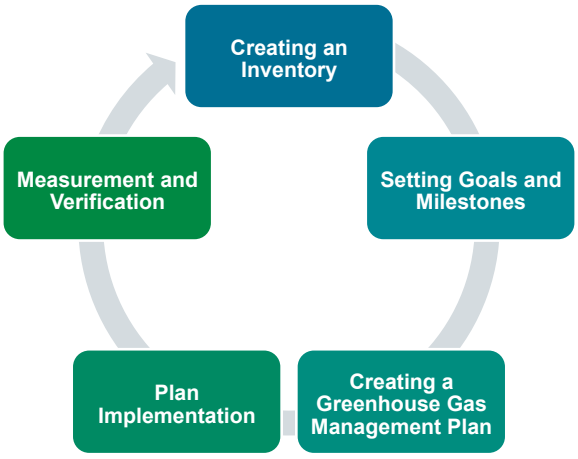
Verification provides confidence that reports of GHG emissions are complete, accurate, consistent, and without significant errors:

- Second party verification
- Third party verification
- Inventory management plan

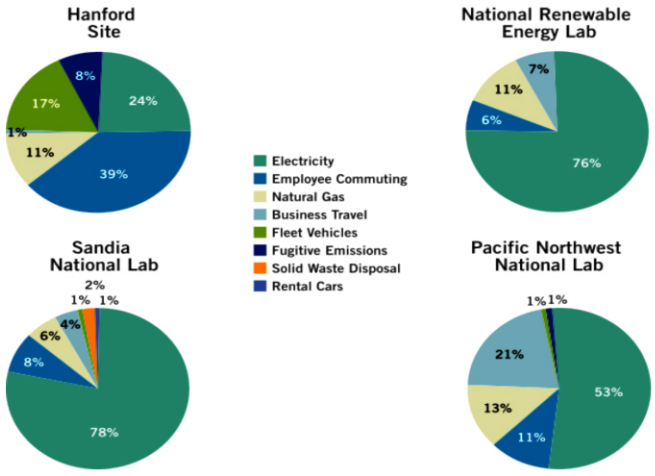
Summary – Key Topics Going Forward

- Reporting
- Scope 3 data collection
- Renewable energy
- Vendor and contractor emissions
- Organizational boundaries (including leased assets)
- Emissions and biological sequestration from land management techniques

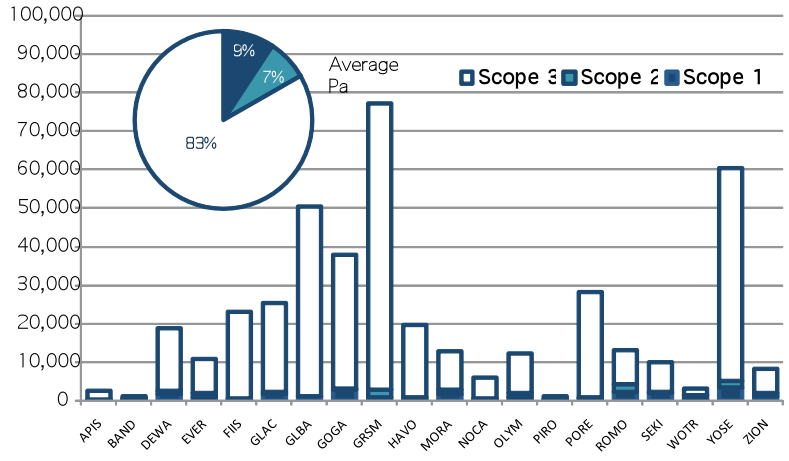
Managing GHG Emissions Process



Bottom Up GHG Inventories at DOE Sites

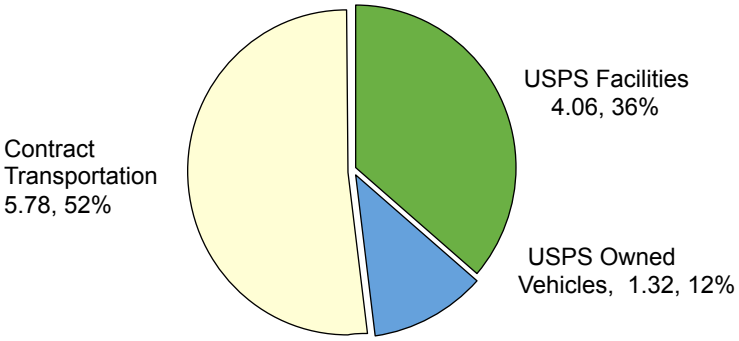


CFP Park's Total GHG Emissions



United States Postal Service

CY2007 GHG emissions from facilities, owned vehicles, and contract transport (11.2 M MTons CO_2 eqs)



Calculating Emissions

In general for each GHG source:

Step 1, Calculate emissions for each GHG

Emissions [Tons of GHG] = Emission Factor [Tons GHG/Unit of Activity] x Activity Data [Unit of Activity]

Step 2, Calculate CO_2e for each GHG and sum overall emissions

Total Emissions [Tons of CO_2e] = Emissions (From Step 1) [Tons GHG] x Global Warming Potential [CO_2e/GHG]

Example: Purchased Electricity

eGrid subregion SRVC with annual purchases of 30,000 MWh:

Step 1, Calculate Emissions for each GHG

CO_2 Emissions		514.77 kg/MWh		30,000 MWh
N_2O Emissions	=	8.98 kg/MWh	x	30,000 MWh
CH_4 Emissions		10.78 kg/GWh		30,000 MWh

Step 2, Calculate CO_2e for each GHG and sum overall emissions

CO_2e (CO_2)		15,443.1 MT CO_2		1
CO_2e(N_2O)	=	0.269 MT N_2O	x	310
CO_2e (CH_4)		0.323 MT CH_4		21

15,549.01 MT CO_2e

Example: Mobile Combustion

Agency fleet with an annual fuel of 500,000 gallons of gasoline:

Step 1, Calculate emissions for each GHG

CO_2 Emissions		8.78 kg/gal		500,000 gal
N_2O Emissions	=	2.54 x 10^{-4} kg/gal	x	500,000 gal
CH_4 Emissions		2.4 x 10^{-4} kg/gal		500,000 gal

Step 2, Calculate CO_2e for each GHG and sum overall emissions

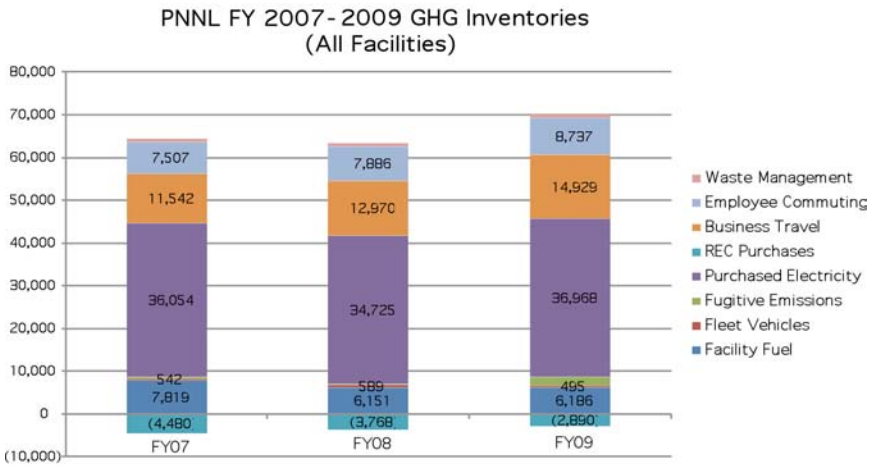
CO_2e (CO_2)		4,390 MT CO_2		1
CO_2e(N_2O)	=	1.27 x 10^{-1} MT N_2O	x	310
CO_2e (CH_4)		1.2 x 10^{-1} MT CH_4		21

4,431.89 MT CO_2e

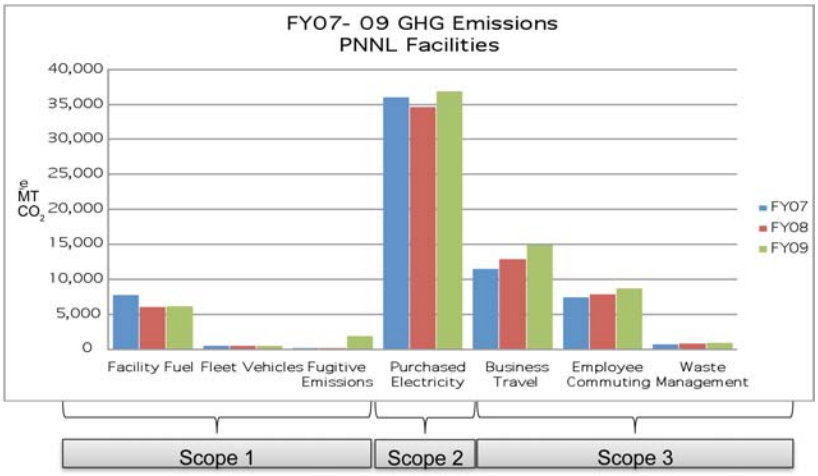
PNNL Case Study

1.1 billion business volume
4,600 staff
>2 millions sq. foot campus

PNNL Summary Data



PNNL: Summary Data



FEMP Support

- Briefings and General information
- One-on-one technical assistance
- Reporting Portal
- Case study Development
- On-site Training (e.g. GovEnergy course)
- Web-based Training
- Coordination through emails and meetings
- Develop technical guidance and tools

Contact Information

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www.eere.energy.gov/femp/programgreenhousegases.html

www.fedcenter.gov/programs/greenhouse/

IN CONCLUSION

Reducing and reporting GHG pollution will ensure that the Federal Government leads by example in building the clean energy economy.

Actions taken under Executive Order 13514 will spur clean energy investments that create new private-sector jobs, drive long-term savings, build local market capacity, and foster innovation and entrepreneurship in clean energy industries.

Federal Greenhouse Gas Accounting and Reporting

Seminar Evaluation and the Open Book Quiz

Almost done . . .

The link below will take you to the brief open-book Quiz and Evaluation.
Earn a Certificate of Completion for your records!

http://apps1.eere.energy.gov/femp/training/quiz/ghg.cfm