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

Federal Greenhouse Gas Accounting and Reporting

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Objectives

After completing this seminar, you will be able to:

1. explain common greenhouse gases and their effect on climate.
2. discuss federal sources of greenhouse gas emissions.
3. identify scope 1, 2, and 3 emissions and give examples.
4. access existing greenhouse gas accounting protocols.
5. describe a process for managing greenhouse gas emission reductions.
6. locate resources to assist you in greenhouse gas emissions accounting and reporting.

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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



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What Are Greenhouse Gases?

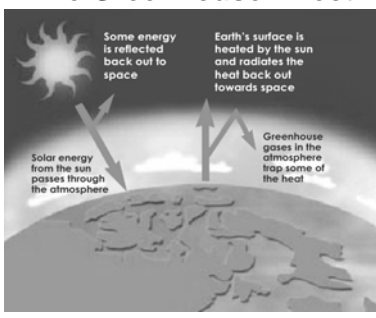
- Concentrations of naturally occurring GHGs have remained fairly steady for thousands of years.
- Since the industrial revolution, human activity has drastically increased the atmospheric concentrations of these gases.

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The Greenhouse Effect



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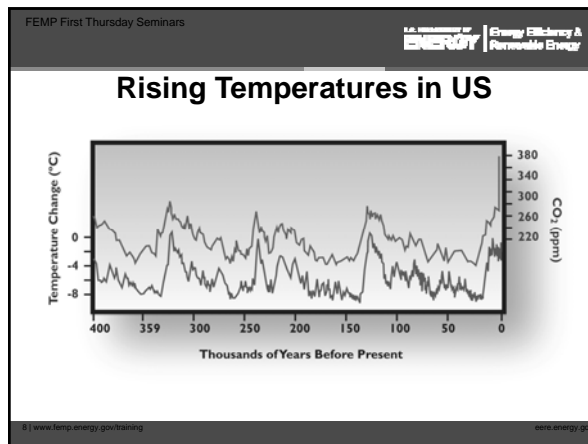
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Key Greenhouse Gases

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 ₂ O)	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

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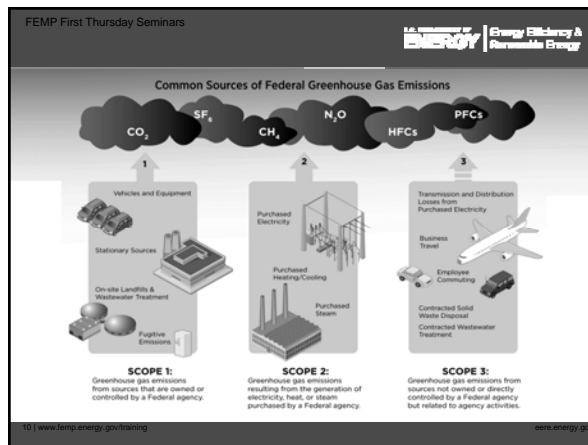
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US Climate Policy

- “...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)

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

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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

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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

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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

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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

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Requirements Milestones

Date	Task	Category
11/5/09	Designate Senior Sustainability Officer	FEMP-Specific Task
1/4/10	Submit Scope 1 & 2 target goals for 2020	Agency Requirement
4/5/10	Submit to CEQ/OMB recommended GHG reporting guidance	FEMP-Specific Task
4/5/10	Issue guidance on Federal fleet management	FEMP-Specific Task
4/5/10	GSA submits recommendations on vendor and contractor GHG emissions and Federal local transportation logistics	FEMP-Specific Task
6/2/10	Submit Strategic Sustainability Performance Plan, in concert with 2012 budget submission	Agency Requirement
6/2/10	Submit Scope 3 target goals for 2020	Agency Requirement
10/5/10	Provide electronic GHG reporting capability	FEMP-Specific Task
10/5/10	Submit to CEQ input on agency adaptation actions	FEMP-Specific Task
Jan 11	Submit comprehensive FY 2008 and FY 2010 GHG inventory	Agency Requirement

Green: FEMP-Specific Tasks Black: Agency Requirements

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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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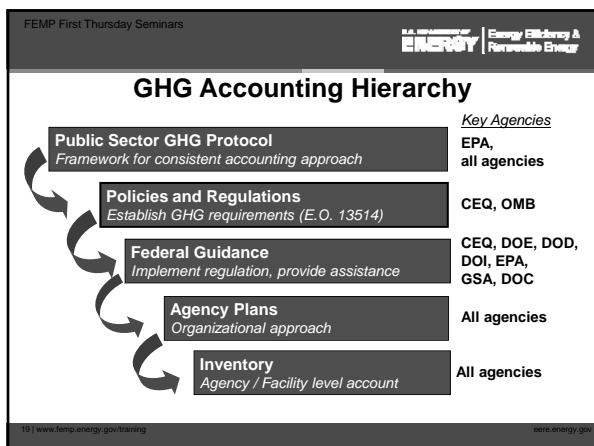
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Public Sector Protocol

The diagram shows the U.S. Public Sector Protocol as a central element. It is derived from the following sources:

- The Greenhouse Gas Protocol (A Corporate Accounting and Reporting Standard)
- EPA Climate Leaders Guidance
- ISO 14054 Standards
- CCAR Reporting Protocol
- Climate Registry Protocol

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- ### GHG Accounting Principles
- **Completeness**
 - **Consistency**
 - **Transparency**
 - **Accuracy**
 - **Relevance**
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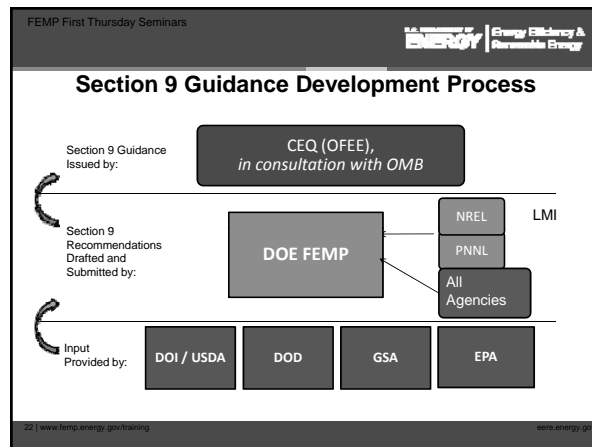
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Federal Greenhouse Gas Accounting and Reporting

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- ### 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
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- ### 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
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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

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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.

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GHG Reporting Portal
Energy Reporting data*
Fugitive Emissions data
Scope 3 data

➔

GHG Inventory by:
Scope 1
Scope 2
Scope 3
Other

FAST data (circle) points to GHG Reporting Portal.

GSA's Carbon Footprint tool and Other Bottom-Up Inventory Tools point to GHG Reporting Portal.

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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 ₂ O 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 ₂ O 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.


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Scope 2 Emissions

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



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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

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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

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- Renewable energy
- Vendor and contractor emissions
- Emissions and biological sequestration from land management techniques

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Bottom Up GHG Inventories at DOE Sites

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CFP Park's Total GHG Emissions

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United States Postal Service

CY2007 GHG emissions from facilities, owned vehicles, and contract transport (11.2 M MTons CO₂ eqs)

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Calculating Emissions

In general for each GHG source:

Step 1, Calculate emissions for each GHG

$$\text{Emissions [Tons of GHG]} = \text{Emission Factor [Tons GHG/Unit of Activity]} \times \text{Activity Data [Unit of Activity]}$$

Step 2, Calculate CO₂e for each GHG and sum overall emissions

$$\text{Total Emissions [Tons of CO}_2\text{e]} = \text{Emissions (From Step 1) [Tons GHG]} \times \text{Global Warming Potential [CO}_2\text{e/GHG]}$$

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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	x	30,000 MWh
N ₂ O Emissions	=	8.98 kg/MWh	x	30,000 MWh
CH ₄ Emissions	=	10.78 kg/GWh	x	30,000 MWh

Step 2, Calculate CO₂e for each GHG and sum overall emissions

CO ₂ e (CO ₂)	=	15,443.1 MT CO ₂	x	1
CO ₂ e (N ₂ O)	=	0.269 MT N ₂ O	x	310
CO ₂ e (CH ₄)	=	0.323 MT CH ₄	x	21

15,549.01 MT CO₂e

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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	x	500,000 gal
N ₂ O Emissions	=	2.54 x 10 ⁻⁴ kg/gal	x	500,000 gal
CH ₄ Emissions	=	2.4 x 10 ⁻⁴ kg/gal	x	500,000 gal

Step 2, Calculate CO₂e for each GHG and sum overall emissions

CO ₂ e (CO ₂)	=	4,390 MT CO ₂	x	1
CO ₂ e (N ₂ O)	=	1.27 x 10 ⁻¹ MT N ₂ O	x	310
CO ₂ e (CH ₄)	=	1.2 x 10 ⁻¹ MT CH ₄	x	21

4,431.89 MT CO₂e

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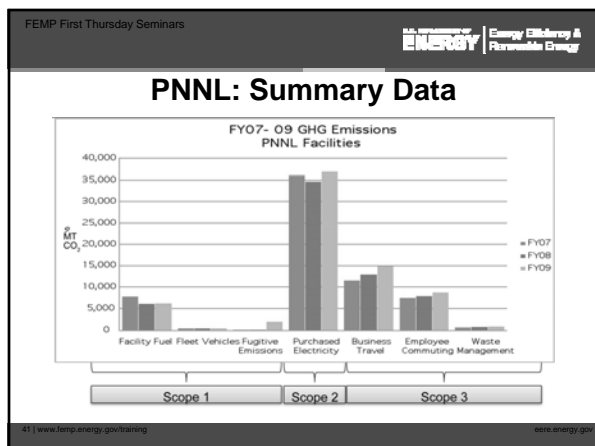
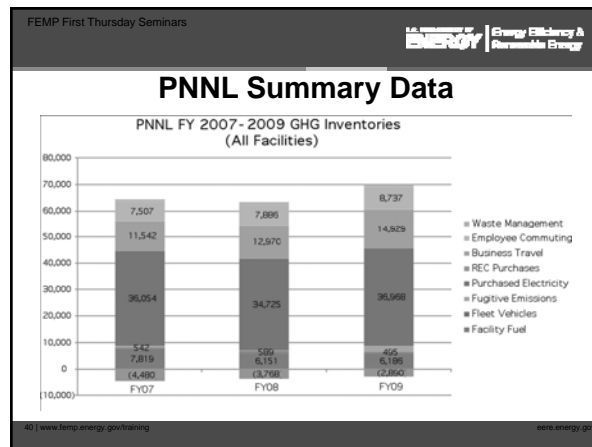
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PNNL Case Study

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

Richland
Sequim
Seattle

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- ### 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
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www.fedcenter.gov/programs/greenhouse/

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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.

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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>

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