Air Emissions Data Management at the Goddard Space Flight Center

Medical and Environmental Management Division

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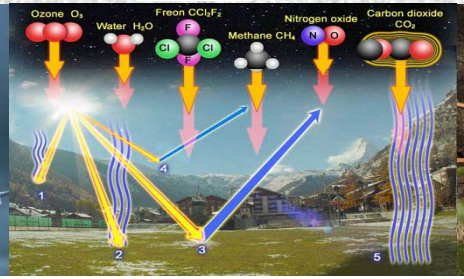

Goddard Space Flight Center (GSFC)

The Mission of GSFC to expand knowledge of the earth and its environment, the solar system and the universe through observations from space

Goddard Space Flight Center (GSFC)

- Located in Greenbelt, Maryland
  - Non-attainment Area for Ground-Level Ozone
- Major Source for NOx
- Area Source for HAPs
- Major Source for GHGs(?)
- Title V Air Permit
  - Annual Compliance Certification
  - Annual Emissions Certification

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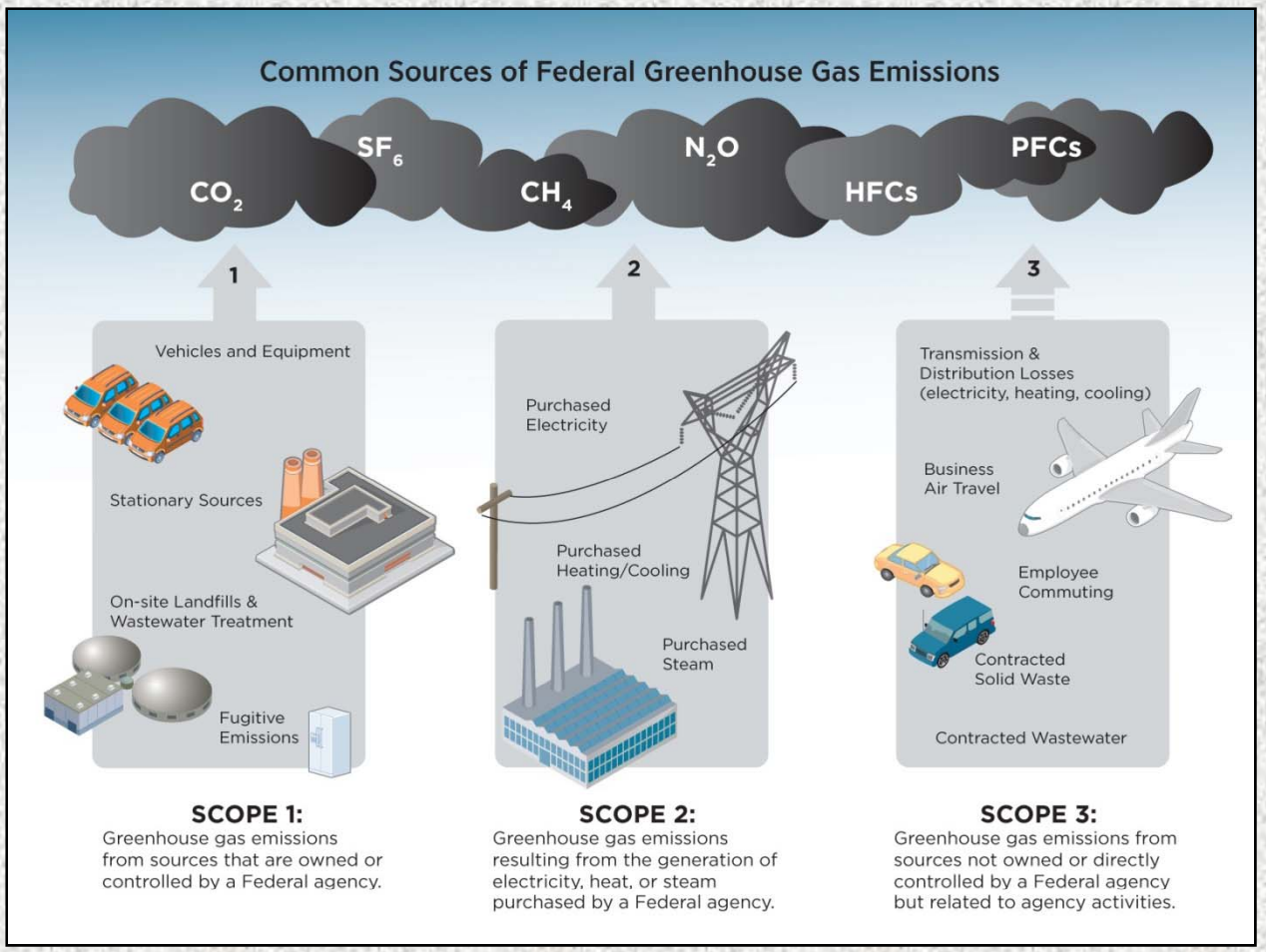
GSFC's Permitted Sources

- Five 49.5 MM/Btu-hr Boilers
  - Landfill gas, natural gas and #2 Fuel Oil
- Backup Diesel Generators providing up to 14.75 MW
- Semi-Conductor Facility
- Aerospace Coating Shop
- Electrochemical Plating Shop

Greenhouse Gas Sources



From NASA's *2010 Strategic Sustainability Performance Plan*

GSFC's Initial GHG Inventory

- GSFC received MDE's request for CY2007 GHG Inventory information on January 2008
  - Submitted as part of the Annual Emissions Certification
- Limited to Title V Registered pieces of equipment, partial Scope 1 GHG Inventory
  - MDE does not consider LFG a biogenic fuel
  - EPA hasn't made up their minds if LFG is biogenic

Environmental Management System and GHG Inventory

- EMS Core Team designated a completed GHG Inventory a high priority aspect in August 2008
- Environmental Management Plan
  - Calendar Year 2008
  - Completed Scope 1, 2, and 3
  - Tracking pending regulations
- Take advantage of existing committees to share information with Center Management
  - Educated Management/Decision Makers
  - Positioning the Center to respond to pending requirements

National Aeronautics and Space Administration

Goddard Space Flight Center's Greenhouse Gas Inventory

CO_2 SF_6 CH_4 N_2O HFCs PFCs

SCOPE 2 INDIRECT

PEPCO

Indirect Emissions

Electricity purchased (from PEPCO) is 65,267 MTCDE

SCOPE 1 DIRECT

Direct Emissions (stationary, mobile, etc.)

Fuel Combustion (at building 24) which is landfill gas and natural gas is 10,800 Metric Tons CO2 Equivalent (MTCDE)

Government Vehicles: 27 MTCDE

BUILDING 24

GOVERNMENT OWNED VEHICLES

SCOPE 3 INDIRECT

(Optional) Indirect Emissions (contractor, mobile, business travel, employee commuting, etc.)

Contractor owned vehicles: 494 MTCDE

CONTRACTOR OWNED VEHICLES

EMPLOYEE BUSINESS TRAVEL

WASTE DISPOSAL

Offsets:
Biogenic Emissions by using landfill gas: 10,535 MTCDE
Recycling: 1,064 MTCDE

All data is for Calendar Year 2008

Source: WRI/WBCSD, The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard, Revised Edition, Chapter 4

www.nasa.gov

Inventory Development

- Identify scope and data needs –
  - Read the protocol, regulations & define requirements!
- Protocols – *Concurrently Calculated*
  - World Resources Institute / World Business Council For Sustainable Development (WRI/WBCSD)
  - Federal Energy Management Program (FEMP), Energy Management Data Report
- Boundaries
  - NASA GFSC directly controlled facilities, civil servant activities, etc. – *mirrors activities monitored under relevant Executive Orders*
- Identify existing Agency data collection and management systems
- Determine if data outputs are relevant, reliable, comparable, available, and maintainable year-to-year

Define Requirements

- Three different Inventories required annually
  - EPA Mandatory Reporting Rule
  - EO 13514 - *Federal Leadership in Environmental, Energy, and Economic Performance*
  - Maryland Department of the Environment (MDE)
  - Data must be verified and auditable

Mandatory Reporting Rule

- EPA issued final regulation September 22, 2009.
- Covered Gases:
  - CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, and NF_3
- Threshold for reporting:
  - Scope 1 emissions
  - 25,000 metric tons of CO_2 equivalent (MTCO2e)
  - Begins January 1, 2010
  - Reporting on a **Calendar Year** by each facility
  - Under the Mandatory Reporting Rule, LFG is biogenic (emissions not counted)

Executive Order 13514

- Signed on October 5, 2009
- Covered Gases: CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6
- Applicable to all federal agencies
- Scope 1, 2, and 3 GHG Inventory
- Based on **Fiscal Year** emissions
- Absolute reductions
- 2008 baseline/2020 target date of reduction

MDE Inventory Request

- GSFC received MDE's request for this GHG Inventory information on January 2008
  - **Calendar Year** 2007
  - Part of the Annual Emissions Certification
- Limited to Title V Registered pieces of equipment, partial Scope 1 GHG Inventory for MDE
  - MDE does not consider landfill gas a biogenic fuel

Inventory Development

- Identify existing Agency and Facility data collection and management systems
- Determine if data outputs are relevant, reliable, comparable, available, and maintainable year-to-year

Data Sources

- Past Executive Orders mandated collection of energy and transportation data you need!
- Determine appropriateness and availability of data in existing reporting systems
- Engage local "keepers" of the data early on
- Select and incorporate data inputs
  - NETS / Center utilities data
  - Title V Air Emissions Certification Calculations
  - GSA vehicle fuel and / or mileage data
  - HVAC refrigerant recharge data

Scope 1 Inventory

- Scope 1 for CY09 MRR is 10,547 MTCO2e
  - Landfill Gas (LFG) is **not** included in GHG Emissions
- MDE Limited Scope 1 – 28,700 MTCO2e
  - Landfill Gas (LFG) **is** included in GHG Emissions

Title V PSD Boilers ONLY

- PTE (assuming LFG not biogenic) – 58,720 tons per year CO2e (53,270 MTCO2e)
  - LFG Composition – 51% CH4, 38% CO2
- PTE (assuming no LFG, 100% NG) – 44,120 tons per year CO2e (40,020 MTCO2e)

GHG Limited Scope 1 Inventory

- PTE for Sources Other than Power Plant Boilers
  - Emergency Generators – 110 MTCO2e (1% of total)
  - Space heaters – 460 MTCO2e (4% of total)
  - Mobile Sources – 27 MTCO2e (0% of total)
  - No SF6, HFCs, and PFCs, and NF3 in measurable amount
  - Fugitive Emissions – not required, but rough data shows much less than 1% of total

Data Collection and Maintenance

- Document each Calendar/Fiscal Year (record keeping, record keeping, record keeping)
- Validate the data
- Manage your resources
  - 1st Year – must have detailed data across the board
  - Thereafter – don't spend half your time on a source that doesn't affect the bottom line
  - Need a good HazMat Management/Tracking system to ensure that SF6, HFCs, and PFCs, and NF3 usage remains insignificant

Annual GHG Inventories

- Three different Inventories required annually
  - MDE, EPA MRR, and EO 13514
  - Data must be verified and auditable
- Maryland Department of the Environment
  - Calendar Year
  - Limited Scope 1
  - GHG Gases: CO2, CH4, N2O, HFC, PFC, and SF_6
  - Landfill gas is not considered a biogenic fuel
- EPA's Mandatory Reporting Rule
  - Calendar Year
  - Scope 1 (Source Categories)
  - GHG Gases: CO2, CH4, N2O, HFC, PFC, SF_6, and Fluorinated Gases
- EO 13514
  - Fiscal Year
  - Scope 1, 2, and 3
  - GHG Gases: CO2, CH4, N2O, HFC, PFC, and SF_6
  - Plus need verification/validation of data

Air Quality Management Planning and Impact Analysis

GHG Emissions and Climate Change inclusion in NEPA

- Federal Action
  - Projects
  - Policy Changes
  - Upstream/Downstream impacts
  - Scope 1, 2, and 3
- GHG Gases: CO_2, CH_4, N_2O, HFC, PFC, and SF_6
- Reference Point of 25,000 $MTCO_2e$
- Impacts of/on Proposed Action
- Mitigation and Adaptation Analysis

Resource Impacts

Element	Estimated Increase			
	FTE	WY	One-time ODC	ODC
Annual GHG Inventory Development	↑	↑	↑	↑
Project GHG Inventory/Mitigation and Impact Analysis (NEPA)	↑	↑	↑	↔
Title V and Prevention of Significant Deterioration	?	?	?	?

GSFC's Lessons Learned

- EMS provided the opportunity to **educate** Center Management on the impacts of GHG regulations
- State and federal regulations will drive GHG Inventory approaches
- Flexible and transparent data collection and management is even more important for rapid adaptation, modification, recalculation and validation
- Electronic Data Management
- Determine if data outputs are relevant, reliable, comparable, available, and maintainable year-to-year

GSFC's Lessons Learned

- Assess the data source's continued viability and sustainability for long-term use
- Leverage existing Agency data collection and management systems (don't reinvent the wheel!!)
  - Past EOs mandated collection of energy and transportation data
  - Using existing system should have some data quality and verification
- Engage local "keepers" of the data early on
- Part of larger effort, not an independent effort (sustainability)

Questions????

http://knowledge.allianz.com/en/media/galleries/greenhouse_gas_sources.html