

# Charting a Course to Energy Independence

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## INTRODUCTION TO FEDERAL GREENHOUSE GAS MEASUREMENT: II

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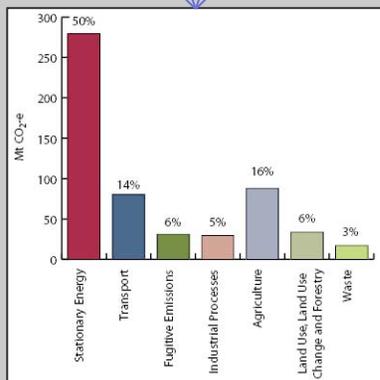
# GHG Inventory Strategies

- Top-down
  - Headquarters level approach for facilities
  - Leverage existing institutional data systems
  - Standardized installation calculation templates/profiles
  - Easy to roll-up facility inventories to the headquarters level
- Bottom-up
  - Installation lead and/or close cooperation
  - Utilize detailed site-specific data and knowledge
  - Customized installation calculation templates/profiles
  - Manual rollup or aggregation of results to headquarters level
- Hybrid in future?
  - Approach that meets in the middle



# Top-down GHG Inventories

## Existing institutional data systems

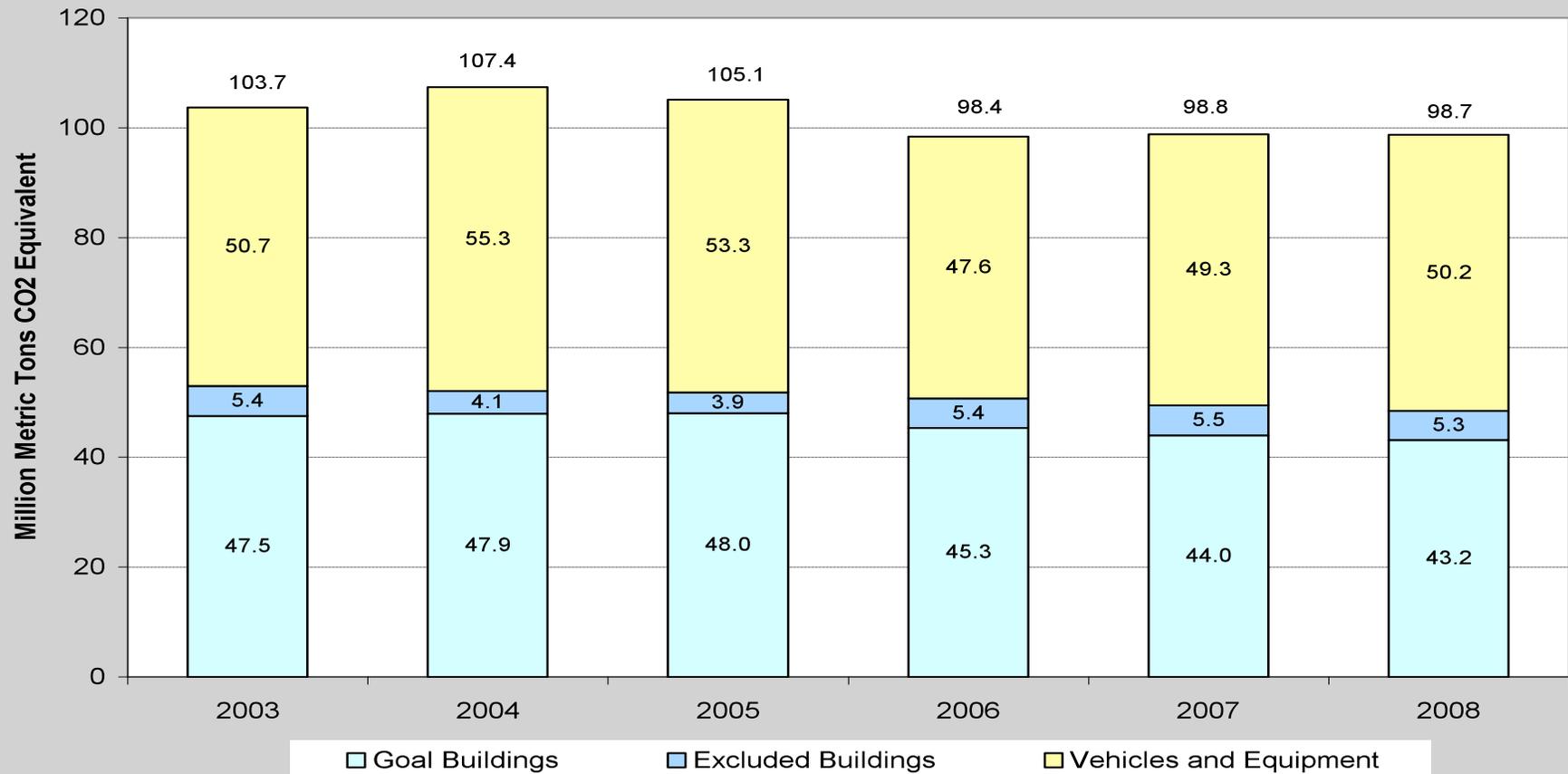


- Advantages
  - Leverage existing data systems
  - Consistent template approach
  - Rapid installation results
  - Easy agency-wide rollup totals
- Disadvantages
  - Scope uncertainties
  - Omitted emission source data
  - Limited ability to meet emerging regulatory requirements
    - Cap-and-Trade Regimes



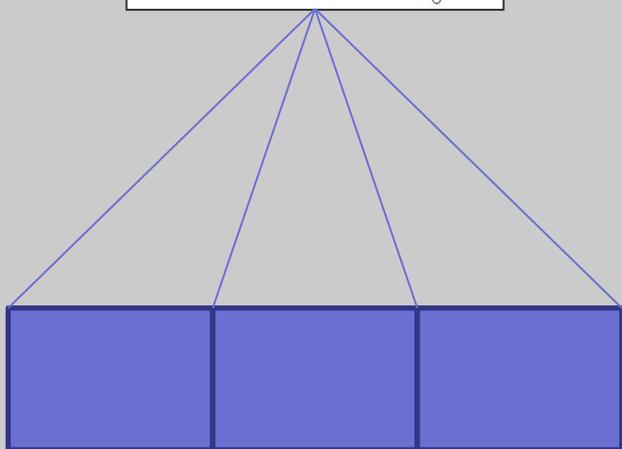
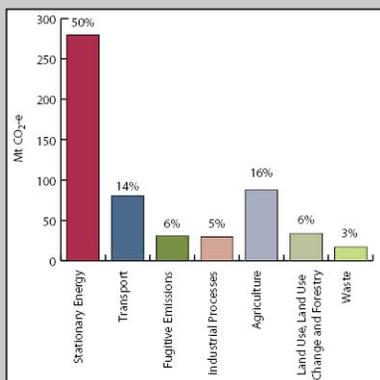
# Recent Federal GHG Emissions

Preliminary Estimated Federal Agency GHG Emissions Trends by End-Use Sector  
(FY 2003-2008) (Carbon Dioxide, Methane and Nitrous Oxide)





# Bottom-up GHG Inventories



Site/source specific data

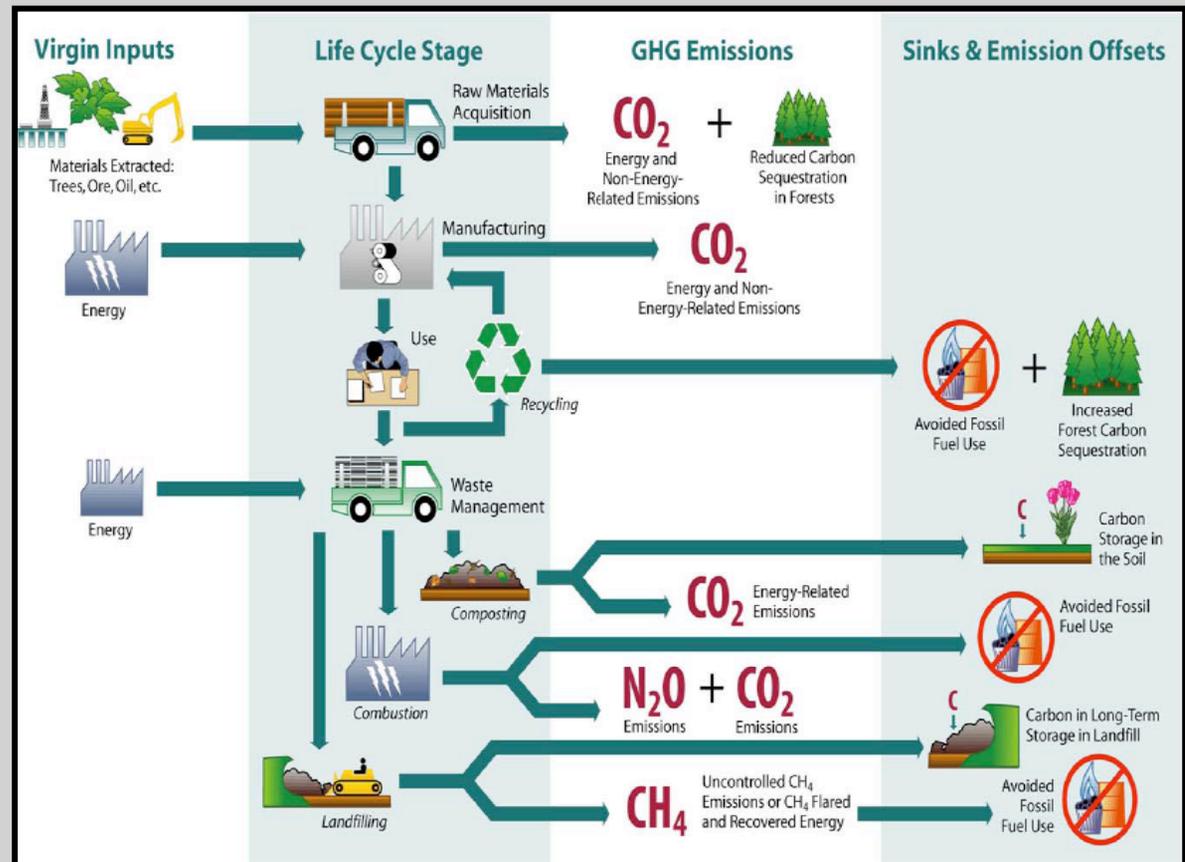
- Advantages
  - Well-defined boundaries
  - Higher resolution and detailed data
  - Reveal data and EF gaps
  - Identify complementary energy program opportunities
  - Meet state regulatory requirements
- Disadvantages
  - Time consuming
  - Complex boundary issues
  - Difficult to roll-up to HQ level



# Sandia Waste Carbon – Bottom Up

## WARM Captures:

- ☞ GHG emissions
- ☞ Sinks
- ☞ Emission offsets

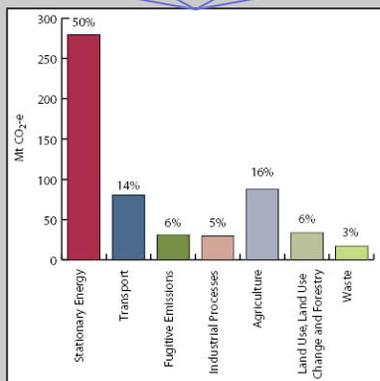
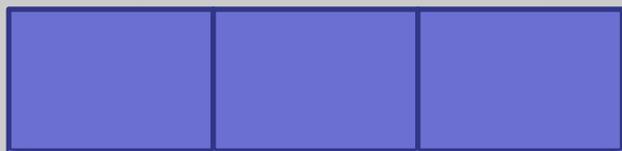


**EPA's Waste Reduction Model Material Life Cycle**



# Hybrid GHG Inventory Approaches

Existing institutional data systems



Site/source specific data

- Advantages
  - Better-defined boundaries
  - Higher resolution and detailed data
  - Reveals data and EF gaps
  - Meets state regulatory and emerging federal requirements
- Disadvantages
  - Time consuming
  - CY vs. FY challenges
  - Complex data reconciliation



# Choosing the GHG Approach

- Top-down
  - Utility for agency-level GHG inventory results, their analysis, and strategic decision-making on mitigations
  - Strategic planning and energy investment
- Bottom-up
  - Better suited for faster state regulatory compliance
  - Energy, environmental, and sustainability opportunity assessment utility
- Hybrid
  - Best of both worlds
  - Meets multiple current and future requirements



# Monitoring Emissions

## Federal GHG Sources

- Direct Emissions
  - Onsite electricity, heat, steam production
  - Backup generators
- Mobile Emissions
  - Cars, trucks, airplanes, portable generators
- Up-Stream/Down-Stream
  - Replace SF<sub>6</sub> in magnesium smelting.
  - How does that change performance of metal in DOD applications?



# Monitoring Emissions

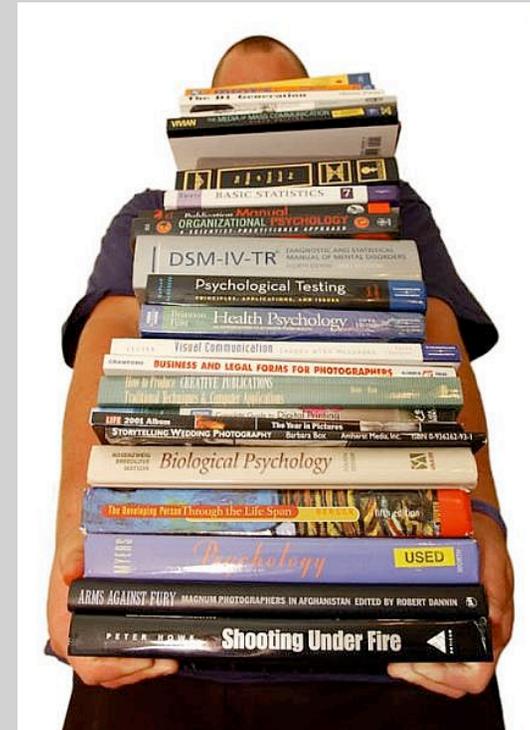
## Emissions not monitored or recorded

- Wastewater treatment ( $\text{CH}_4$ )
- Electric Transformers and switchgear ( $\text{SF}_6$ )
- Medical Imaging Equipment (PFCs)
  - High-contrast ultrasound
  - MRI
  - Treatment of decompression sickness
- A/C and Refrigeration leaks (HFCs)
- Laboratory fume hoods (??)



# Inventory Information Sources

- IPCC
  - Assessment Reports
  - Technical Reports
- WRI
  - Corporate Standard and Project Guidance
  - Draft Public Sector Protocol
  - Analysis Reports
- GHG Protocol Initiative
  - Draft PSP Download





# Inventory Data Needs

- Purchase records
  - Refrigerant replacements
  - Stationary fuels
- FAST Database
- Utility bills
  - Electricity
  - Gas
- eGRID emission conversion factors





# GHG Inventory Data Collection

- **Utility/Energy Data**
  - + Purchased heating fuel (e.g., natural gas, fuel oil, etc.)
  - + Purchased electricity
  - + Purchased steam
- **Current CAA Air Emissions Inventory (AEI) Calculations and Documents**
  - + Permitted emissions sources
  - + Munitions use and open burn/open detonation (OB/OD)
- **Mobile Source Data**
  - + GSA/DPW vehicles
  - + Fuel use
- **Prescribed Burn Data**
  - + Acres burned
- **Refrigerant use/other fugitives (non-Ozone Depleting Substances)**
  - + Refrigerants and chemicals
  - + Wastewater treatment and landfill gas



# Database Limitations

- Fiscal year vs. calendar year
- Fuel Oil use vs. delivery records
- Lack of integration of databases (swivel chair)
- Fugitive emissions / Toxic Release Inventories
- Fed Fleet data quality
- Global Warming Potential
- Emission Factors
- Addition of  $\text{NF}_3$



# Database Limitations

- Grid Factors
- De Minimis issues
- Metering and submetering detail
- Joint occupancy and use, shared facilities
- Contractor emissions
- Mixed billing
- Leasing, who is responsible? (GSA, BLM)
- Multiple governmental organization types



# *QUESTIONS?*