

NDCEE

National Defense Center for Energy and Environment

From The Trenches: Top-down and Bottom-up GHG Inventory Approaches

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Presentation Outline

- Why Greenhouse Gas (GHG) Inventories Now?
- GHG Inventory 101 - Protocols, Scope, and Boundaries
- Federal Institutional GHG Inventory Approaches
- Data Collection – What do you have?
- Calculation Approaches and Tools
- Conclusions

Why GHG Inventories Now?

- Executive Order 13423
- Complements goals of Energy Policy Act (EPA Act 2005) and Energy Independence and Security Act (EISA 2007)
- *Massachusetts v. EPA* - U.S. Supreme Court (2007)
- EPA's GHG Advance Notice of Proposed Rulemaking (ANPR) or "GHG Rule" (2008)
- New Administration Direction
 - "State of Union" call for GHG Cap and Trade System
 - New GHG Executive Order(s)
- State and Regional GHG Mandates and Activities

New Administration's Direction



- Obama-Biden New Energy for America plan:
 - Make the U.S. a leader on climate change
 - Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050
 - Develop and deploy clean coal technology
 - Invest \$150 billion over the next ten years to catalyze private efforts to build a clean energy future
 - Ensure 10 percent of US electricity comes from renewable sources by 2012 and 25 percent by 2025 (double alt energy production in 3 years)
 - Establish a national low carbon fuel standard
 - Increase fuel economy standards

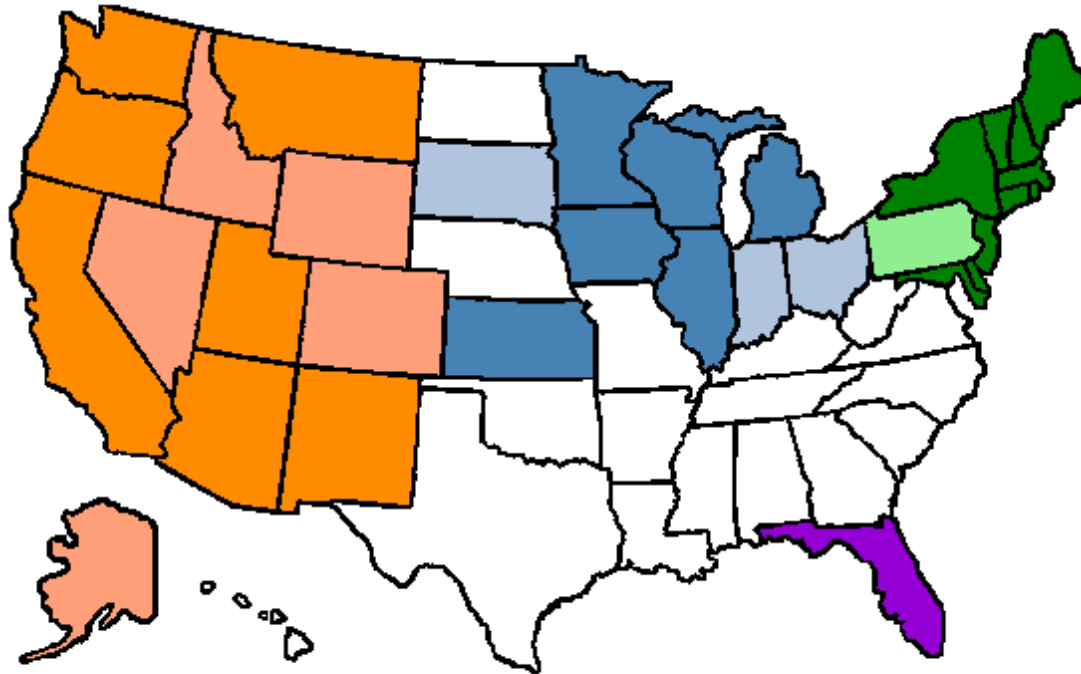
Source: www.whitehouse.gov/agenda/energy_and_environment

New GHG Executive Order(s)



- New Executive Order on GHGs anticipated
- Case 1 - Require federal agencies to measure and reduce GHG emissions
 - Reduction requirements likely to be aggressive
 - Base year expected to be 2003
- Case 2 - Require agencies to account for GHGs when performing environmental analyses under NEPA
- National security exemptions?

State and Regional Activity



- Regional Greenhouse Gas Initiative RGGI
- RGGI Observer
- Midwest Regional GHG Reduction Accord
- MRGHGRA Observer
- Western Climate Initiative
- Western Climate Initiative Observer
- Individual State Cap-and-Trade Program

Source: www.pewclimate.org

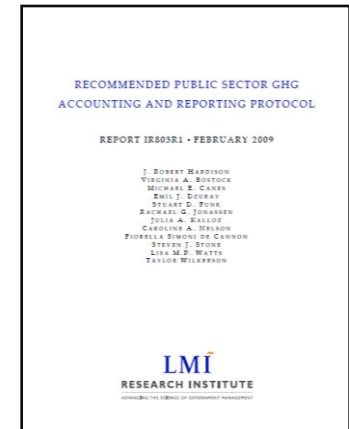
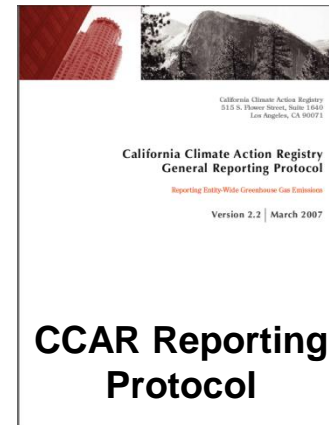
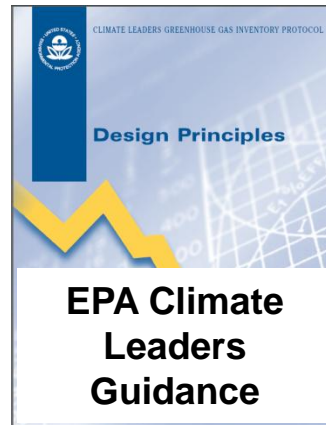
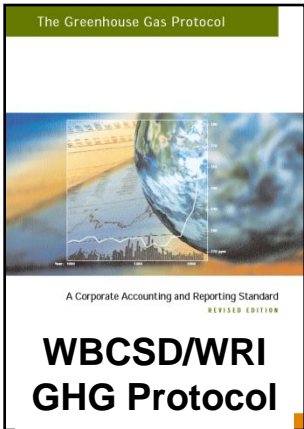
If these drivers aren't reason enough...

- Developing and implementing proactive and thoughtful GHG management strategies helps federal institutions to:
 - Understand their GHG emissions
 - Complement energy security goal achievement
 - Avoid future costs from climate change regulations, risks, and liabilities
 - Reduce costs by linking GHG reduction goals to operational improvement
 - Obtain financial value from climate-related market activities
 - Establish a leadership position

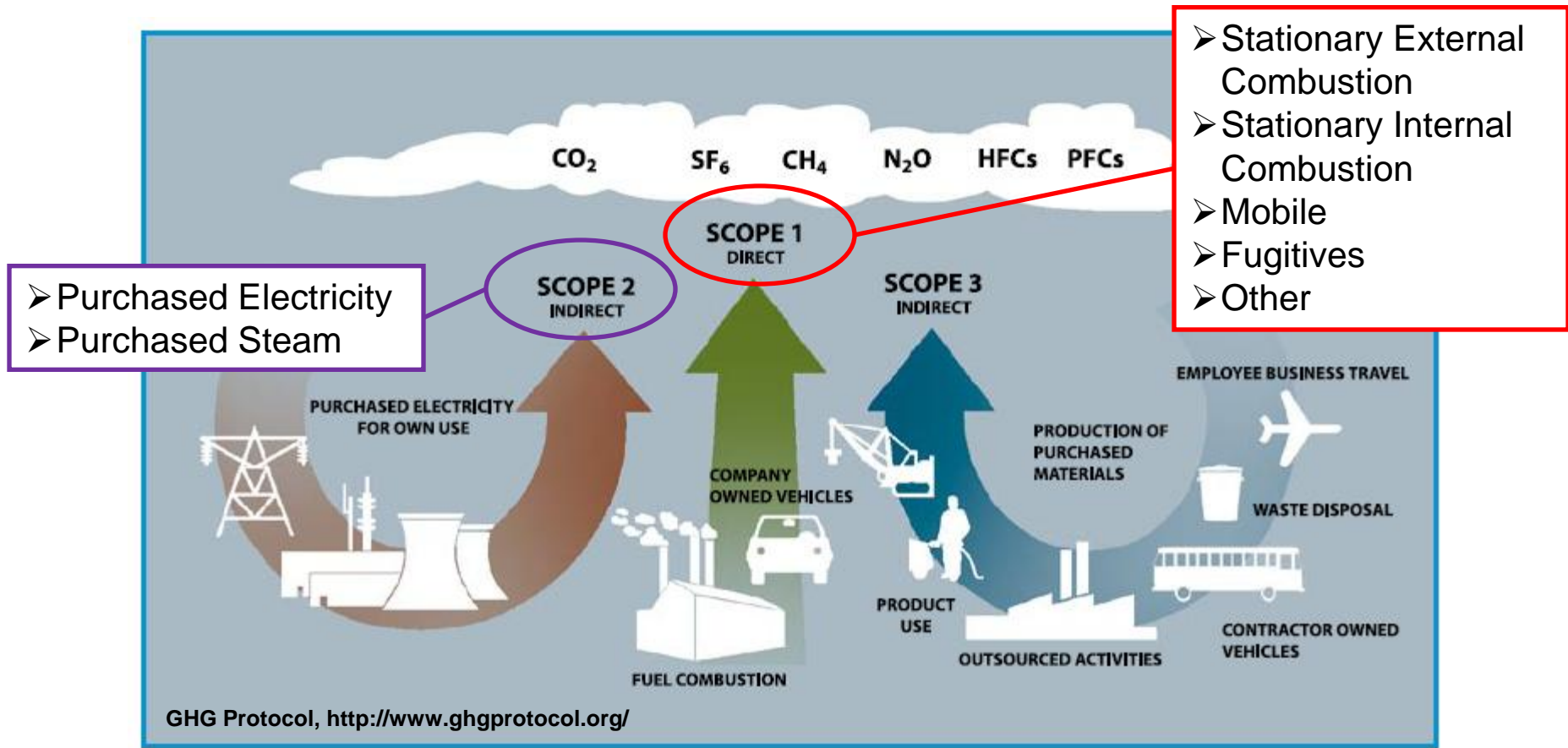
Now the How...Be Thoughtful and Practical

- Which protocol(s) should be used?
- Which institutional approach can be used?
- What data is needed and available?
- Which calculation tool should be used?

GHG Inventory Protocols/Guidance



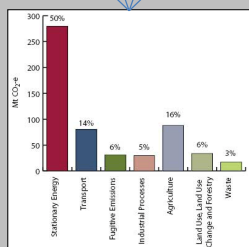
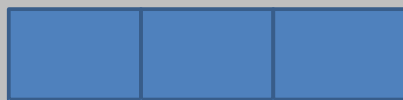
Installation GHG Emission Sources



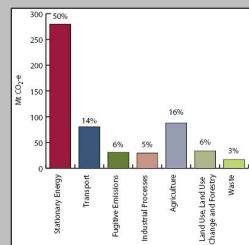
Federal Institutional GHG Approaches

Top-down approach

Existing institutional data systems



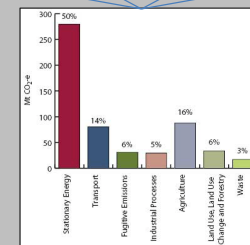
Bottom-up approach



Site/source specific data

Hybrid approach

Existing institutional data systems

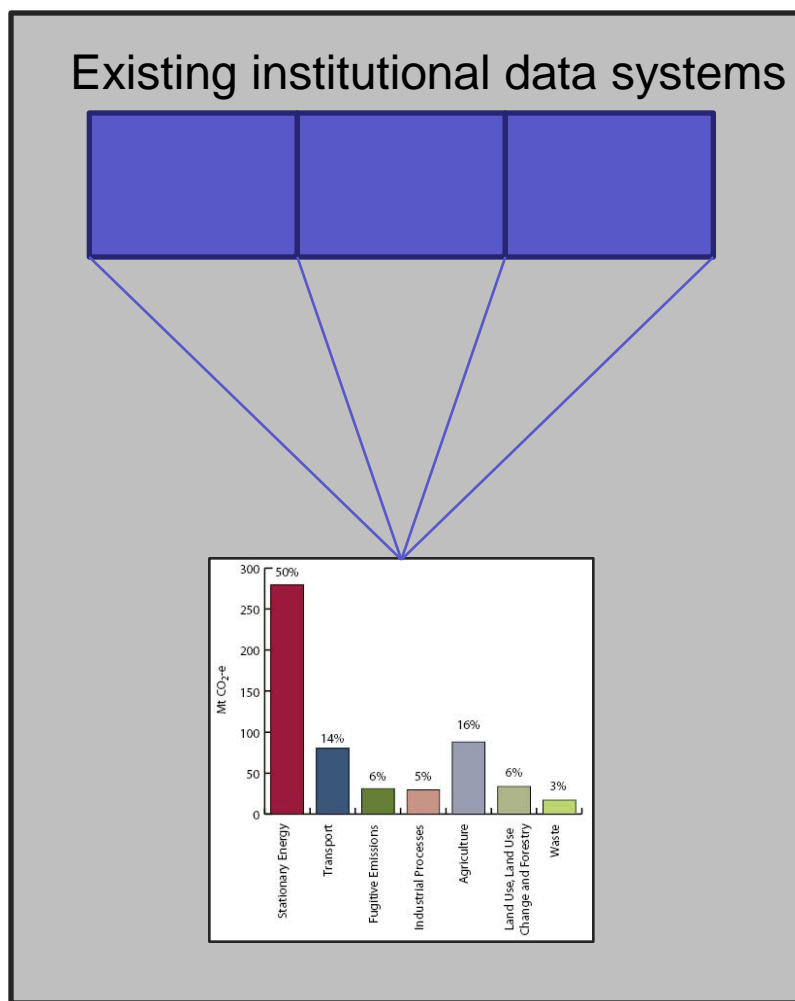


Site/source specific data

Federal Institutional GHG Approaches

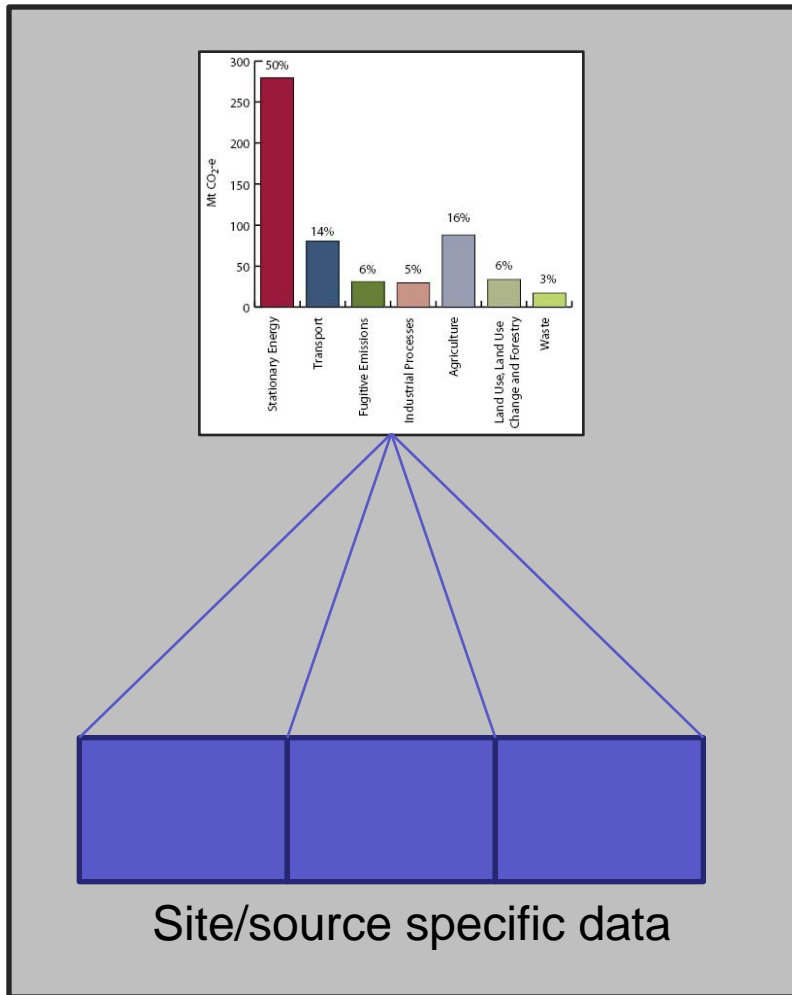
- Top-down
 - Headquarters level approach for facilities
 - Leverage existing institutional data systems
 - Standardized installation calculation templates/profiles
 - Easy to roll-up facility inventories to the headquarters level
- Bottom-up
 - Installation lead and/or close cooperation
 - Utilize detailed 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 Inventory Approach



- Current Efforts
 - AEC
 - NASA HQ EMD
 - USAF APIMS
- 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

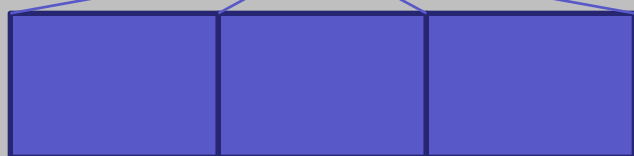
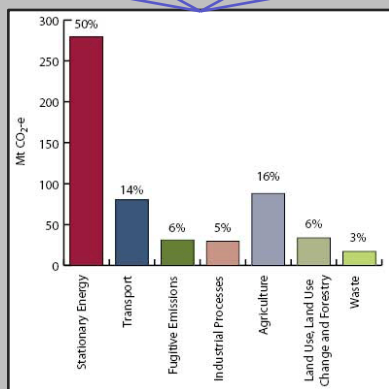
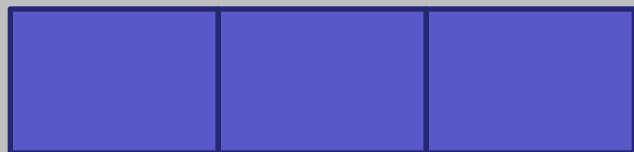
Bottom-up GHG Inventory Approaches



- Current Efforts
 - DASA (ESOH) and NDCEE
 - NASA GSFC (CY2007)
- 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

Hybrid GHG Inventory Approaches

Existing institutional data systems



Site/source specific data

- Current Efforts
 - NASA GSFC
 - Others?
- 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

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

Calculation Approach and Tools

- Depends on institutional goals and budget
- Spreadsheet tool, enterprise-wide EMIS, etc.
- Flexibility required to adapt to dynamic regulatory environment
- Modular setup required to handle diverse emissions sources
- Transparency required for audits, recalculations, etc.
- Consistency required for installation and component rollup
- Design and plan for future third party audit

Conclusions

- Goal is thoughtful GHG Management as Force Multiplier!
- Decide on bottom-up and/or top-down inventory approach to maximize utility and inform decision making
 - Top-down for strategic planning and energy investments
 - Bottom-up for regulatory compliance and opportunity assessment
- Process quickly identifies what you don't know and need to
- Analyze results to identify GHG reduction opportunities and support energy, transportation, and environmental goals

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