
B&W Y-12's Green House Gas Initiative

Wayne McMahon, B&W Y-12
Sara Cornwell, Strata-G

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Bio - Wayne McMahon

Wayne McMahon is an environmental specialist with **29 years** of diverse experience within Department of Energy (DOE) operations (systems management; regulatory analysis, permitting and compliance; project management; environmental monitoring; analytical laboratory management; sampling and data management).

He is currently a Technical Staff Specialist and EMS Coordinator for the Y-12 Environmental Compliance Department.

Wayne has **16 years** technical responsibility for interpreting, organizing, executing, and coordinating assignments in support of environmental protection program and projects at the Y-12 National Security Complex.

He is responsible for directing Y-12 site implementation of ISO 14001 Environmental Management System (EMS) and serves as subject-matter-expert for senior management and customer briefings. He is the Y-12 technical lead for ORR Annual Site Environmental Report, environmental Standard / Requirement Identification, and environmental liabilities.

Wayne's previous positions include: Section Manager, Environmental Surveillance, Oak Ridge Reservation (6 years), Analytical Chemist, Oak Ridge Gaseous Diffusion Plant – (7 years), Forensic Chemist, State of Tennessee - Three years as manager of one of four state regional crime laboratories.

Education:

Middle Tennessee State University Master of Science, Chemistry 1974, Bachelor of Science, Chemistry and Mathematics 1971

Bio – Sara Cornwell

Sara Cornwell is an environmental specialist with **20 years** of diverse experience in environmental protection with more than **15 years** of experience within Department of Energy (DOE) operations (Pollution Prevention, Waste Management, Environmental Compliance, ISO 14001 environmental management systems (EMS), and sustainable design).

She currently supports the Y-12 Environmental Compliance department, the Y-12 Uranium Processing Facility (UPF) design team, and the Y-12 Sustainability and Stewardship Pollution Prevention Program. Her work includes technical support and coordination of: the B&W Y-12 Greenhouse Gas initiative, and B&W Y-12 EMS implementation, assessment, training and improvement efforts; and the integration of Leadership in Energy and Environmental Design (LEED) sustainable building principles into the UPS design.

Sara is a US Green Building Council LEED Accredited Professional and a Certified Environmental Management System Auditor.

Education

Christian Brothers University: Master of Science, 1986, Bachelor of Science, Chemical Engineering, 1982

Drivers for Developing GHG Inventories

- Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (January 24, 2007)
 - Sets goals in the areas of *energy efficiency, renewable energy, sustainable buildings, fleet fuels*, and other areas
 - “Improve energy efficiency and **reduce green house gas emissions** of the agency by 3% annually, or **30%** by the end of FY2015, relative to the baseline of the agency’s energy use in **FY2003**”
 - “Implement ...sustainable practices for.... energy efficiency, **greenhouse gas emissions** avoidance or reduction, and petroleum products use reduction”
- Potential new Executive Order (possibly to be issued by September 2009) may set additional goals or limits for GHG.

Drivers for Developing GHG Inventories

- DOE Order 430.2B, *Departmental Energy, Renewable Energy and Transportation Management*
 - Assigns EO 13423 requirements to the DOE and Contractors
 - Includes requirements for reducing greenhouse gas emissions by:
 - Purchasing electricity, and other fuels from lower GHG sources
 - Purchasing non-petroleum based fuels.
 - Implementing employee incentives
 - Using an environmental management system (EMS) to establish and track progress towards meeting greenhouse gas reduction goals

B&W Y-12's EMS Objectives and Targets

- B&W's environmental planning process added a target to address greenhouse gas inventories in FY 2009.

OBJECTIVE: "Minimize emissions of air pollutants...."

TARGET: "Initiate planning and data collection to develop Y-12 Complex GHG Inventory"

ACTIONS:

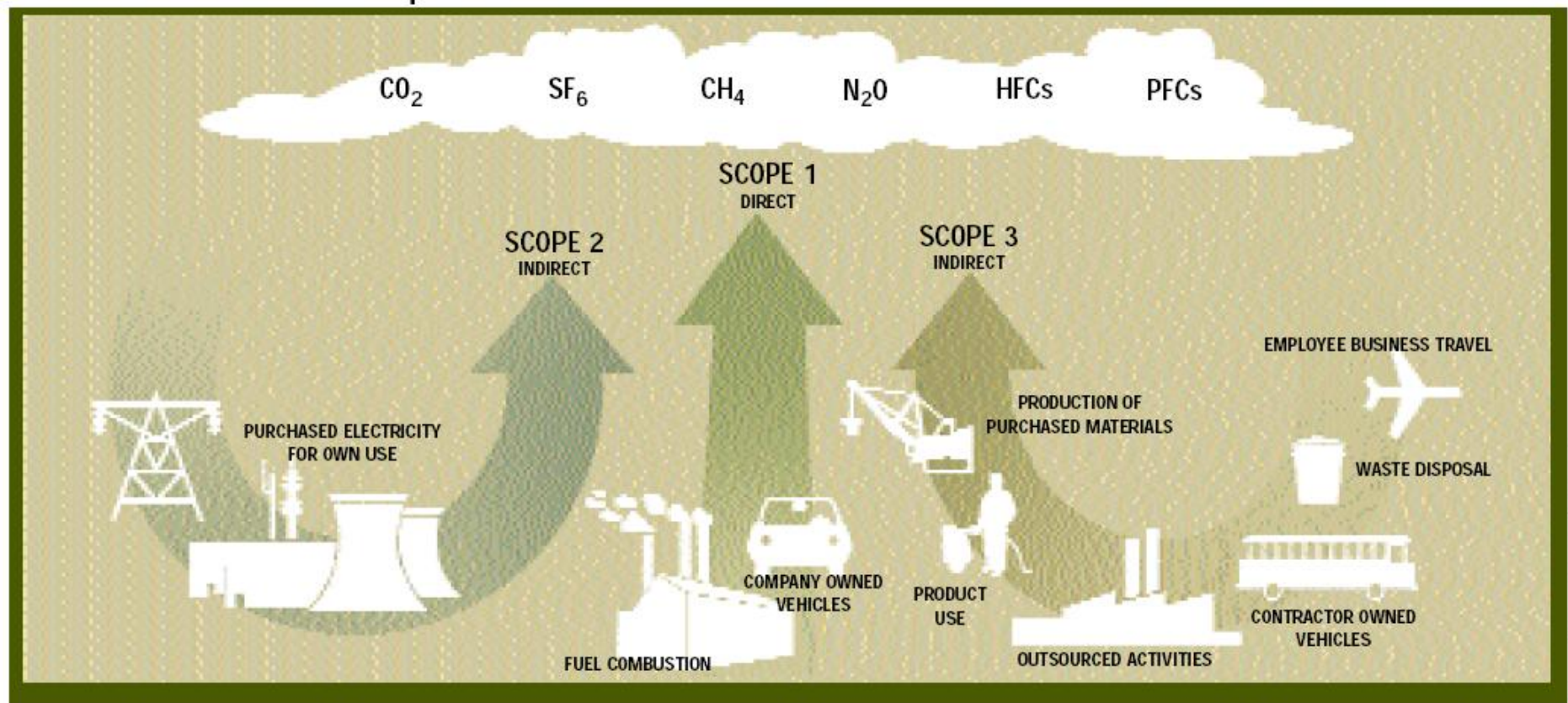
- Establish GHG Inventory Team
- Evaluate benchmarking and training
- Initiate GHG Inventory Management Plan
- Define operational boundaries

B&W Y-12's GHG Inventory Team

- Members included representatives from:
 - Energy Management / Utilities
 - Environmental Compliance
 - Air Quality
 - Waste Management / Pollution Prevention
- GHG Team purpose:
 - Identify GHG emission sources at the Y-12 Complex
 - Identify organizations that contribute to GHG's
 - Identify data sources that can be used to estimate and calculate GHG emissions
 - Facilitate GHG inventory management process
 - Promote employee awareness

GHG Protocol: Corporate Standard Overview

- Classifying Emissions: SCOPE 1 / SCOPE 2 / SCOPE 3



Slide source: GHG Protocol

GHG Benchmarking Results

(Scope) Source	SNL (FY2005)	NREL (FY2007)	PNNL (CY 2007)	Yellow- stone
(2) Purchased Power	81%	76%	8%	56%
(1) On-site Steam / Fuel Combustion	6%	11%	25%	22%
(1) Fleet Transportation	1%	<<1%	1%	12%
(3) Employee Commute	6%	6%	22%	Not calculated
(3) Business Travel	4%	7%	42%	Not calculated
(3) Waste	<2%	<<1%	2%	6%
(3) Process emissions/CFCs	Not included	Not included	Not included	Not included

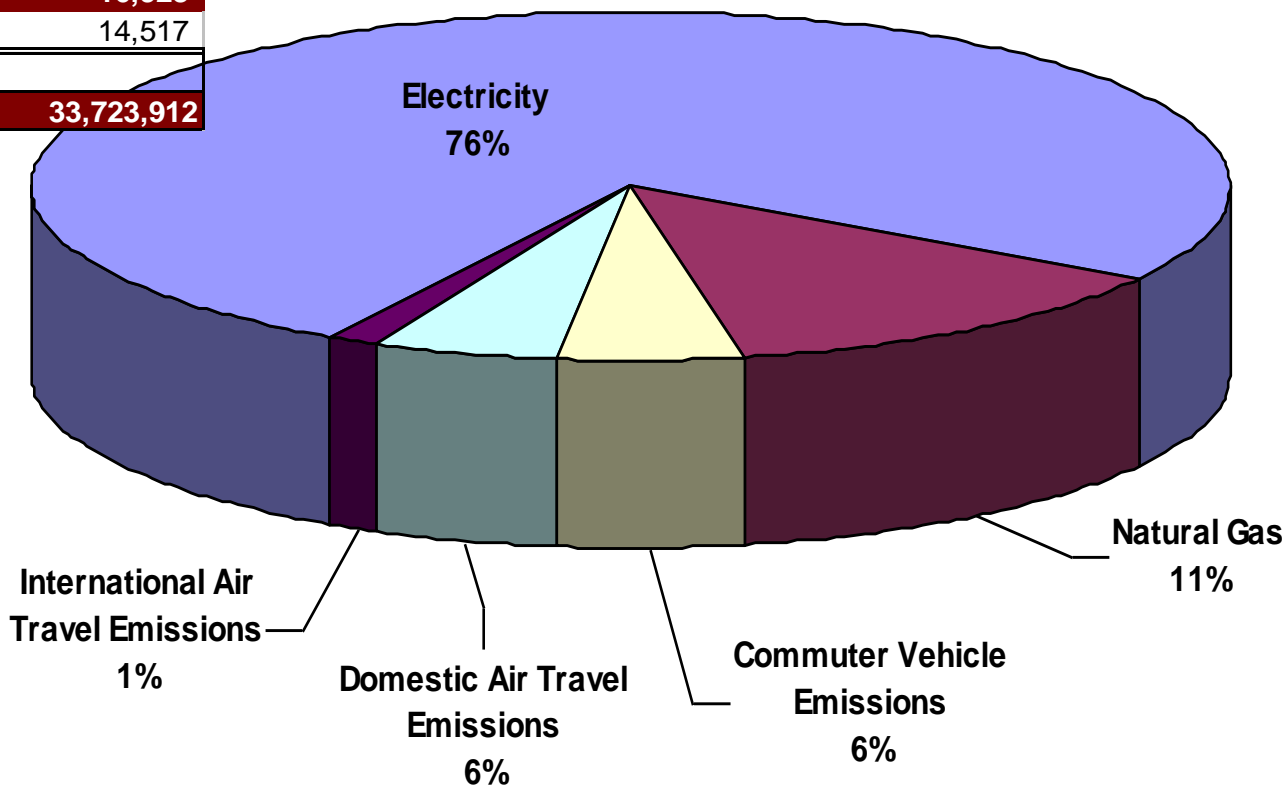
SNL = Sandia National Lab

NREL= National Renewable Energy Lab

PNNL=Pacific Northwest National Lab

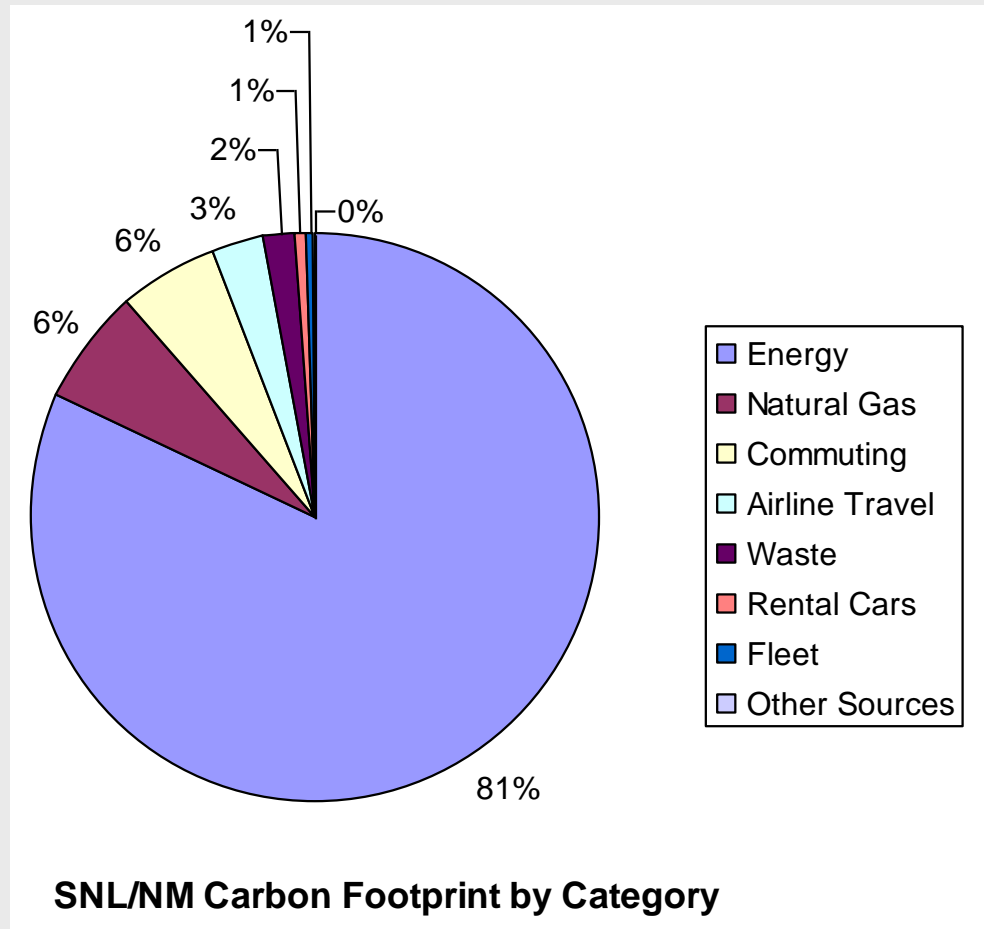
FY07 National Renewable Energy Lab Carbon Foot Print

SOURCE	Kg CO2 Eq.
Electricity	25,376,679
Natural Gas	4,387,694
Commuter Vehicle Emissions	1,677,026
Domestic Air Travel Emissions	1,670,191
International Air Travel Emissions	448,001
Fleet Vehicle Emissions	90,838
Solid Waste Disposal	42,044
Water (Electricity consumed)	16,923
Water (Natural Gas consumed)	14,517
	33,723,912



Source:
 Proceedings
 from 2008
 Federal
 Environmental
 Symposium

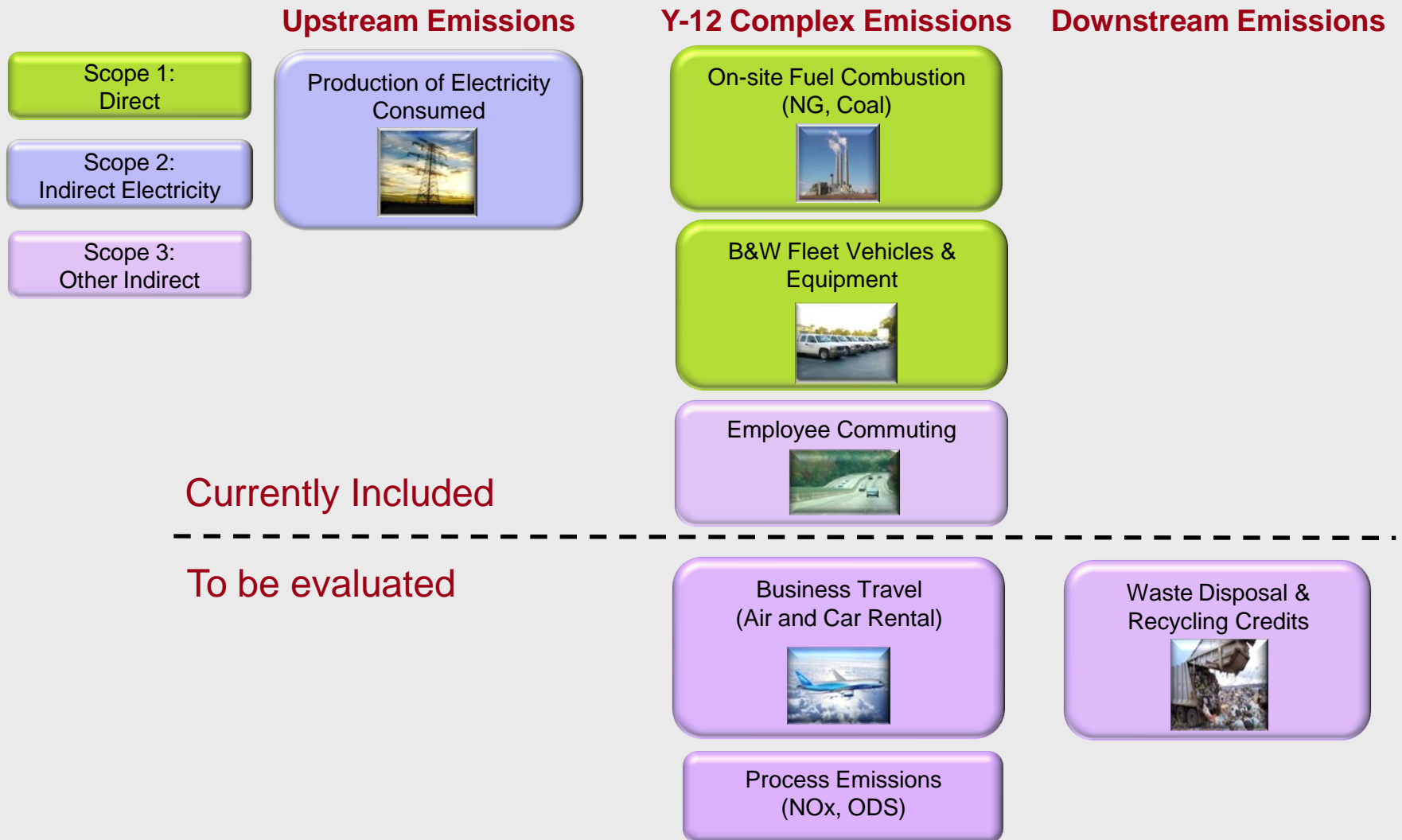
FY 2005 Sandia National Laboratory GHG Inventory Results



Source: Proceedings from 2008 Federal Environmental Symposium

B&W Y-12 GHG Inventory Management Plan

Areas included in B&W Y-12's GHG inventory



Currently Included

To be evaluated

B&W Y-12 GHG Inventory Management Plan

- Data Sources: Use existing data collection systems
 - EMS-4 Annual Energy Report (power and fuel use)
 - FAST Annual Report (fleet fuel usage)
 - Air Permitting Calculations (emission factors)
 - Pollution Prevention Tracking System (waste & recycling)
 - EPCRA TRI Report (process emissions)
 - Y-12 ODS Phase-Out and Management Plan (Y/TS-1880)
 - Commuter Survey(s)
- Organizational Boundary:
 - Include only sources controlled by B&W
 - Considering feasibility of including other DOE Prime Contractors (e.g., Wackenhut Security, DOE Y12 Site Office)

B&W Y-12 GHG Inventory Management Plan (cont.)

- Baseline Year: Estimated 2003 as baseline
 - Prior to 4x10 work week
 - Dependent on data availability
 - May be influenced by new Executive Order
 - Methodology:
 - Based on GHG Protocol (WRI – World Resources Institute)
 - Use Sandia National Laboratory spreadsheet tool currently under development to perform calculations.
 - Basic equation: $Fuel\ Quantity \times EF \times GWP = CO_2\ e$
- Where:
- **EF** = Emission Factor for specific emission source
 - **GWP** = Global Warming Potential (for gases other than CO₂)
 - **CO₂e** = CO₂ Equivalents

GHG Awareness – B&W 2009 Safety Expo

- Safety Expo Theme = “*it's easy being green*”
- Attended by more than **8000** Y-12 employees, alumni, and area residents.
- The Safety Expo was planned as a *Zero Waste* event.



NNSA Site Management Ted Sherry welcomes EXPO attendees.

B&W 2009 Safety Expo GHG Carbon Footprint Booth

- “GHG Emissions At Home” display and calculator.
- Commuter Survey and drawing for rain barrel.

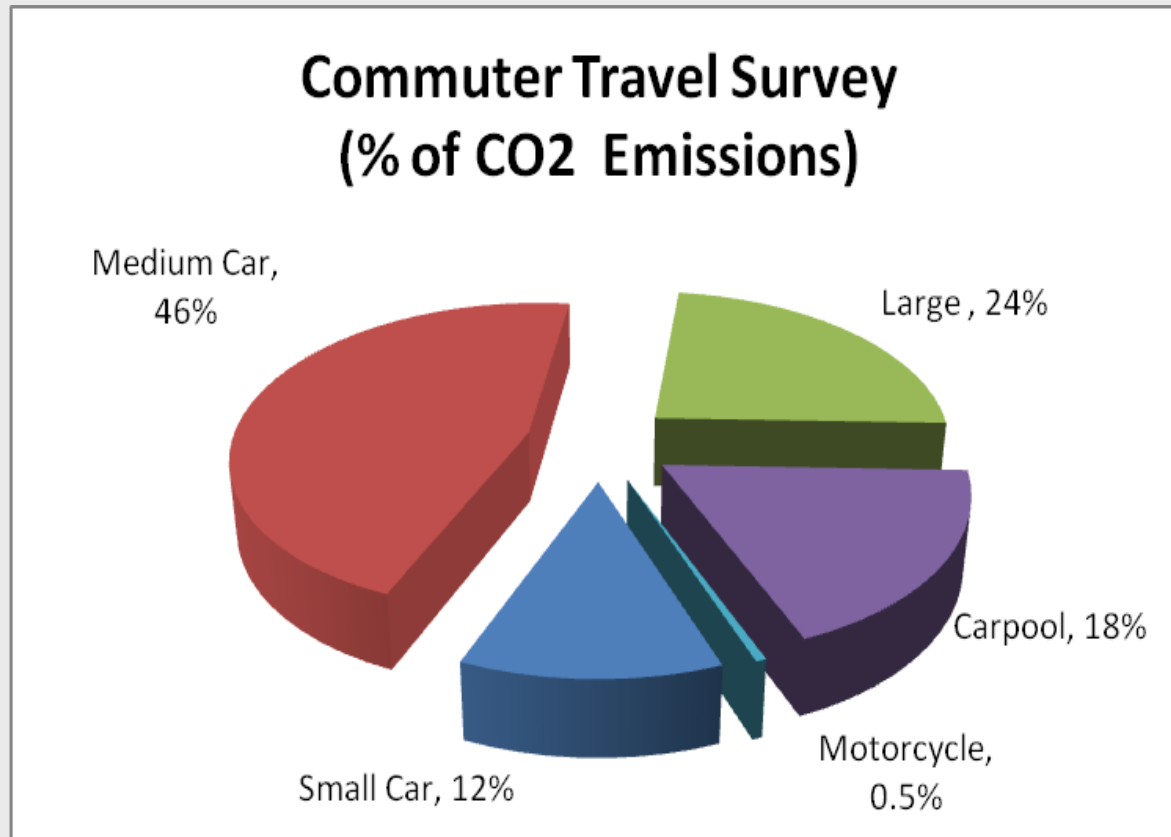


Y-12 employees complete commuter surveys.



Results of Y-12 Commuter Survey

- >**450** Surveys were completed that included employee fuel use information (Represents approx. **9%** of Y-12 employees)
- Estimated gas consumed by Y-12 employees to commute to work: > **2,300,000 gal/yr**, > **20,000 metric ton CO2e/yr**



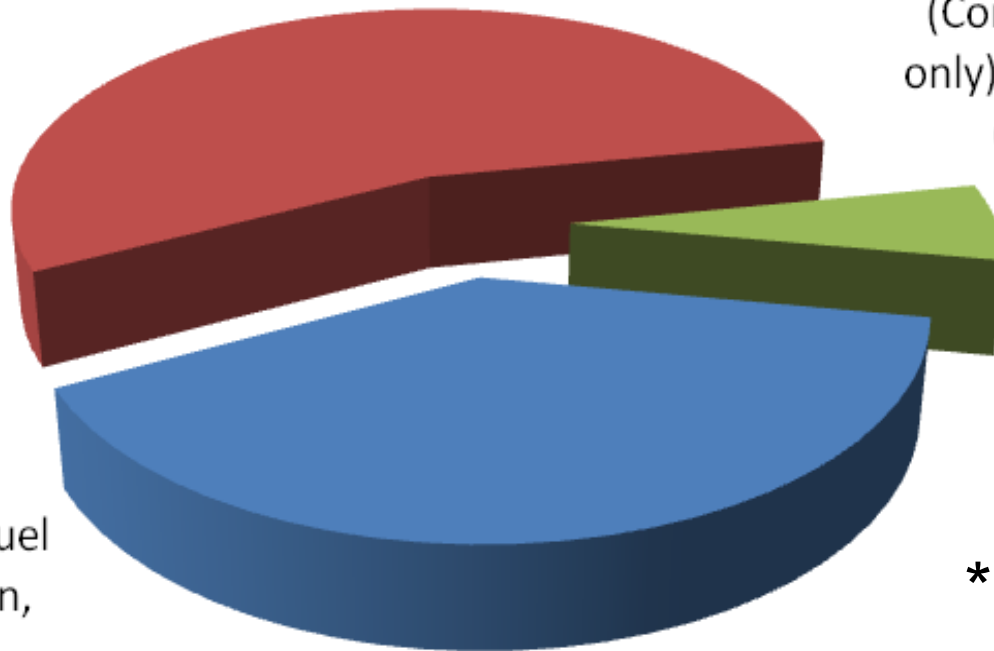
B&W Y-12 Preliminary GHG Baseline Emissions*

FY 2003 Emissions by Scope (Metric Ton CO₂ e / yr)

2 Purchased
Power,
219,883
(55%)

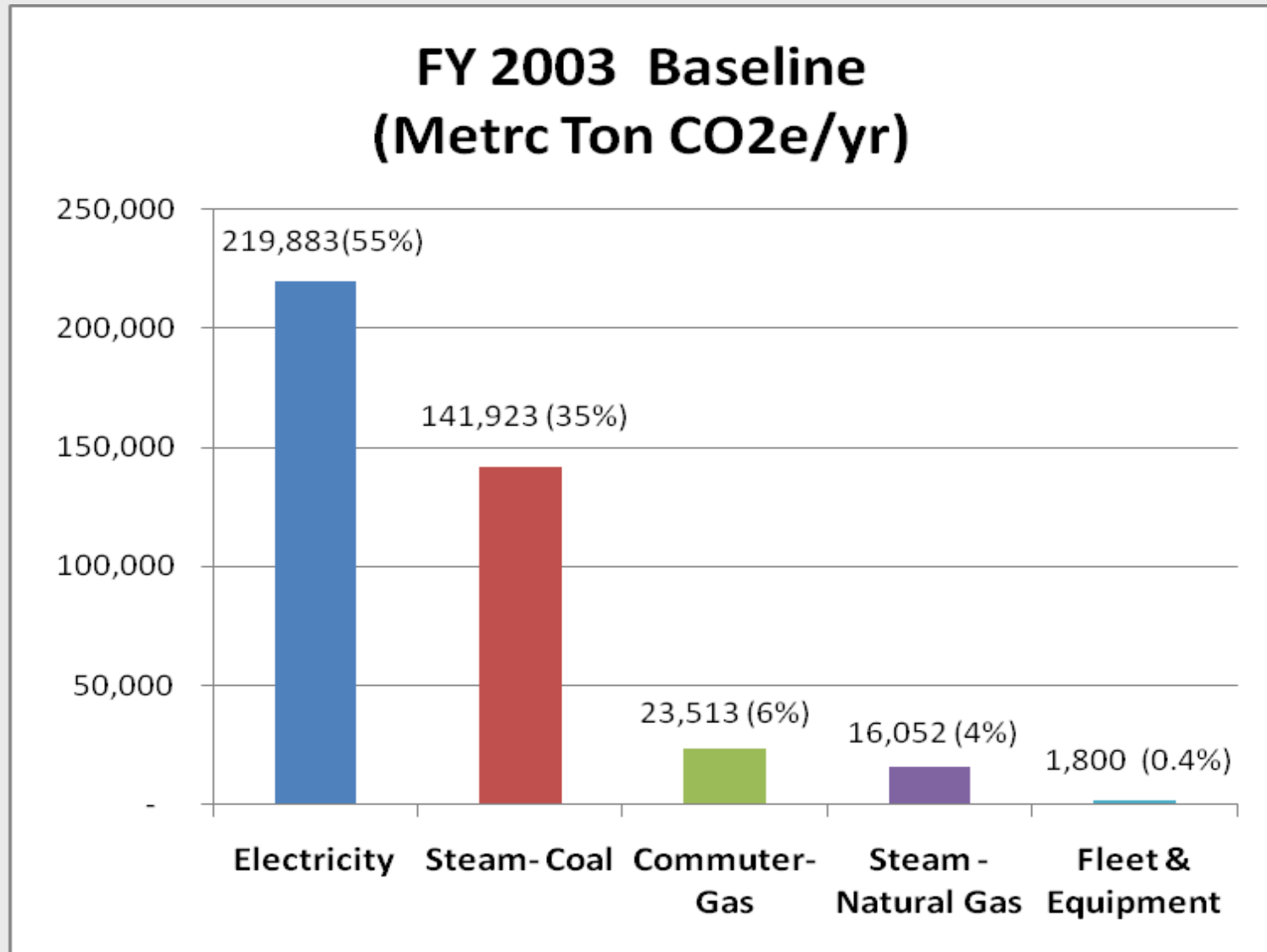
3 Indirect
(Commuter
only), 23,513
(6%)

1 On-Site Fuel
Combustion,
159,776
(40%)



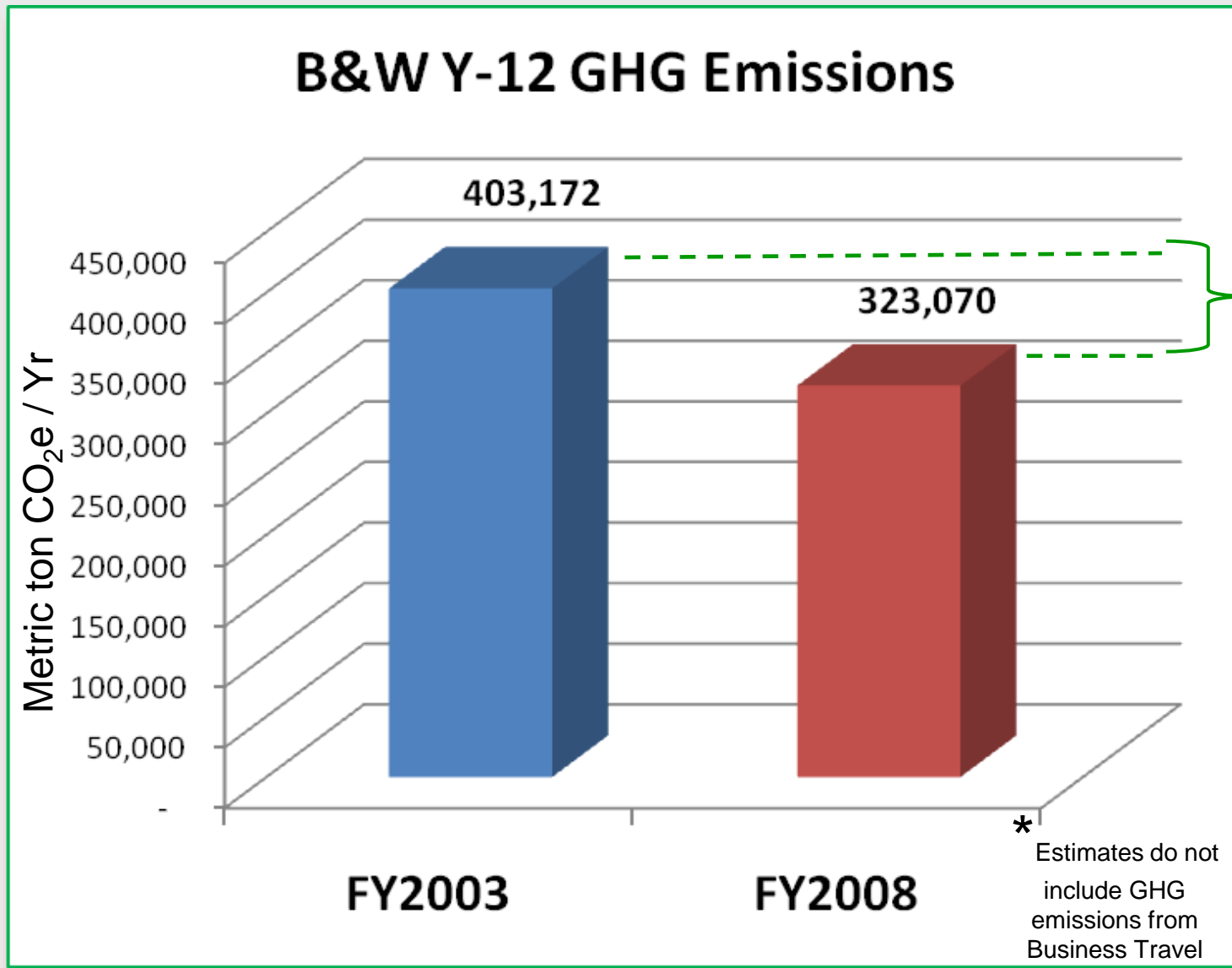
* Estimates do not include GHG emissions from Business Travel

B&W Y-12 Emission Sources (Estimate)



B&W GHG Emissions (2008 vs. Baseline)

Preliminary Estimates*

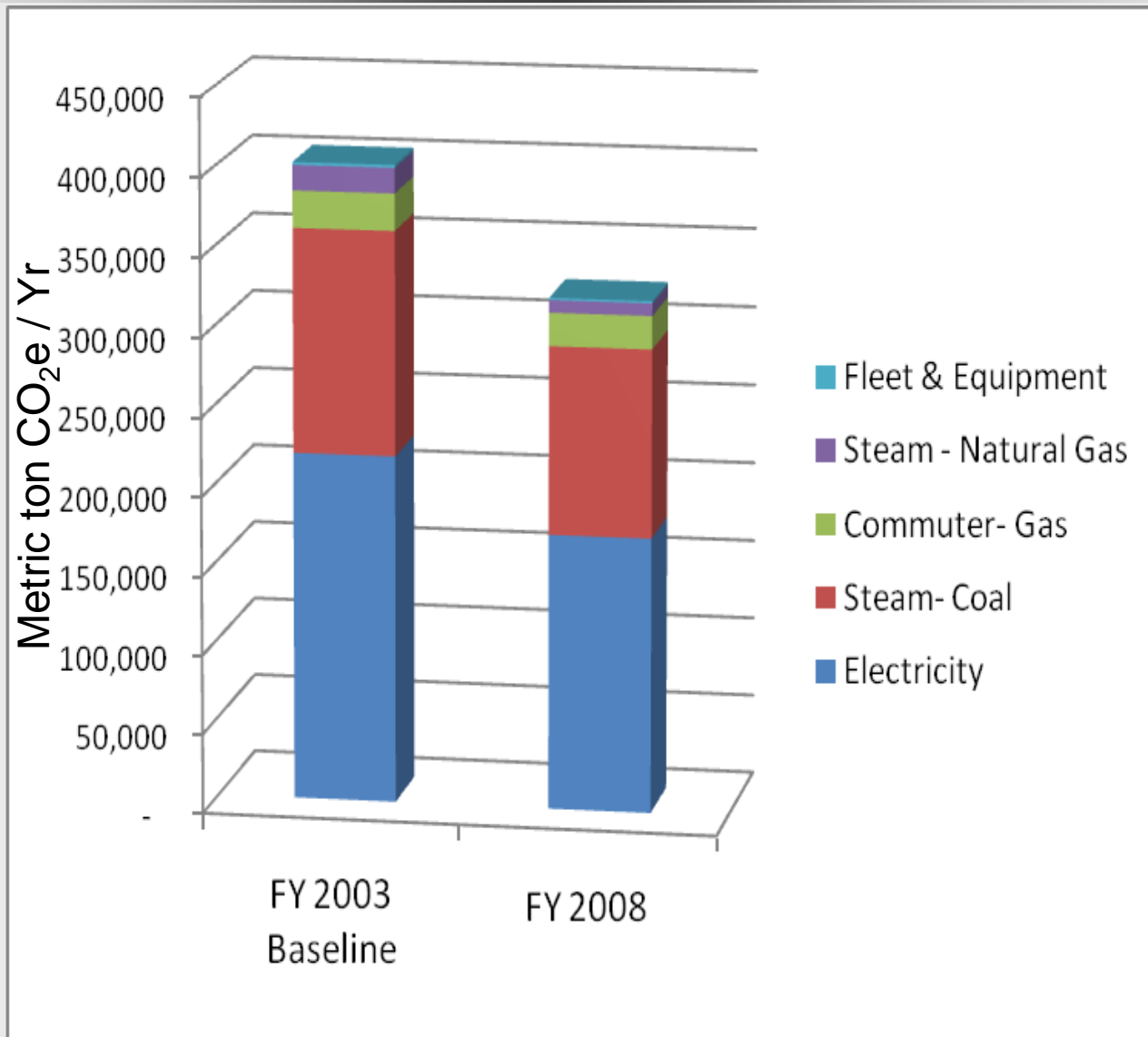


B&W Y-12 GHG Emissions (Preliminary Estimate)

<u>Scope</u>	<u>Emission (metric ton CO2e/yr)</u>	<u>FY 2003</u>	<u>% Redxn</u>	<u>FY2008</u>
2	Purchased Electricity	219,883	21%	173,961
1	Steam - Natural Gas	16,052	51%	7,935
1	Steam- Coal	141,923	16%	118,855
1	Fleet- Gasoline	1,159	4%	1,115
1	Fleet -E85+Biodiesel	-	-	75
1	Diesel Equipment	642	77%	150
3	Commuter- Gas	23,513	11%	20,978
3	Rental Car	TBD		TBD
3	Air Travel	TBD		TBD
TOTAL		403,172	20%	323,070

GHG Emissions (2008 vs. Baseline)

Preliminary Estimates



Potential GHG Improvement Opportunities

- NEAR TERM:
 - Energy Awareness web-based training course for all Y-12 employees set for November 2009,
 - Implement building HVAC system ‘Setbacks’ to turn buildings “off” when not in use,
- MID TERM:
 - Improve employee rideshare program
 - Increase access to public transit / shuttles

Potential GHG Improvement Opportunities

- MID - LONG TERM:
Y-12 Modernization / Footprint Reduction, and ESPC Projects
 - Uranium Processing Facility (UPF) technology improvements and reduced footprint (>400,000 SF) is expected to reduce system energy usage by **13%** from 2008
 - ESPC projects will reduce electricity and natural gas
 - Improvements to Chiller plant, Steam traps, Condensate Return System, Demineralized Water Production
 - Saving **4%** of total site energy useage (**\$1.9MM / yr**)

Source: Johnson Controls Inc., June 3 2009 M&V Plan

Path Forward

- Finalize GHG Inventory:
 - Collect and include data on Business Travel
 - Evaluate other Scope 3 Emission Sources
 - Waste disposal / transportation
 - Security
 - Recycling Credits
 - Process emissions
 - Finalize decision on organizational boundary
 - Include other DOE Prime contractors and site office business travel?
- Monitor development of new Executive Order and address requirements.