



• August 15-18, 2010 • Dallas, Texas •  
• Dallas Convention Center •

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# **Greenhouse Gas Management A Federal Agency Perspective**

**August 17, 2010**



# Role of Energy Data in GHG Management

- Energy data forms the foundation of GHG emission accounting and tracking methodologies
- Unlike most air emissions, GHG emissions releases and requirements based on indirect estimating approaches
- Calculation of GHG emissions tracks broadly with energy use and intensity

**Success in achieving energy reduction goals generates related GHG emission reductions**



# NASA Initiatives and Tools

- NASA instituted annual GHG inventories as part of its Chemical Management Plan requirements (initiated for CY2007)
- Evaluated established resources/tools for GHG inventory
  - WRI/WBCSD Protocol Guidance (Gold Standard and NASA's Tool)
  - U.S. EPA Climate Leaders Program Guidance
  - ISO 14064-1 – *Design and development of organizational GHG Inventories*
  - ISO 14064-2 – *Design and development of GHG Projects*
- Set Boundaries
  - NASA direct controlled Centers & facilities, civil servant activities, etc. – *mirrors activities monitored under relevant Executive Orders*
- Analyzed Scopes
  - Scope 1: Direct Emissions (boilers, vehicles, etc.)
  - Scope 2: Indirect Emissions (electric, steam use, etc.)
  - Scope 3: (*Optional*) Indirect Emissions (contractor mobile, business travel, employee commuting, etc.)

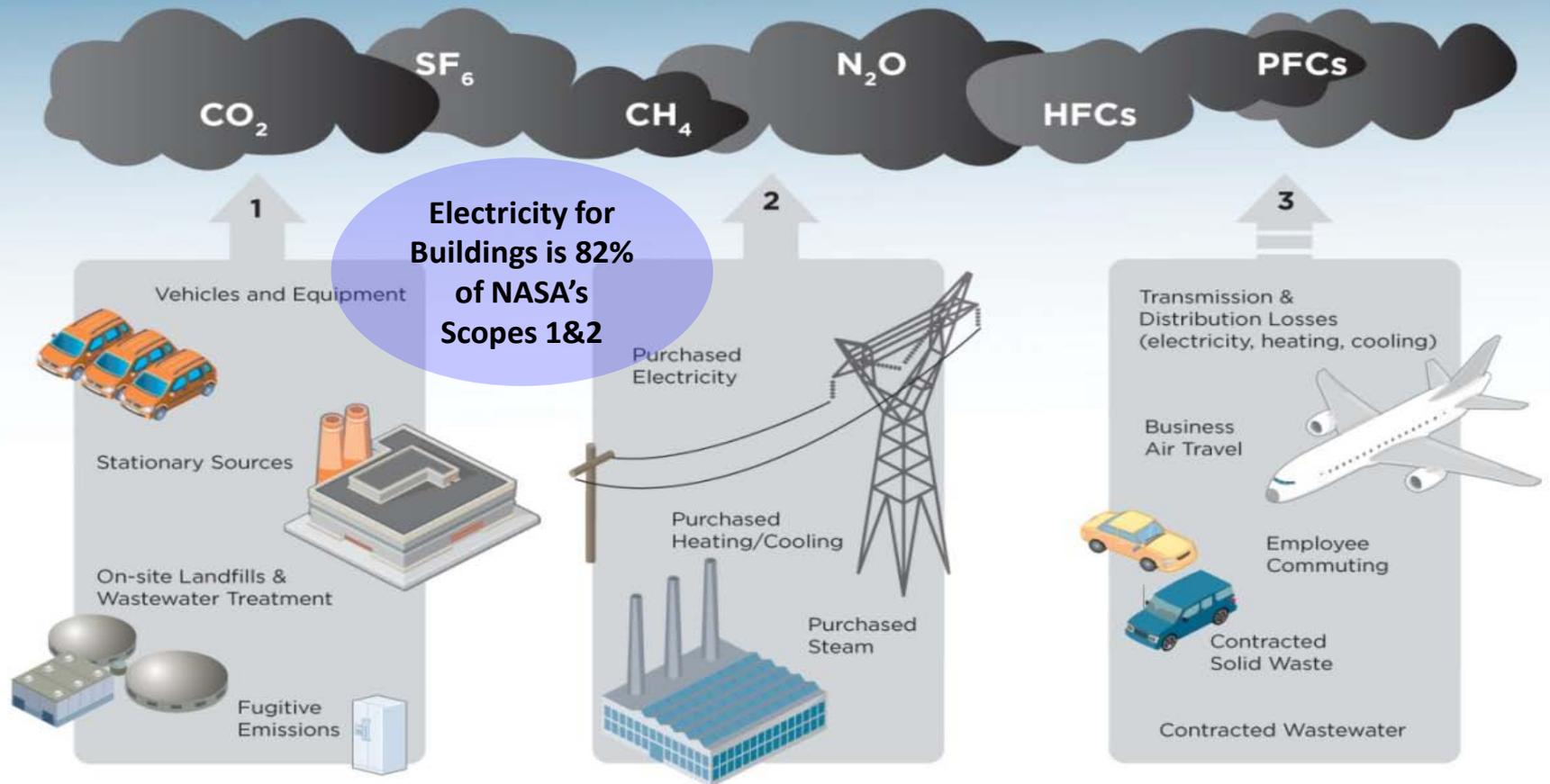


# major challenge

3

# greenhouse gas management

## Common Sources of Federal Greenhouse Gas Emissions



### SCOPE 1:

Greenhouse gas emissions from sources that are owned or controlled by a Federal agency.

### SCOPE 2:

Greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by a Federal agency.

### SCOPE 3:

Greenhouse gas emissions from sources not owned or directly controlled by a Federal agency but related to agency activities.



# Use of Energy Data in NASA Initiatives

- Leverage existing data gathered at NASA in response to Executive Orders (NETS, FAST)
- Apply internal NETS and FAST data to develop Scorecard and GHG emissions
- Designed tool to:
  - Maintain input component data streams from WRI
  - Developed a crosswalk between NASA's WWRI-based tool and evolving DOE FEMP requirements
  - Serve as a generic template with facility specific look up tables for customization and consistency
  - Maintained an updated manual and tracking of changes from each annual inventory



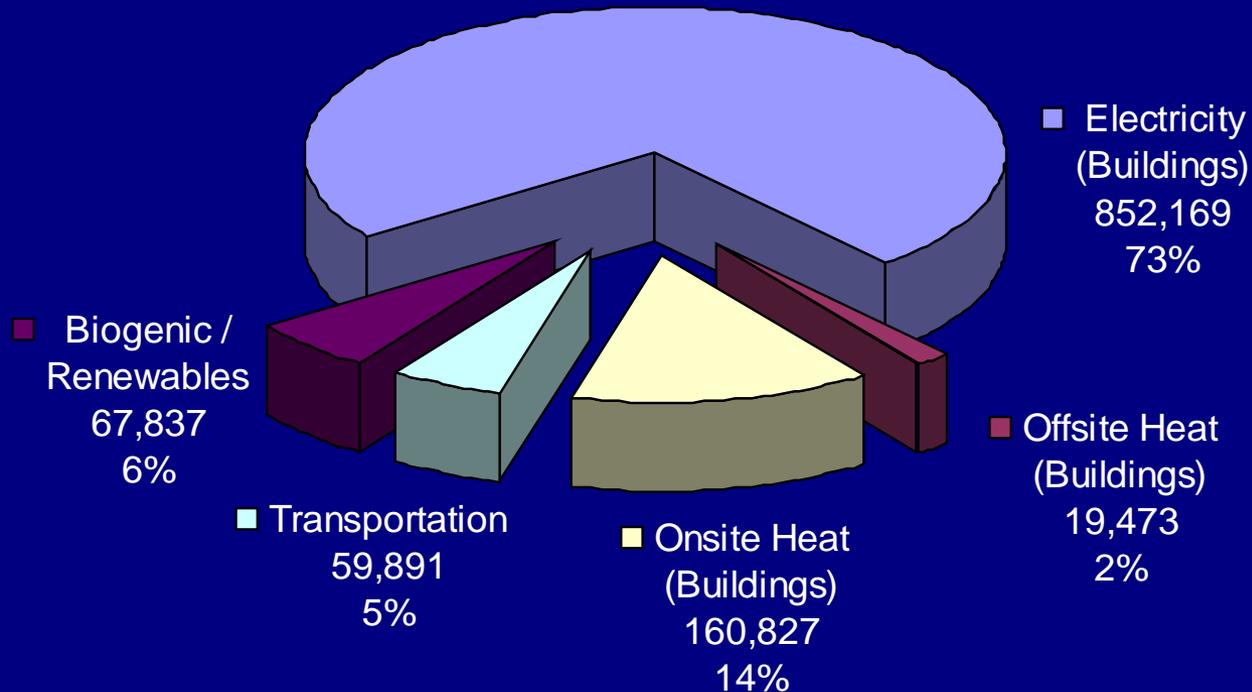
# NASA Approach

- Complete inventories for NASA Centers and HQ for CY03, CY06, CY07 and CY08
- Roll-up data at Agency level for GHG and energy usage goal setting and trends analysis
- Data viewable at various levels – Agency, Center, Scope, Fuel Source
- QA for facility and rollup components
  - Dual calculation protocols (NASA tool)
  - On-going during preparation process
  - Analysis after calculations are completed



# Green House Gas Emissions

## NASA CY2008 GHG Emissions (MTCO<sub>2</sub>e) By Source Type





# Lessons Learned

**Expect expanding and evolving reporting, tracking requirements for GHG from Federal and state regulators**

- Involve energy, transportation, & environment leads “early and often” as data will be used for multiple reporting efforts
- Formalize communication across organization and HQ/Field staff
- Develop collaboration with other federal agencies in GHG management



## Lessons Learned (cont).

- Maximize data “borrowing” to minimize new data collection and maintenance where possible
- Document approaches, tools and track changes
- Standardize data definition and collection to support QA\QC and efficient reporting
- Define resources and data needs clearly throughout organization



# Emerging GHG Requirements

- **EO 13514:** Annual GHG accounting, establishment of baseline (2008) and reduction targets
- Link this reporting to the Annual Environmental Scorecards (including Energy) and SSPP submissions
- **EPA, Mandatory Reporting Rule (MRR) under CAA:** Annual reporting of facility levels of GHG if greater than a threshold of 25,000MtCo<sub>2e</sub>
- MRR calculates GHG for 43 defined Source Categories, including Stationary Combustion Sources (e.g. physical plants) and industrial activities
- Expanding **State controls** and requirements (e.g. MD)



# Energy Data: Key Role in Sustainability

- Energy data will be utilized to address a growing and diverse set of energy and environmental management scenarios
- Needs for energy data, with increased levels of sophistication and accuracy, will expand for Federal agencies
- Evolving GHG accounting and management requirements (e.g., Scope 3 emissions) will further expand the energy data requirements into non-traditional areas such as procurement, employee travel, and waste management.



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**Kathleen Judd**

*Pacific Northwest  
National Laboratory*



# GHG Inventory Development and Priority-Setting at Pacific Northwest National Laboratory

# PNNL at a Glance

We deliver solutions to America's most intractable problems in energy, national security and the environment. Through the power of our interdisciplinary teams, we advance science and technology to make the world a better place.

- ▶ 4,700 staff members
- ▶ \$881 million business volume
- ▶ Operated by Battelle for U.S. Department of Energy



# Approach to Developing PNNL's GHG Inventory

## Design

- ▶ Establish team, define inventory boundaries, and select appropriate calculation tools

## Calculate

- ▶ Collect data and calculate emissions

## Target

- ▶ Identify emissions reduction opportunities and set reduction targets

## Reduce

- ▶ Implement emissions reduction activities

## “Offset”

- ▶ Purchase renewable energy to help meet emission targets, as required after direct reductions

## Report

- ▶ Report inventory annually and assess progress toward emissions goals

# 300 Area

**(DOE-EM)**

**(DOE-SC)**

325 Upgrade  
(Line Item)

312

318

331 Lab Mod.  
(GPP)

361

350

**(Horn Rapids Triangle)**

SDL  
(Line Item)

PSF  
(Line Item)

**Leased  
Facilities  
on Battelle  
Land**

EMSL North Lab/Office  
(Line Item)

EMSL Rad Annex  
(Prog GPP)

EMSL Machine Shop  
(IGPP)

BSF/CSF  
(Lease)

NSL  
(GPP)

EMSL Comp. Rm. /  
South Elec. Expansion  
(Prog GPP)

**Leased  
Facilities  
on Battelle  
Land**

**Other  
Leased  
Facilities**

**Battelle Owned**

# PNNL Future Campus

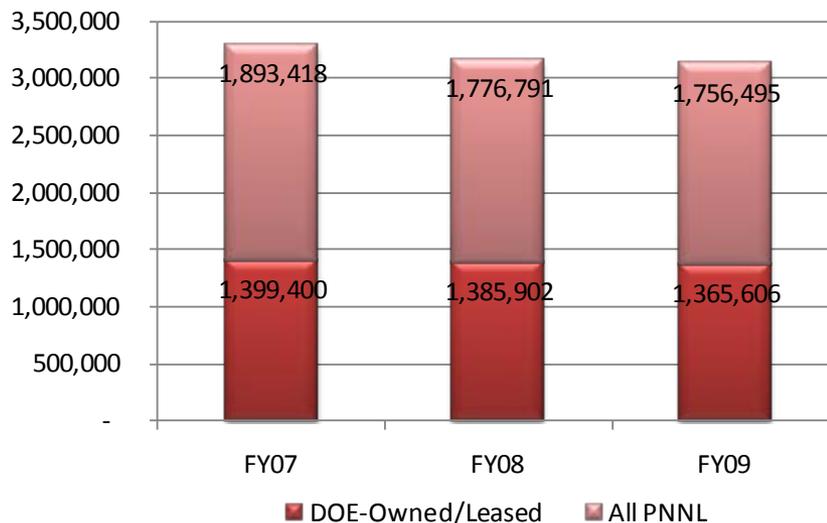
Note: Portions of Richland North Campus not shown

# Organizational Boundaries: EO 13514

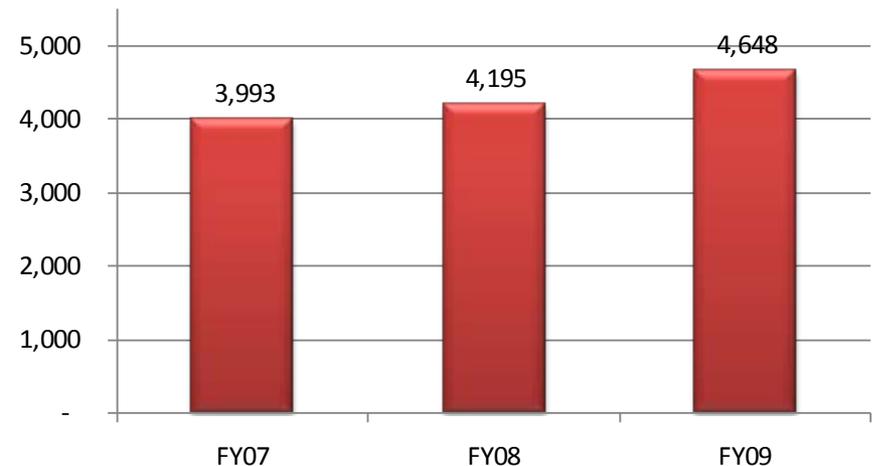


- DOE-owned and -leased facilities only
  - Excludes Battelle-owned facilities
  - Excludes off-site rented facilities (Seattle, Portland, D.C.) with full service leases
- All PNNL staff members

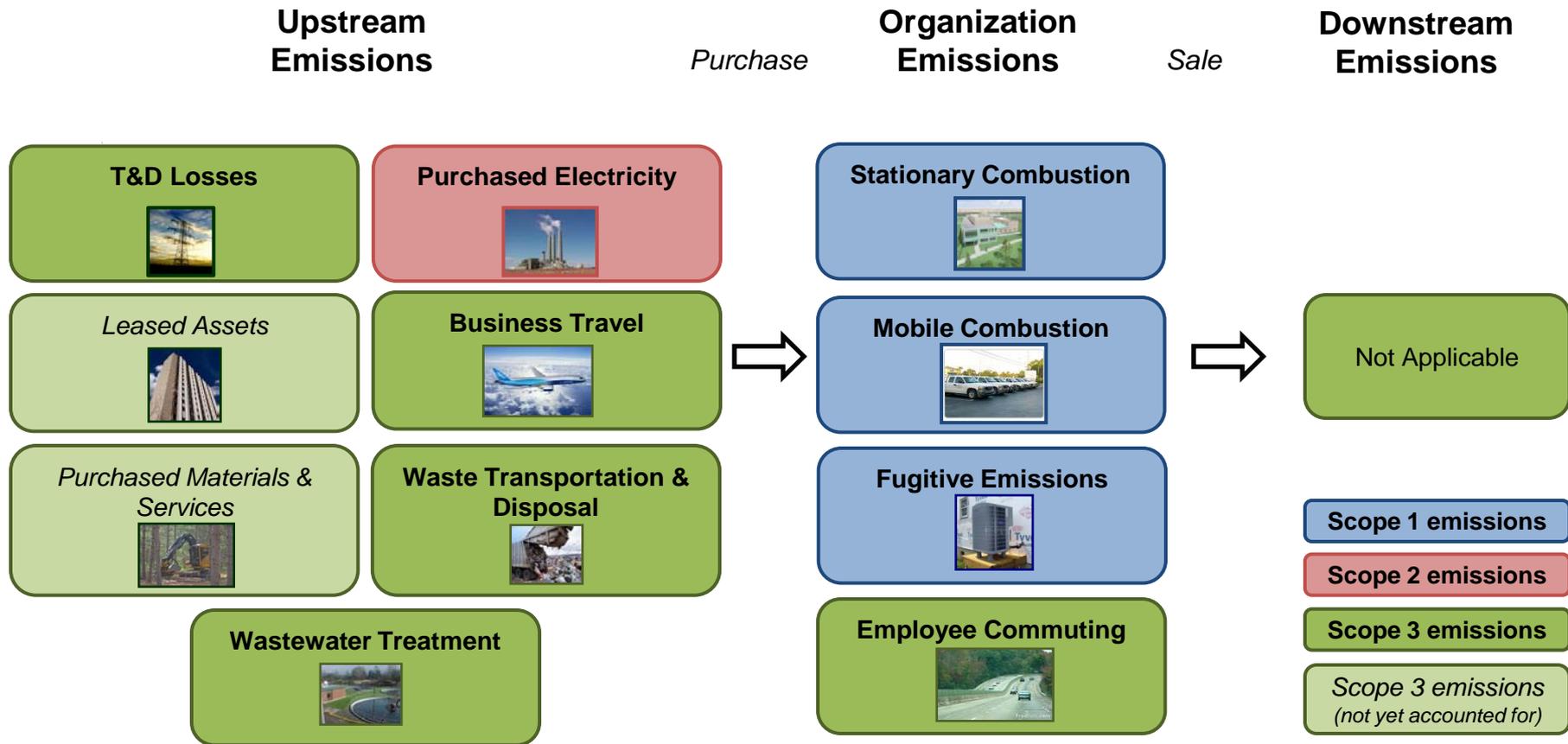
**Building Space (ft<sup>2</sup>)**



**Number of Employees**



# Operational Boundaries: Emissions Across the Value Chain



# Establish Team and Identify Data Sources

- Environmental Mgt System (EMS) core team members and the EMS process used to manage data, track progress and implement changes
- Research staff engaged to support GHG emission reduction strategy

<u>Scope and Emission Source</u>	<u>Name</u>	<u>Title</u>
<b>Scope 1</b>		
Facility Fuel: NG, Propane, Gas, Diesel, B5	Marc Berman	Energy Manager
Fleet Vehicles: Diesel, Gas, E85	Hipolito Velez	Fleet Manager
Fleet Vehicles: Jet Fuel	Marc Berman	Energy Manager
Fugitive Emissions: SF <sub>6</sub> , HFC, PFC	Rodger Woodruff	Air Quality
	Kevin Pfeifer	Refrigerants Data Manager
<b>Scope 2</b>		
Purchased Electricity	Marc Berman	Energy Manager
REC Purchases	Marc Berman	Energy Manager
<b>Scope 3</b>		
Business Travel: Air Data	Tracy Stiles	Travel Manager, TMP
Business Travel: Rental Car Data and Personal Car Use Data	Ken Blaine	Travel Accounting
Employee Commuting	Angela Kora	Survey Development
Waste Disposal/Recycling	Kami Lowry	Pollution Prevention
<b>General</b>		
Subject matter experts	Kathleen Judd Angela Kora Kim Fowler Jordan Henderson Nora Wang others	Research scientists and engineers <b>GovEnergy 2010</b>

# Calculate Emissions: PNNL GHG Inventory Calculator

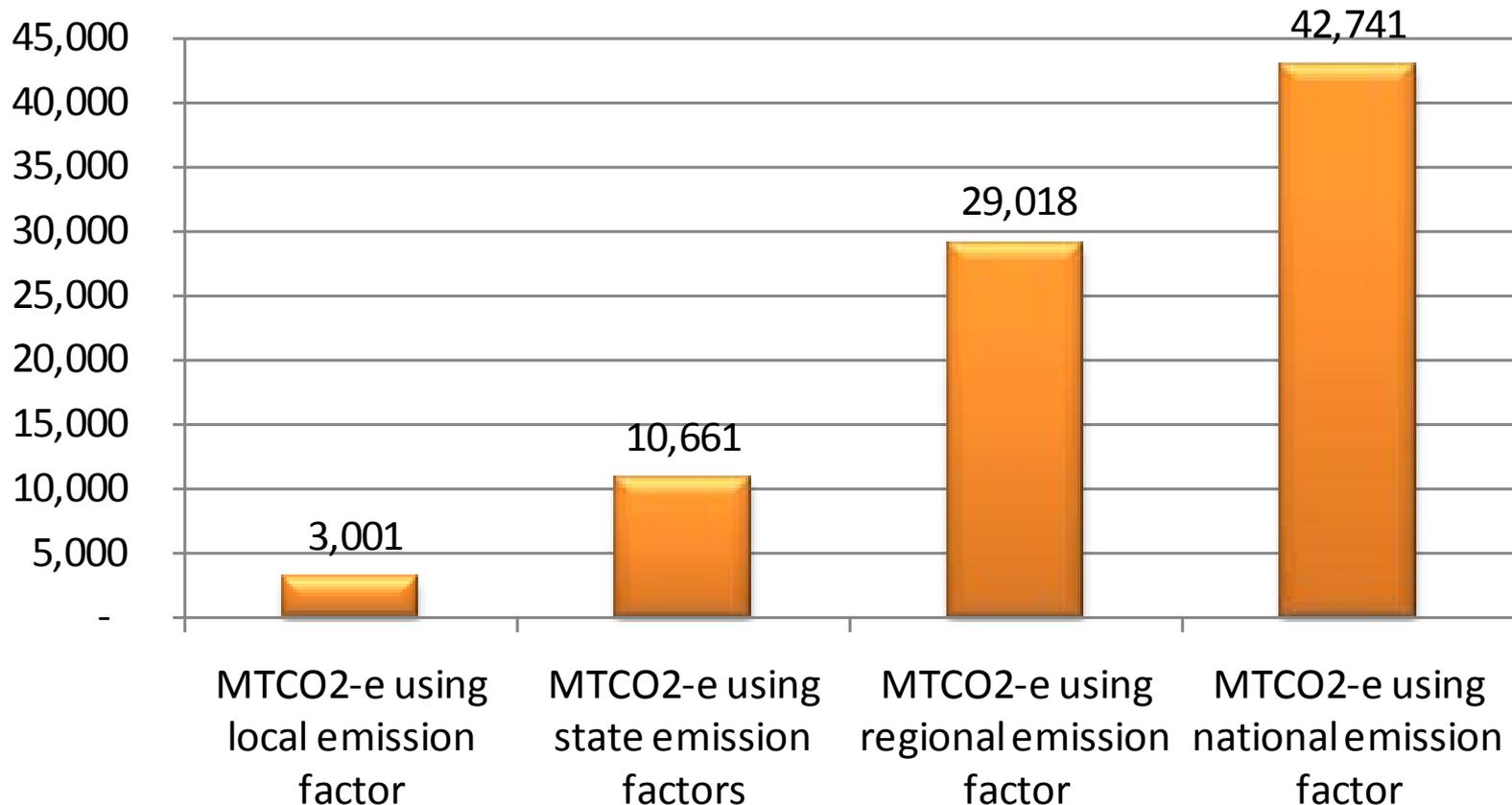
## PNNL GHG Inventory Summary - DOE Facilities

### Results by Emission Category

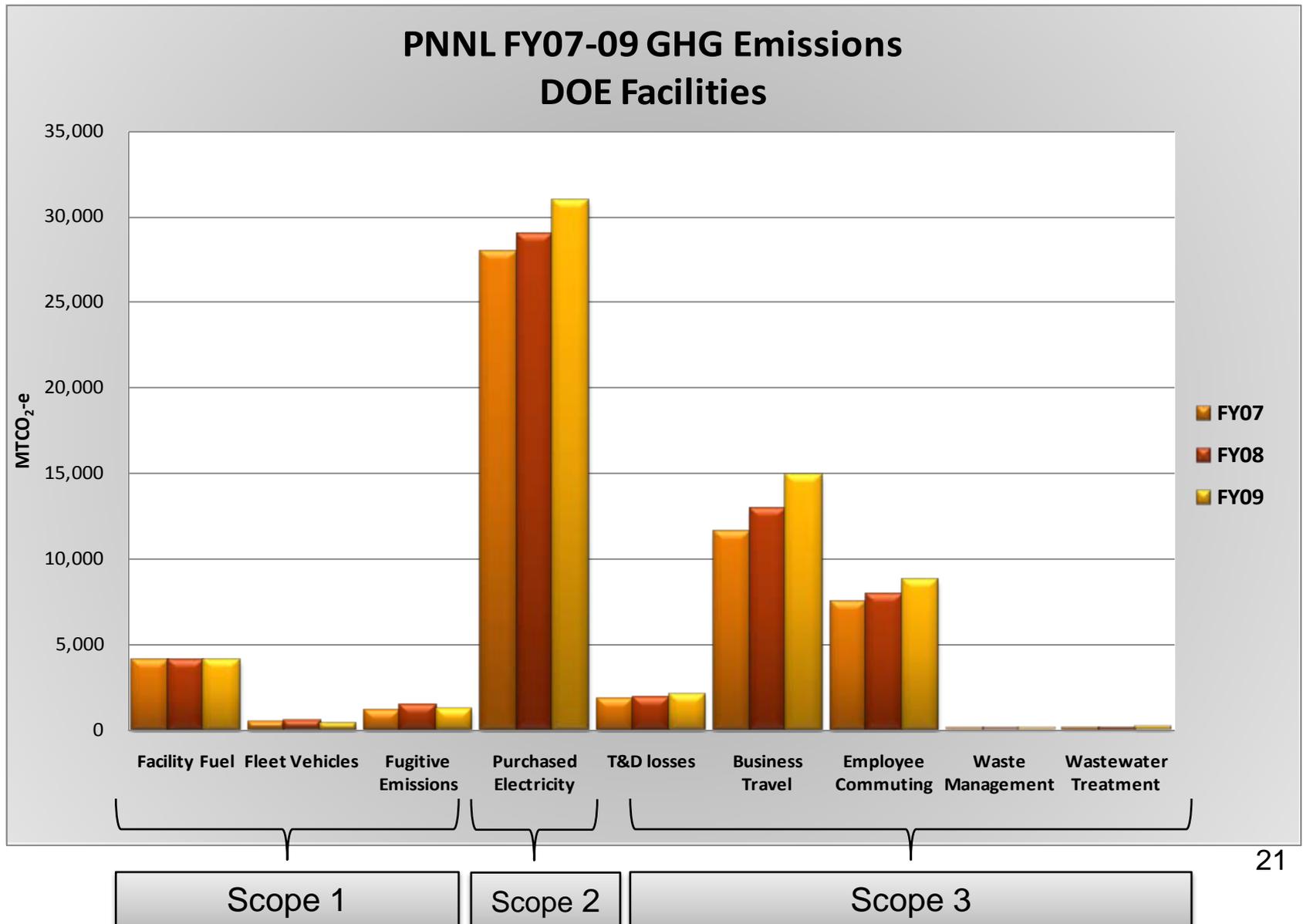
	Description	FY07 MTCO <sub>2</sub> e	% of Total Gross Emissions	FY08 MTCO <sub>2</sub> e	% of Total Gross Emissions
<b><u>Scope 1: Direct</u></b>	Facility Fuel	4,080	7%	4,070	7%
	Fleet Vehicles	461	1%	510	1%
	Fugitive Emissions	1,173	2%	1,507	3%
Subtotal		<b>5,714</b>	<b>10%</b>	<b>6,087</b>	<b>10%</b>
<b><u>Scope 2: Indirect from Purchased Electricity</u></b>	Purchased Electricity (Regl Factor)	27,993	51%	29,018	50%
Subtotal		<b>27,993</b>	<b>51%</b>	<b>29,018</b>	<b>50%</b>
<b><u>Scope 3: Other Indirect</u></b>	T&D Losses	1,844	3%	1,911	3%
	Business Travel	11,546	21%	12,974	22%
	Employee Commuting	7,507	14%	7,892	14%
	Waste Management	3.6	0%	4.2	0%
	Wastewater Treatment	146	0%	154	0%
Subtotal		<b>21,047</b>	<b>38%</b>	<b>22,935</b>	<b>40%</b>
<b><u>Offsets</u></b>	REC Purchases	(3,420)		(3,260)	
<b>Gross CO<sub>2</sub>-e Emissions</b>		<b>54,754</b>		<b>58,041</b>	
<b>Net CO<sub>2</sub>-e Emissions</b>		<b>51,334</b>		<b>54,781</b>	

# Calculate Emissions: Why Emission Factors Matter

**2008 GHG Emissions from Electricity Use Based on Local, State, Regl, Natl Emission Factors**

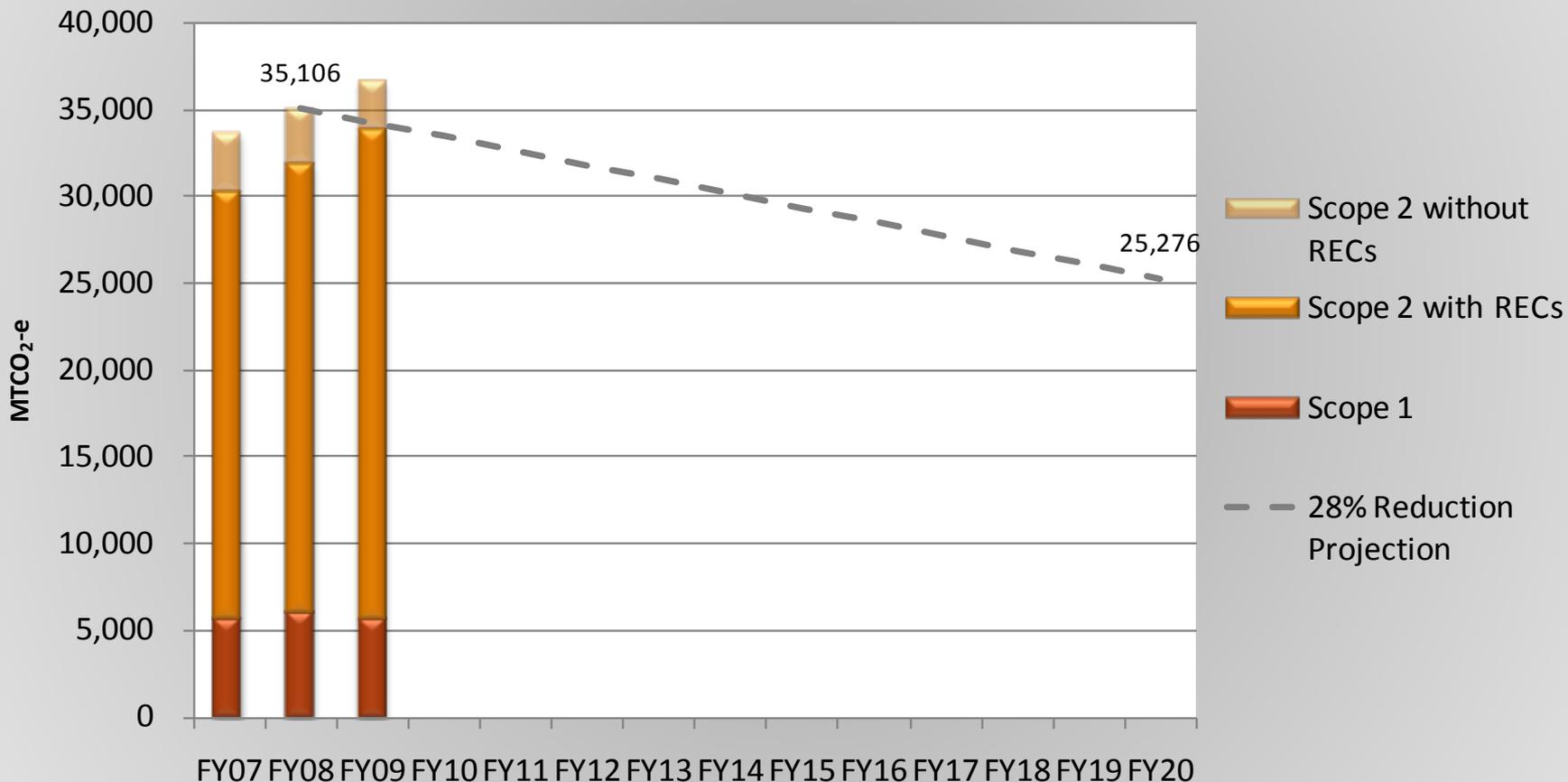


# Calculate Emissions: Summary Data for PNNL



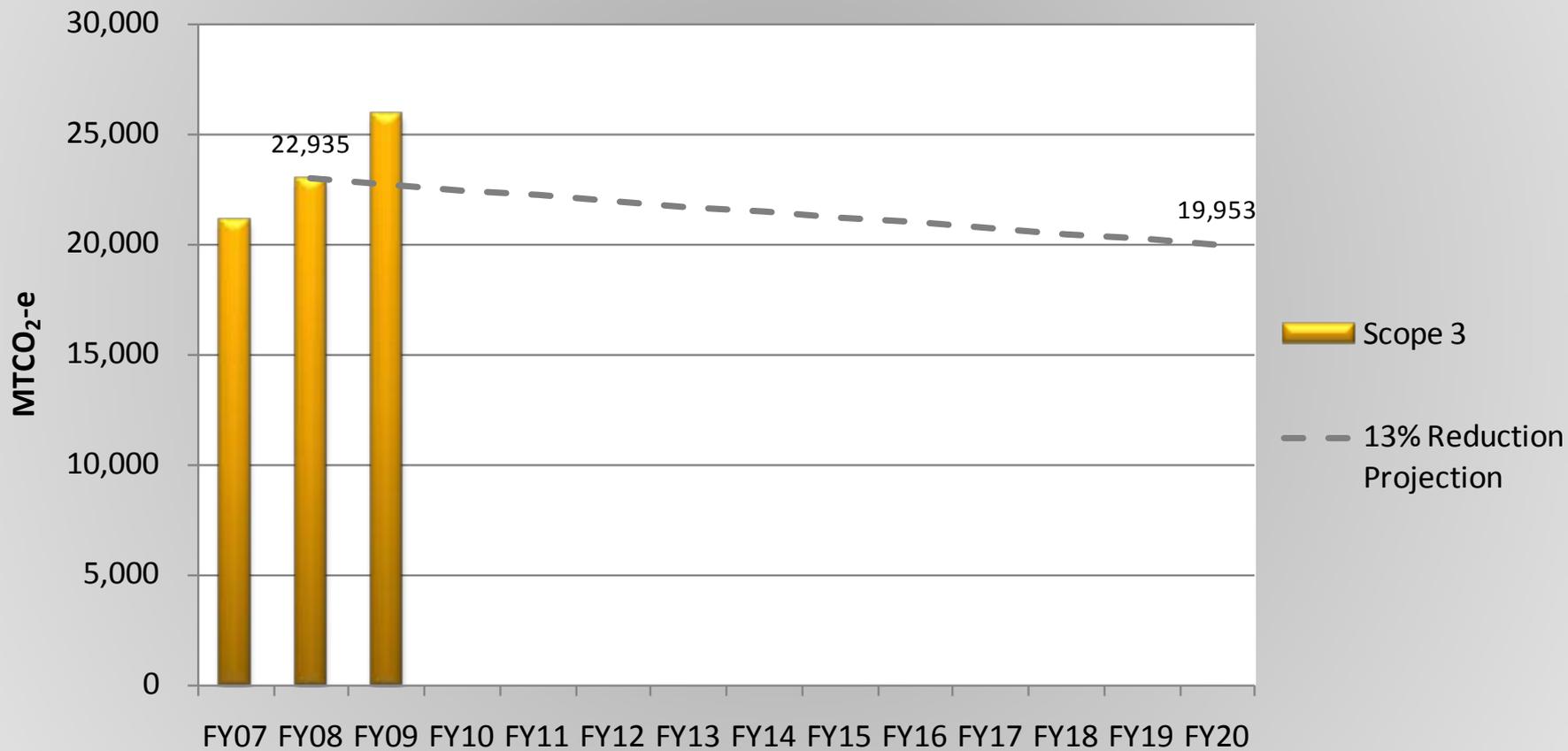
# Emission Reduction Targets: Scope 1 & 2

**PNNL GHG Scope 1&2 Emissions (DOE Facilities)  
DOE 28% Reduction Goal**

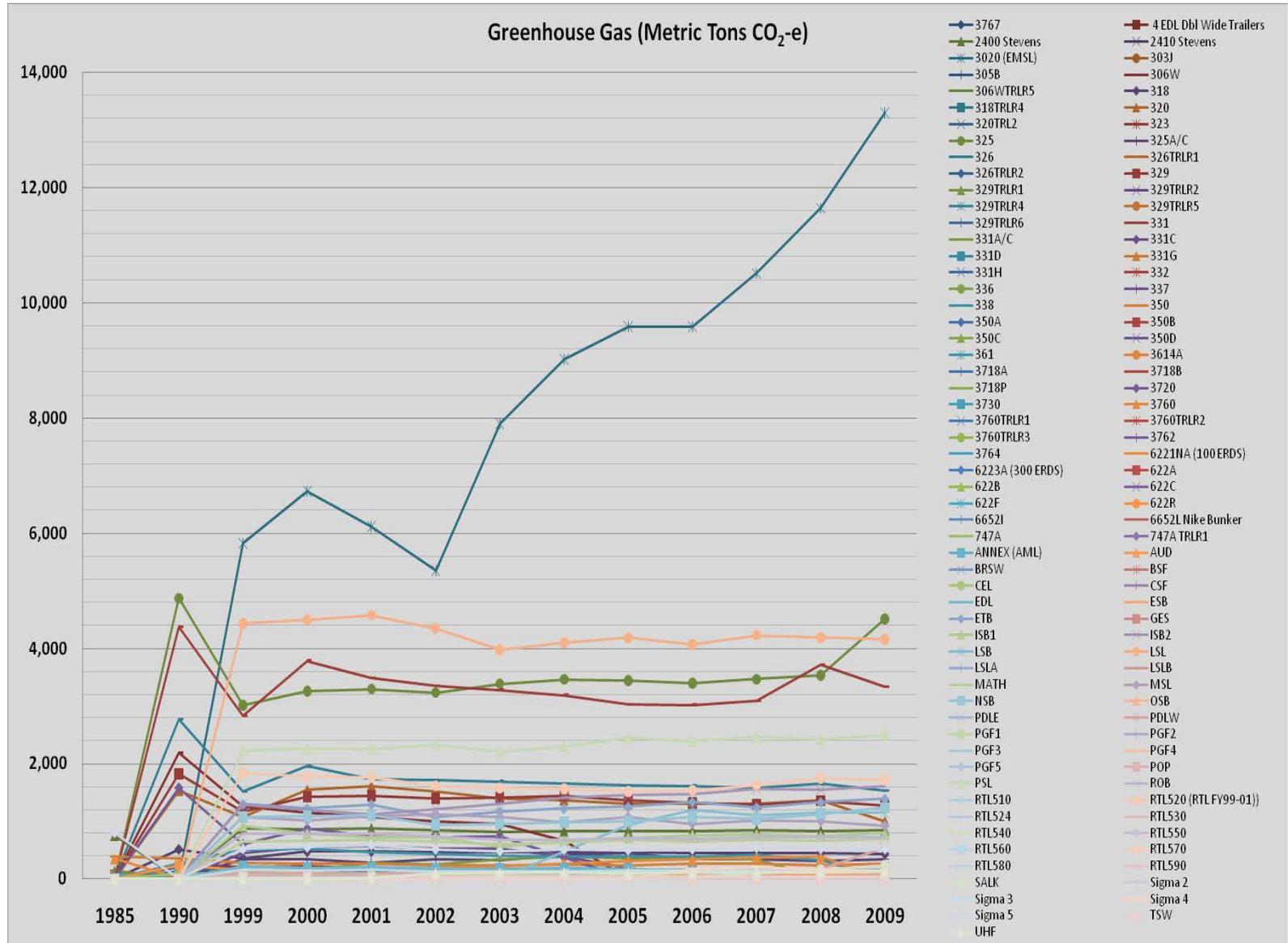


# Emission Reduction Targets: Scope 3

**PNNL Scope 3 Emissions (DOE Facilities)  
DOE 13% Reduction Goal**

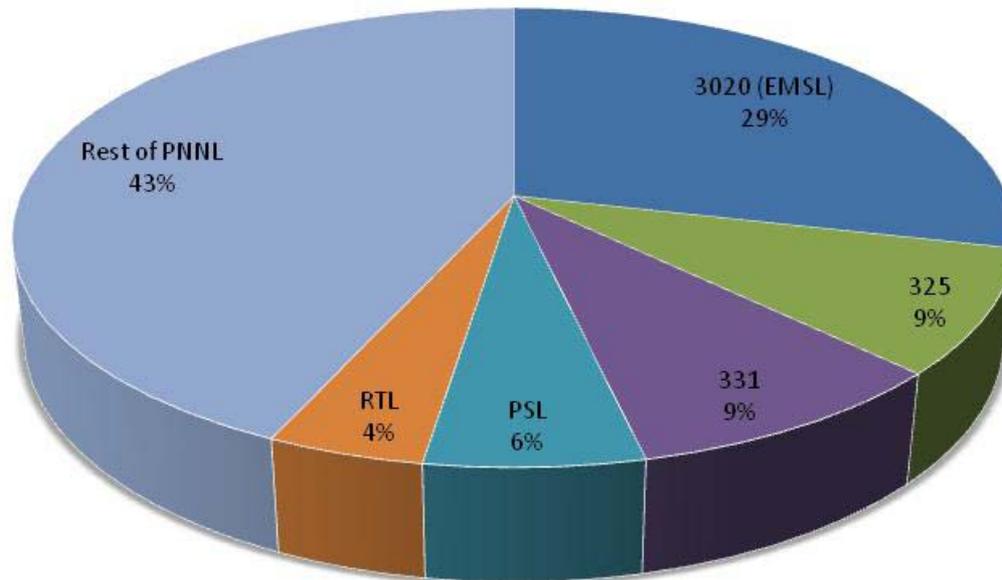


# Identify Emission Reduction Opportunities: Trends by Facility



# Identify Emission Reduction Opportunities: Facilities Baseline

**PNNL's Top 5 Building GHG Emission Sources (FY08 )**



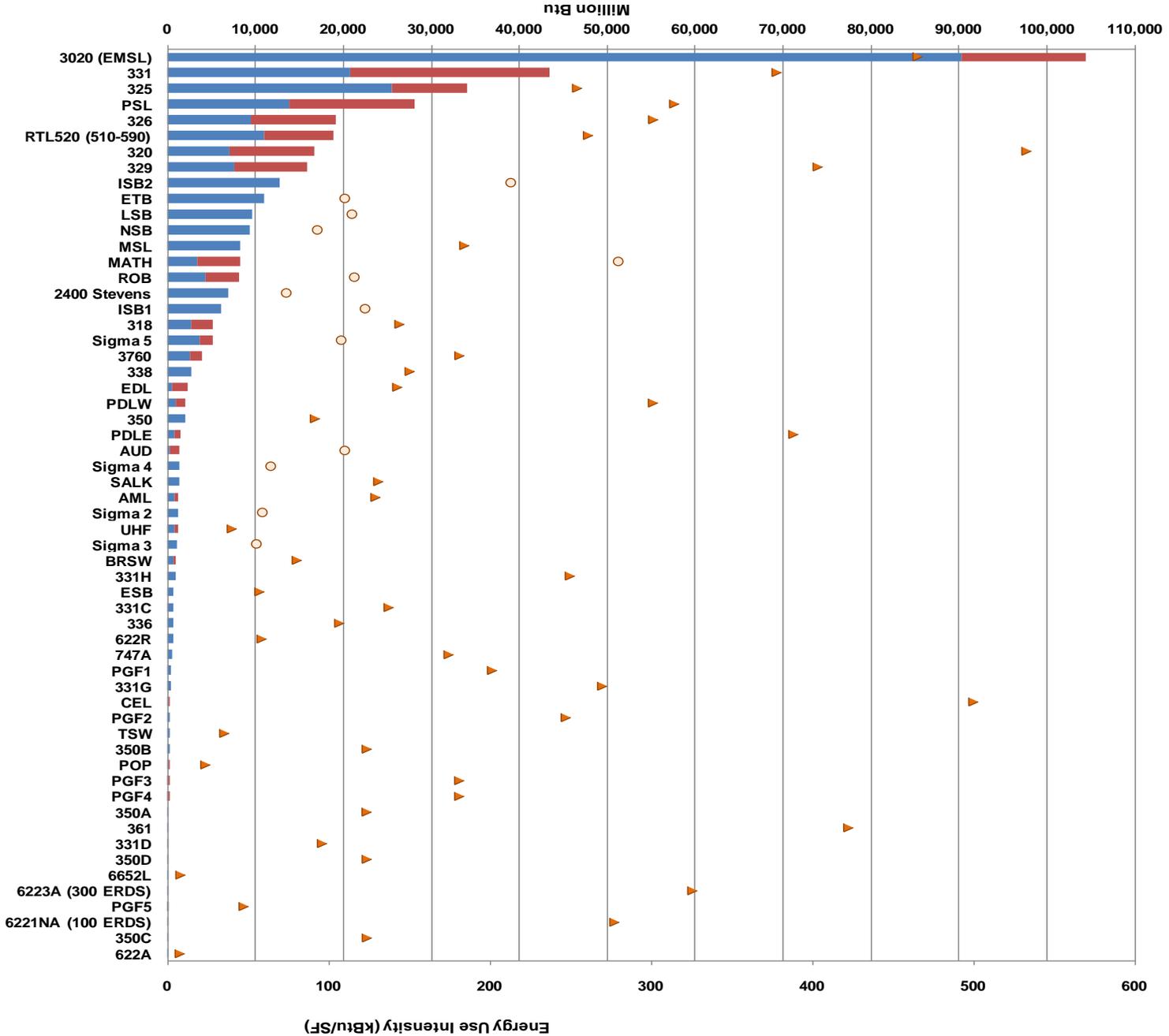
# FY08 Energy Use

Electricity

Natural Gas

EUI Office

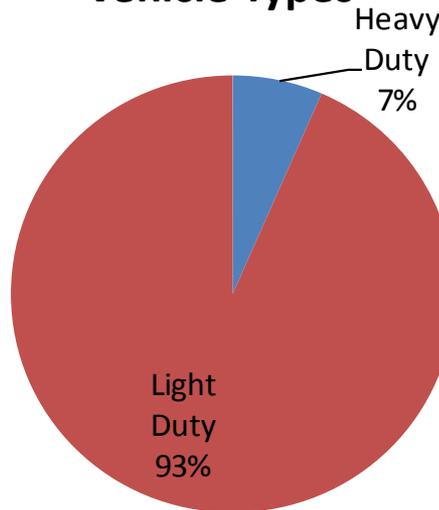
EUI Non-Office



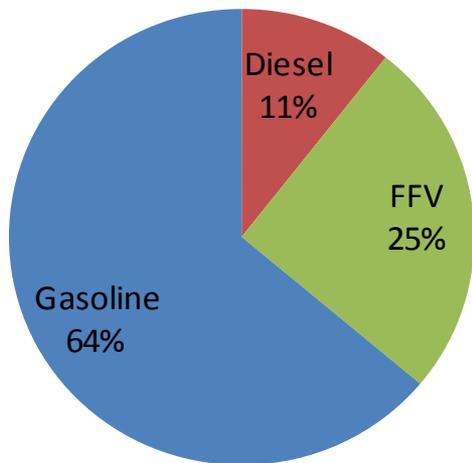
# Identify Emission Reduction Opportunities: Fleet Vehicle Trends

## FY08 PNNL Vehicles (GSA only)

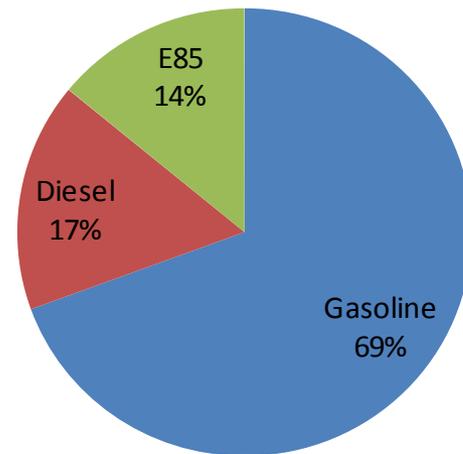
Vehicle Types



Vehicles by Fuel Type

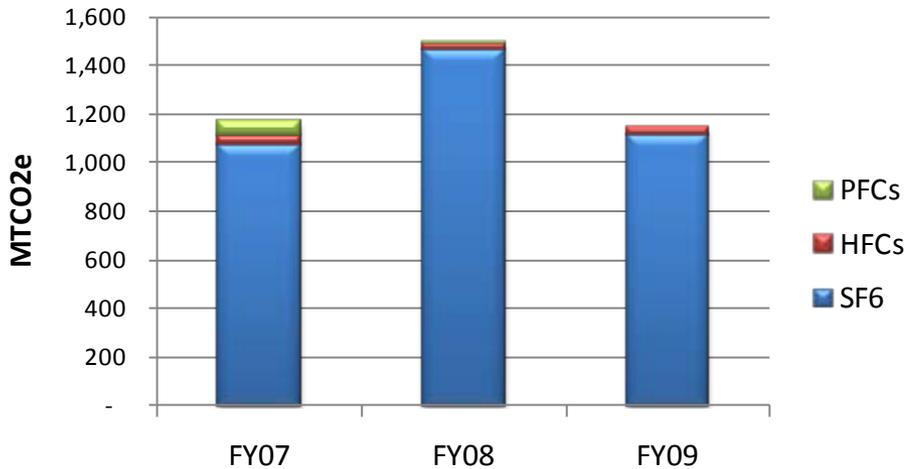


Fuel Consumption



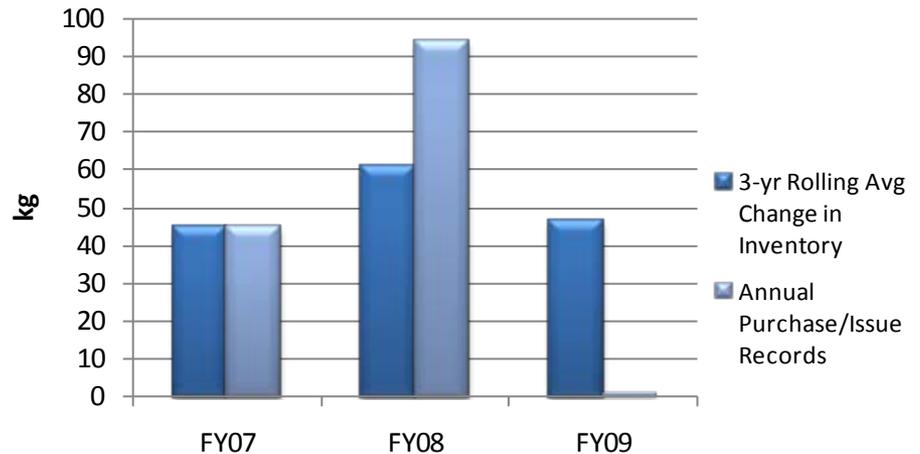
# Identify Emission Reduction Opportunities: Fugitive Emissions

## Fugitive Emissions



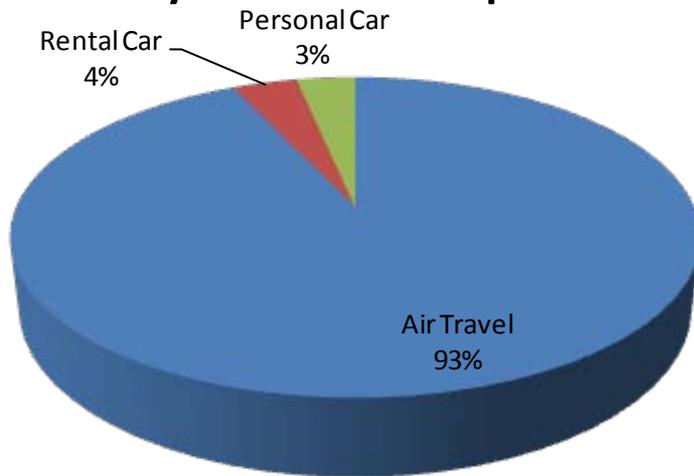
- Used material balance methodology, rather than transaction screening (default)
- Used 3-year rolling average of SF<sub>6</sub> inventory changes to smooth spikes from cyclical purchasing

## SF<sub>6</sub> Usage

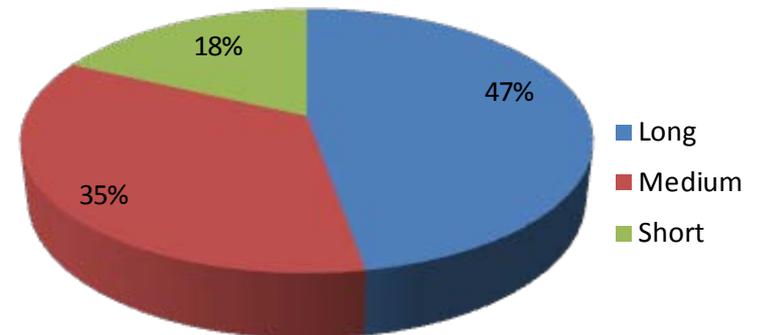


# Identify Emission Reduction Opportunities: Business Travel

**FY08 Business Travel Emissions  
by Mode of Transport**

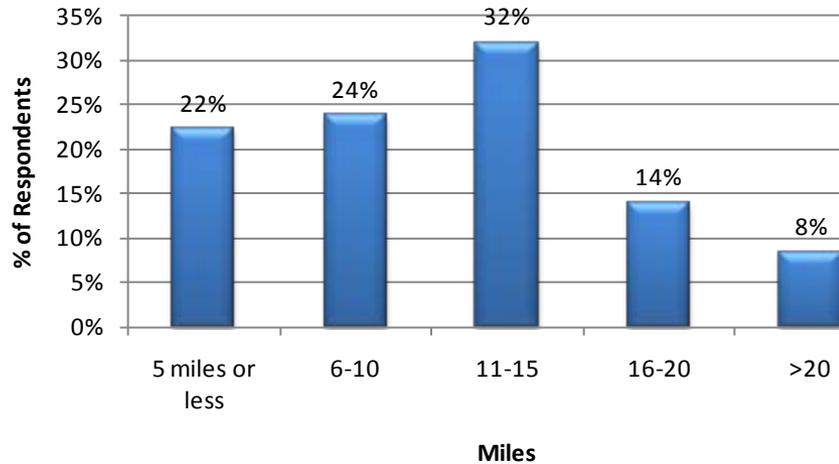


**FY08 Business Air Travel:  
Number of Flights by Type**

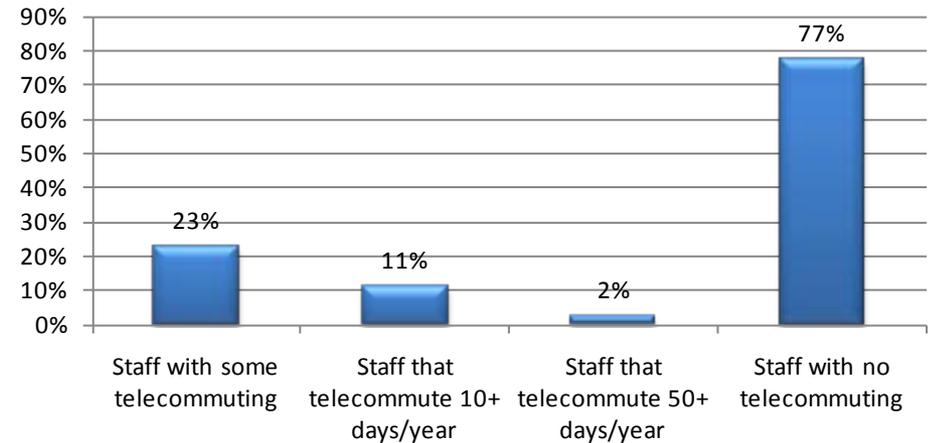


# Identify Emission Reduction Opportunities: Employee Commuting

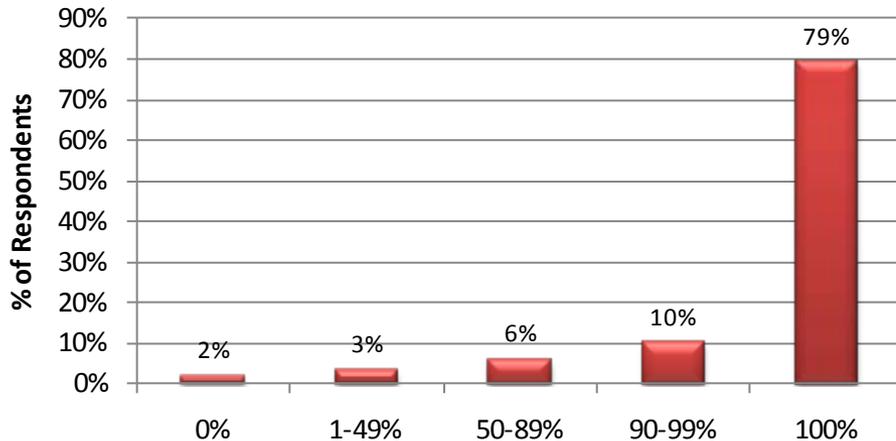
## Avg One-way Commute Distance



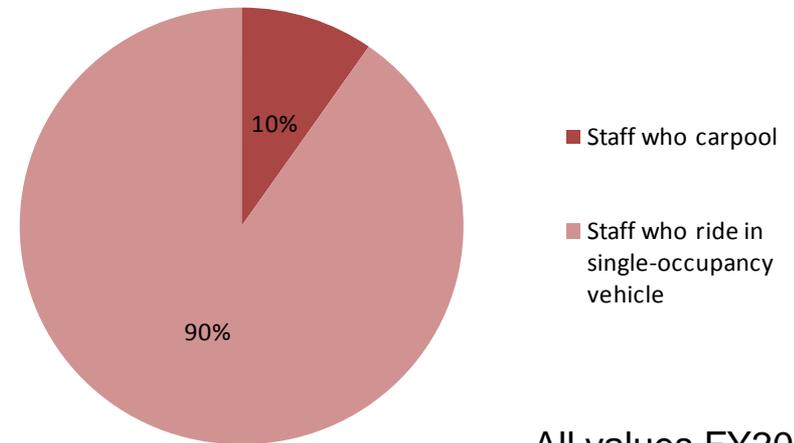
## % of Time Staff Telecommute



## % of Time Staff Commuted by Auto



## Ride-Sharing



# Emission Reduction Strategies: Buildings

Energy Efficiency
Conservation
Renewable Energy

*Strategies defined for different building types*

Category	Strategy Category	Strategy
<b>General Building Strategies</b>		
EE	HVAC	HVAC systems recommissioning
EE	HVAC	Ground source heat pumps
EE	HVAC	Geothermal (water source) cooling
EE	HVAC	Advanced heat reclaim
EE	HVAC	Variable frequency drives
EE	HVAC	High efficiency motors
EE	HVAC	Building Automation System
EE	HVAC	HVAC Upgrade
EE	HVAC	Demand Control Ventilation
CON	HVAC	Adjust temperature for summer months
EE	Lighting	Lighting retrofit
CON	Lighting	Occupancy sensors
CON	Lighting	Dimming/daylighting harvesting
CON	Lighting	Delamping and redesign
EE	Lighting	Energy-efficient high-bay fixtures
EE	Hot Water	Heat Pump Water Heater
EE	Envelope	Cool roofs
EE	Envelope	Roof insulation
EE	Envelope	High performance windows
EE	Envelope	Envelope sealing

Category	Strategy Category	Strategy
<b>Data Center Strategies</b>		
EE	HVAC	Measure and track air temperature and PUE
EE	Computing	Virtualization
EE	Re-arrangement	Consolidation
EE	HVAC	Airflow improvement
EE	Computing	High-efficient computer systems
EE	HVAC	High-efficient cooling technology
<b>Laboratory Strategies</b>		
EE	HVAC	Optimize fume hood air flow
CON	HVAC	Optimize fume hood use
CON	Re-arrangement	Space re-arrangement and scheduling
EE	HVAC	Nitrogen heat exchange
<b>Renewable Energy Strategies</b>		
REN	Generation	Photovoltaic panels
REN	Hot Water	Solar hot water
REN	HVAC	Solar walls

# Emission Reduction Strategies: Buildings

*Each building evaluated for potential to benefit from strategies*

Category	Strategy Category	Strategy	Building Name					
			EMSL		325		318	
			Impact Level	% of bldg	Impact Level	% of bldg	Impact Level	% of bldg
EE	HVAC	HVAC systems recommissioning		100%		100%		100%
EE	HVAC	Ground source heat pumps		100%		0%		0%
EE	HVAC	Geothermal (water source) cooling		0%		0%		0%
EE	HVAC	Advanced heat reclaim		100%		50%		0%
EE	HVAC	Variable frequency drives		100%		0%		50%
EE	HVAC	High efficiency motors		0%		100%		100%
EE	HVAC	Building Automation System		0%		15%		0%
EE	HVAC	HVAC Upgrade		100%		100%		100%
EE	HVAC	Demand Control Ventilation		75%		75%		75%
CON	HVAC	Adjust temperature for summer months		100%		100%		100%
EE	Lighting	Lighting retrofit		0%		40%		20%
CON	Lighting	Occupancy sensors		100%		0%		0%
CON	Lighting	Dimming/daylighting harvesting		80%		0%		50%
CON	Lighting	Delamping and redesign		0%		50%		0%
EE	Lighting	Energy-efficient high-bay fixtures		0%		75%		0%
EE	Hot Water	Heat Pump Water Heater		50%		50%		50%
EE	Envelope	Cool roofs		0%		100%		25%
EE	Envelope	Roof insulation		25%		100%		25%
EE	Envelope	High performance windows		0%		0%		100%
EE	Envelope	Envelope sealing		0%		100%		25%

key

Potential

Complete

N/A

# Emission Reduction Strategies: Buildings

- Developing “climate neutral” campus scenario
- Examining relative impact of emission reduction strategies applied across site

# Emission Reduction Strategies: Scope 3

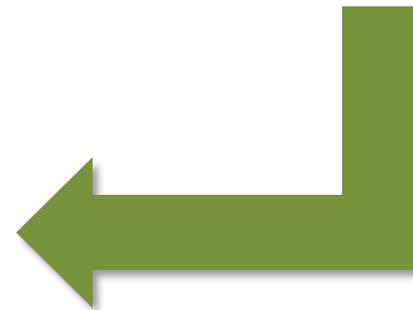
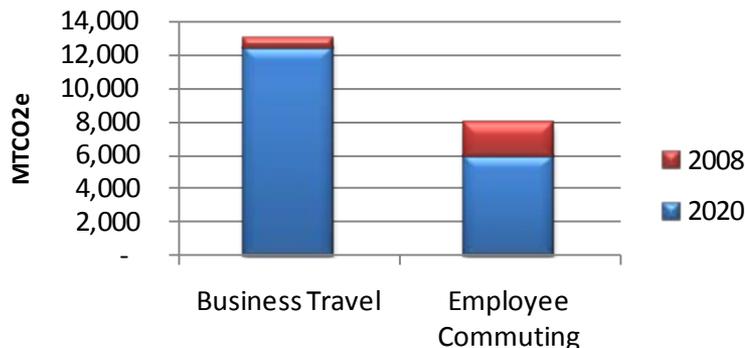
*Strategies defined for Scope 3 categories*

Category	Strategy
<b>Employee Commute Strategies</b>	
CON	Flexible work strategy
CON	Teleworking
CON	Walking and biking
CON	Public transportation
CON	Carpooling and ride shares
<b>Business Travel Strategies</b>	
CON	Encourage tele- and video-conferencing
CON	Consolidate trips
CON	Reduce rental cars



*Case studies evaluated for potential GHG % reductions and applied to PNNL emissions*

**Preliminary Scope 3 Emission Reduction Targets**



# Thank you!

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# Collect Data

Activity Data	Units
Natural gas	Therms (Btu)
Propane	gallons
Gasoline	gallons
E85	gallons
Diesel	gallons
SF6	inventory additions
HFCs/PFCs	estimated use (lbs) by type
Purchased electricity	MWh by eGRID subregion
Renewable energy certificate purchases	MWh by eGRID subregion where generated
Commuting	miles traveled by mode (bus, car, etc)
Business travel: air	miles traveled
Business travel: ground	reported mileage in personal cars; estimated mileage in rental cars
Waste disposal	short tons by waste type and disposal method (e.g. compost, landfill, recycle)
Wastewater treatment	number of employees
Transmission & Distribution losses	MWh by eGRID subregion



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**Randy Overbey**

*Oak Ridge National  
Laboratory*



Oak Ridge National Laboratory  
Sustainable Campus Initiative  
The Context for GHG Management

# Oak Ridge National Laboratory *A Significant Footprint*

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- Staff: 4,600
- Guest researchers: 3,000 annually
- Short-term visitors: 17,000 annually
- Annual funding: \$1.4 billion
- Reservation: 34,000 acres
- Facilities: 4,256,064 square feet on 4,400 acres of land
- Supported by a dedicated fire department, medical center, and security force.
- Extensive utilities with both centralized and distributed systems.



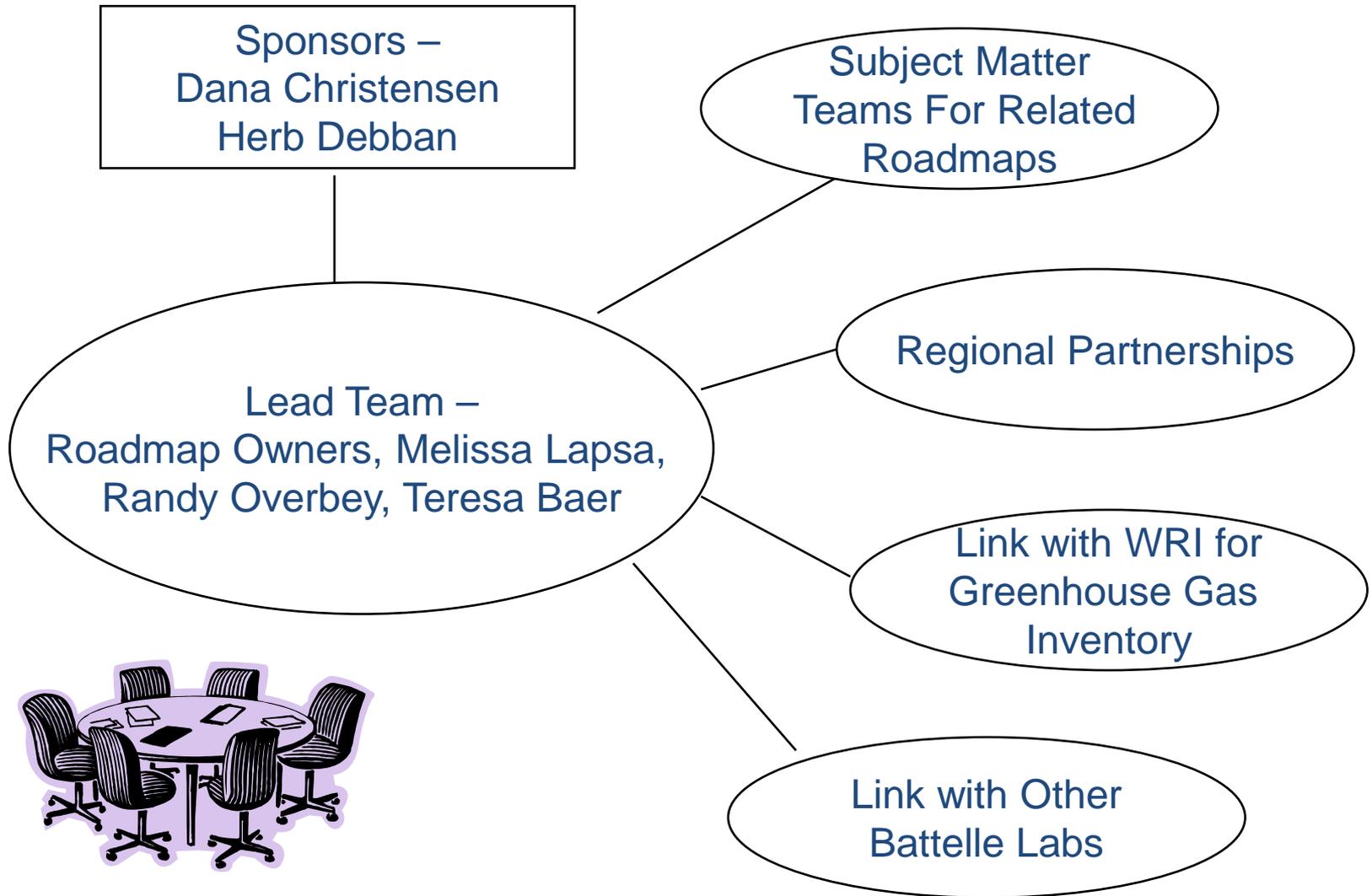
Sustainable Campus Initiative  
The Context for Greenhouse Gas  
Management

# Oak Ridge National Laboratory's Sustainable Campus Initiative

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- ❑ ORNL's goal is to achieve benchmark sustainability
  - in campus operation and
  - in research, development and deployment of key technologies
  
- ❑ Time frame - Ten years (2018) with heavy front-end loading
  
- ❑ Sponsored and advocated by Executive Leadership
  
- ❑ Focus on integration of operations and research

# Deployment



# Sustainable Campus Initiative Elements

**Facilities & Land**



**Transportation**



**Utility Infrastructure**



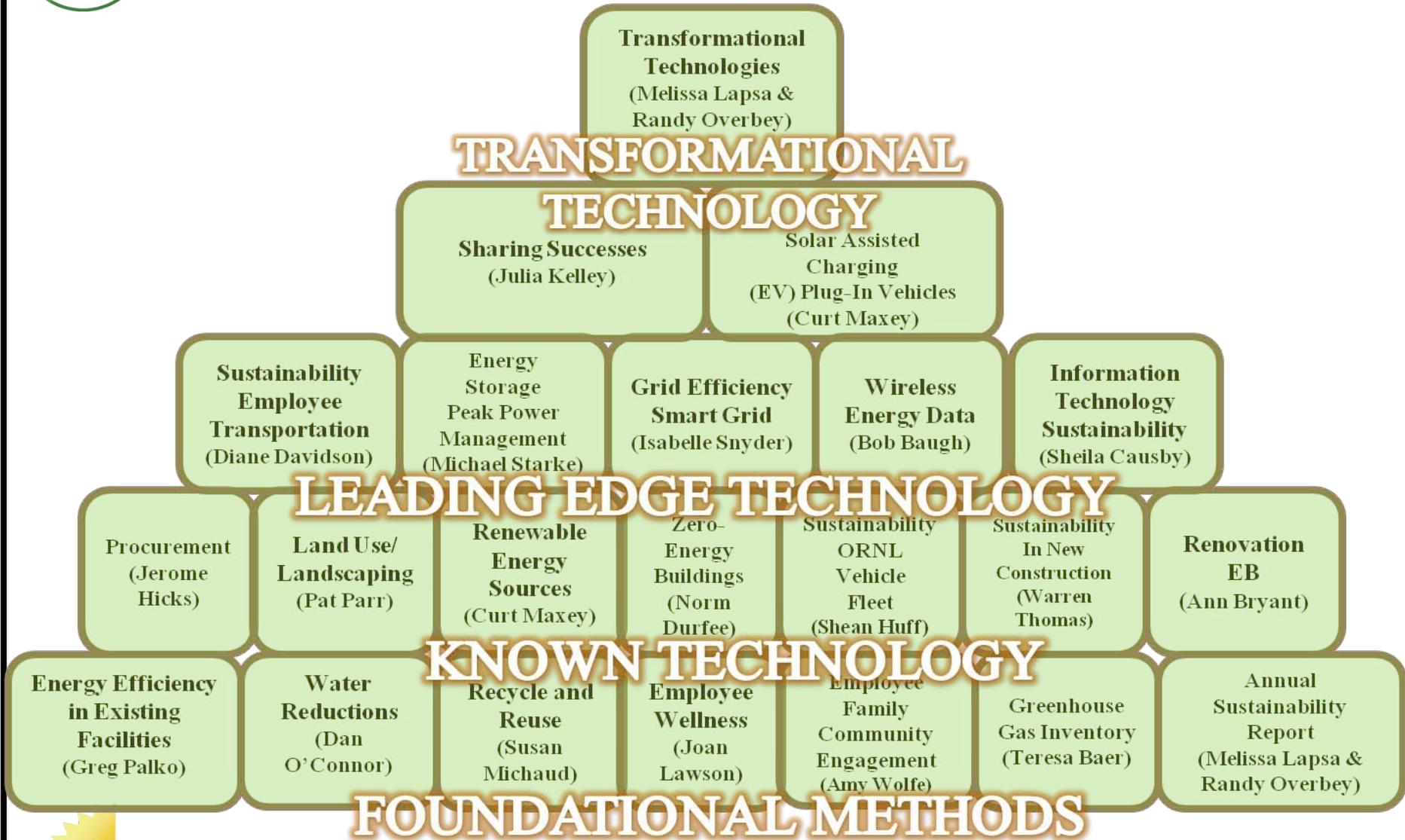
**Transformational**



**Waste**



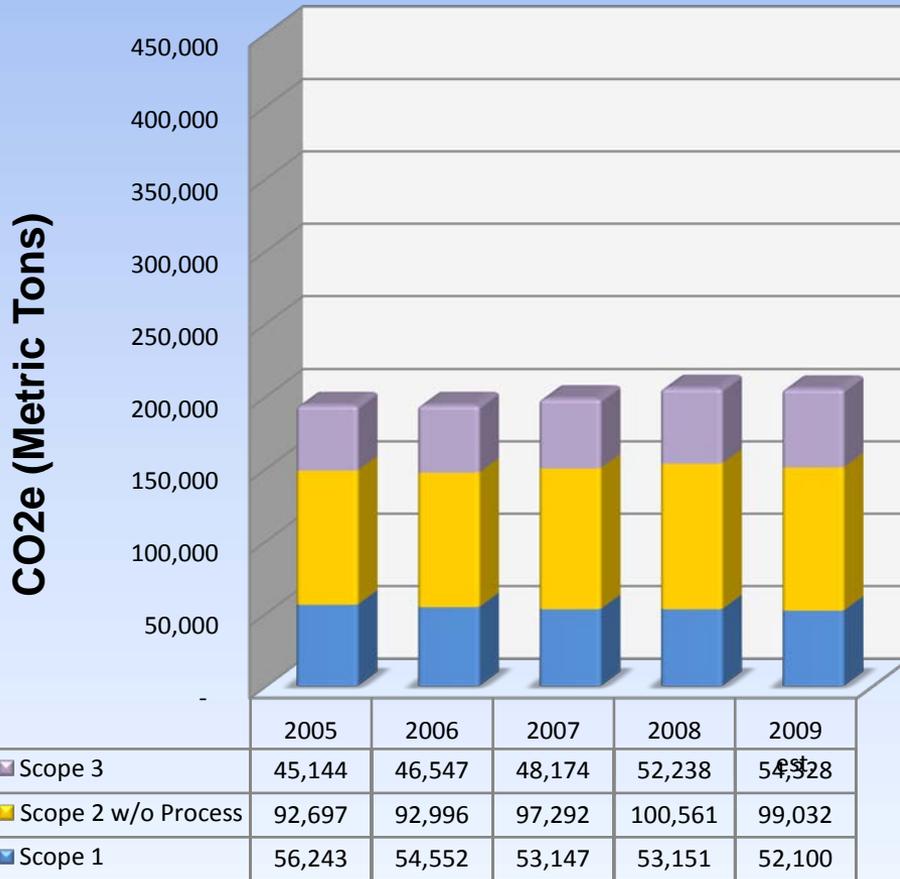
**Employees & Systems**



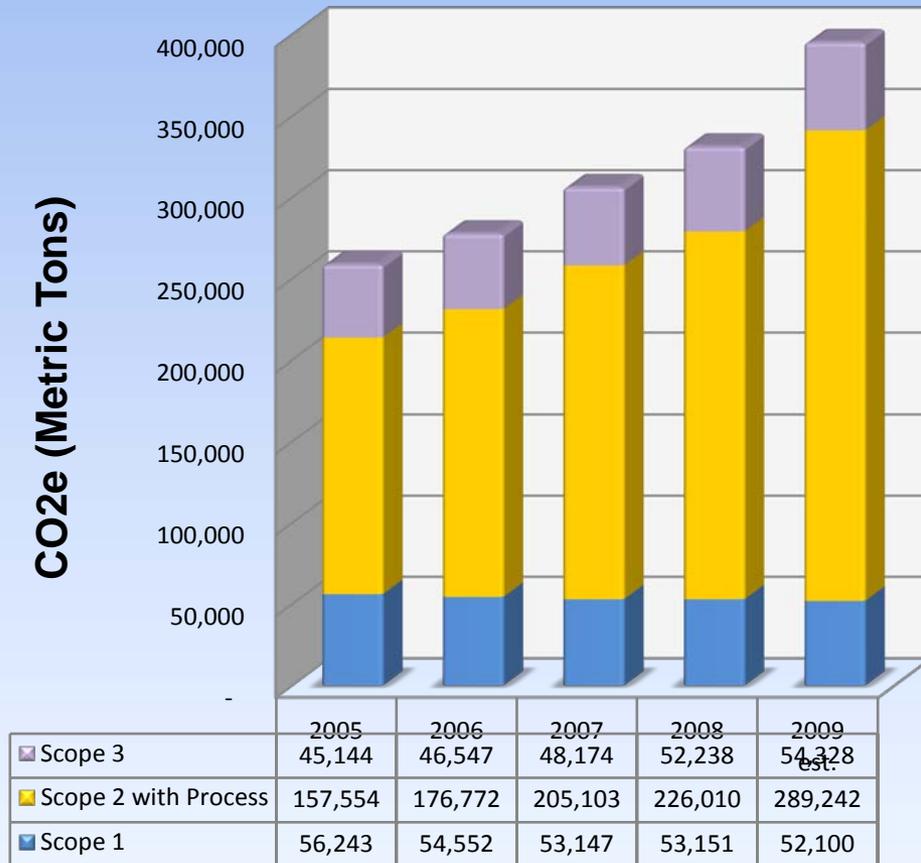


- 1. Used Public Sector Protocol in cooperation with FEMP and WRI**
- 2. Completed inventory for FY05 through FY09**
- 3. Covered all three scopes for all years**
- 4. Scope 3 included employee commuting, business travel, waste hauling, and visitor travel to campus**

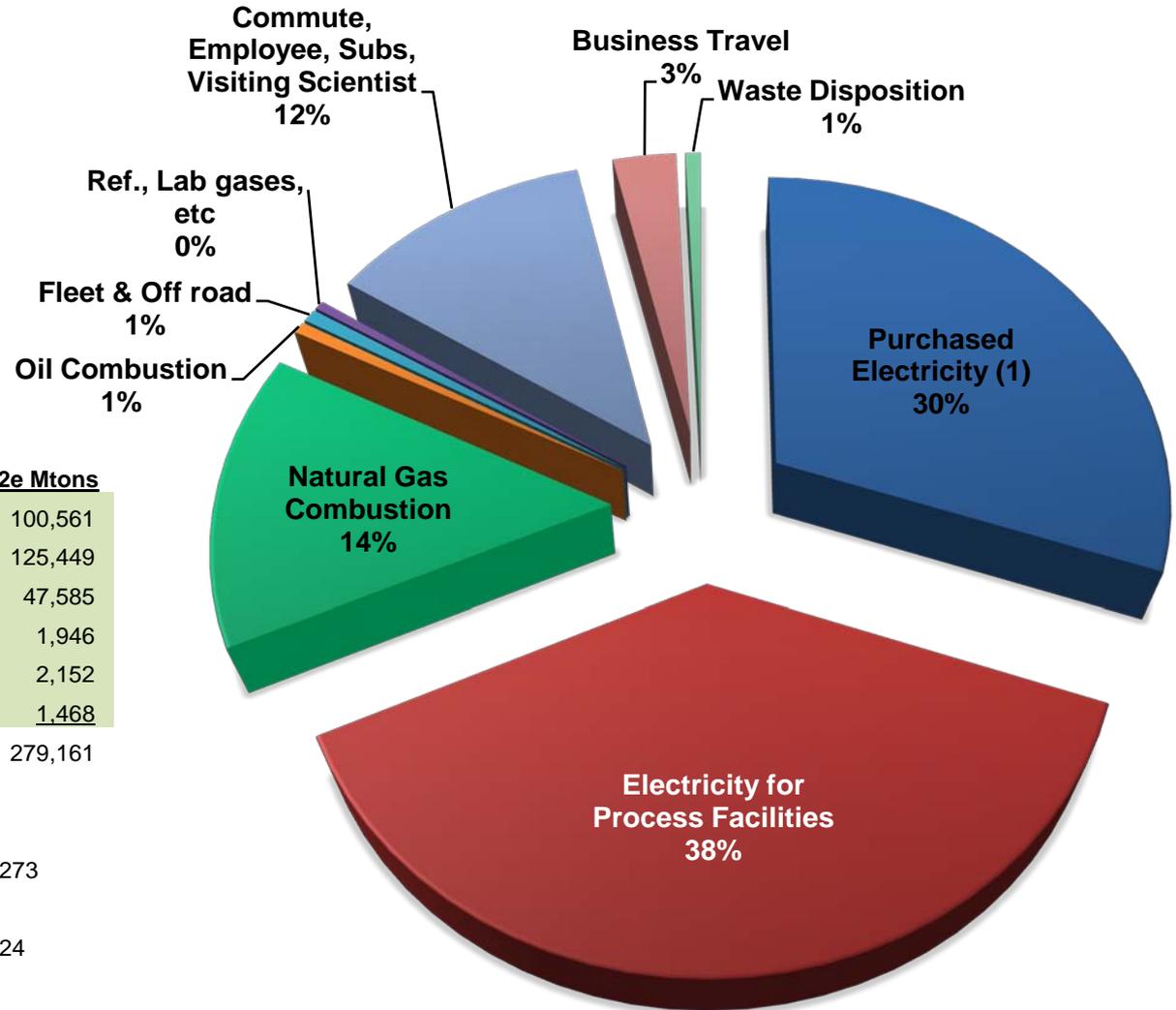
## Scope 1, Scope 2, and Scope 3 Emissions Without Process Facilities



## Scope 1, Scope 2, and Scope 3 Emissions Including Process Facilities Growth



The ORNL Team Used WRI GHG Protocol, Public Sector Standard to calculate emissions and document data



Scope	FY 2008	CO2e Mtons
2	Purchased Electricity (1)	100,561
2	Electricity for Process Facilities	125,449
1	Natural Gas Combustion	47,585
1	Oil Combustion	1,946
1	Fleet & Off road	2,152
1	Ref., Lab gases, etc	1,468
	Scope 1 & Scope 2 Total	279,161
3	Commute, Employee, Subs, Visiting Scientist	40,273
3	Business Travel	9,724
3	Waste Disposition	2,341
	Scope 3 Total	
	<b>Total All Scopes</b>	<b>331,499</b>

Details of FY2008 Emissions as a % of all Sources

## Facilities & Land



## Transportation



## Utility Infrastructure



**GHG Reductions**



## Transformational

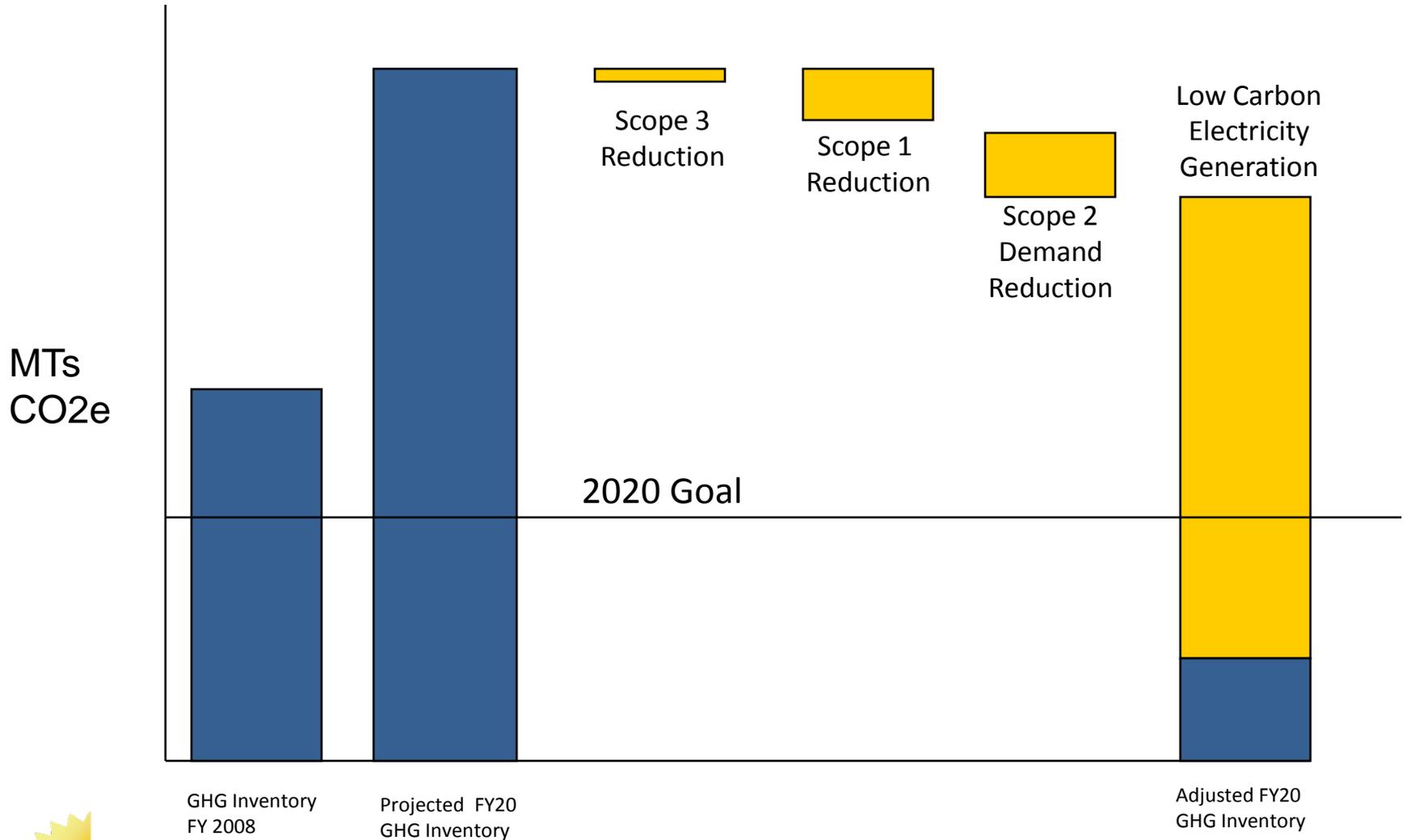


## Waste



## Employees & Systems

# Greenhouse Gas Reduction Plan 2008 vs. 2020

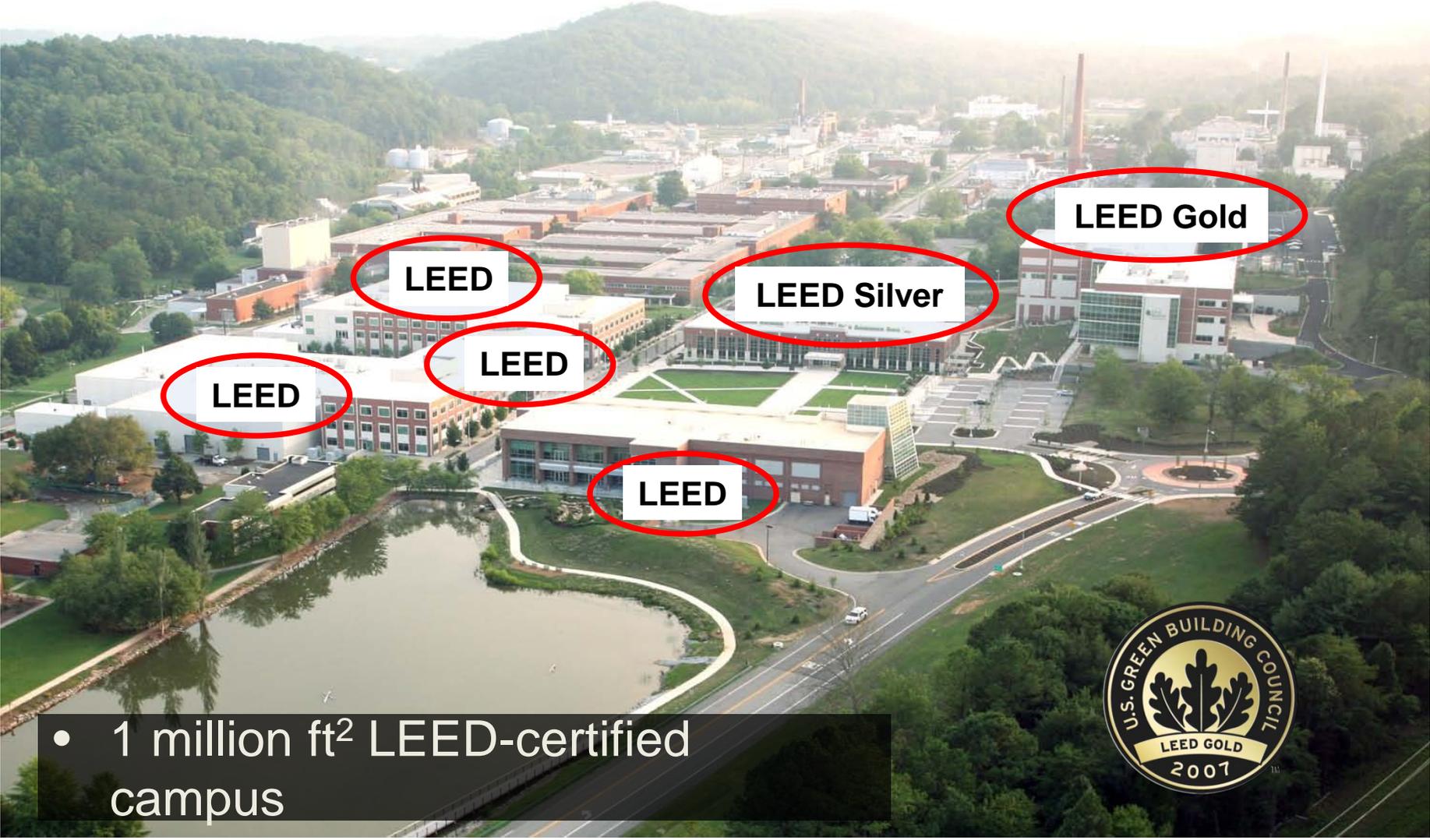


## Key Examples

Projects Positively Impacting  
Greenhouse Gas Inventory



- 1. High Performance Buildings**
- 2. Energy Audits for Existing Facilities**
- 3. Net-Zero Energy Buildings**

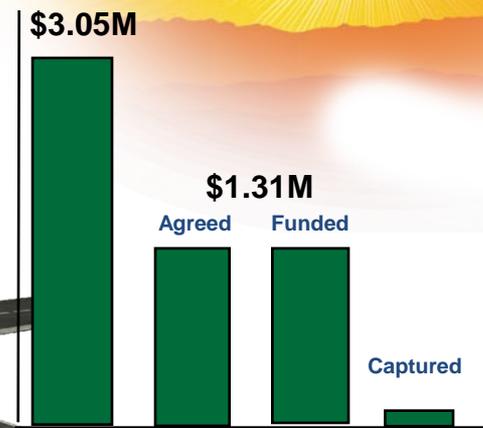


- 1 million ft<sup>2</sup> LEED-certified campus



**Energy  
Efficient  
Facilities**

**Energy Savings Opportunities**



**Key Accomplishment**

Establish  
Audit  
Protocol  
Aug 2009

Audit 25%  
Campus  
facilities  
Sep 09

Fund  
Targeted  
ECMs  
Nov 09

Complete  
targeted  
ECMs  
Sep 10

Repeat  
Cycle  
Annually

**Energy Audits  
for Existing  
Facilities**

**EO 13514:**  
 ❖ 15% HPS- EB by 2015  
 ❖ Reduce building energy intensity to reduce GHG  
 ❖ 20% non-potable reduction by 2020 vs 2010  
 ❖ 26% potable intensity reduction by 2020 vs 2007

**FY 10 Deliverables:**  
 ✓ Secure funding for approved FY09 ECMs  
 ➤ Implement and track ECMs to closure  
 ✓ Establish audit schedule  
 ➤ Establish audit contract for FY10  
 ➤ Conduct FY10 Audits and establish ECMs

The Johnson Controls ESPC is an Investment of \$89M with estimated annual savings of \$8M for an aggregate simple payback of 12.78 years.

The ESPC will help meet Executive Order requirements and reduce greenhouse gas emissions while modernizing the utility infrastructure.

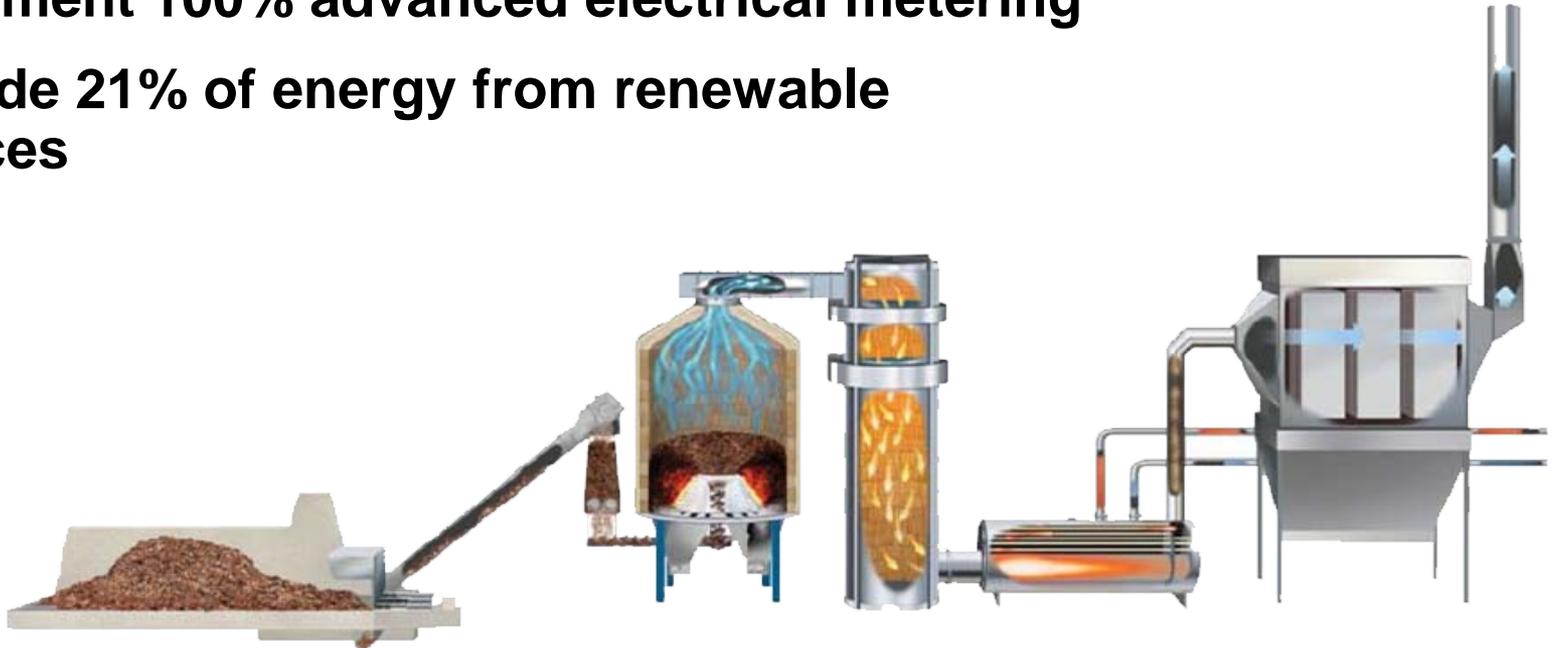
### Energy Conservation Measures include:

- Conversion to Biomass Steam Plant
- Steam Decentralization of Remote Buildings
- Building Management System Upgrades
- Advanced Electric Metering
- Comprehensive HVAC Upgrade
- Energy-Efficient Lighting Upgrade
- Water Conservation



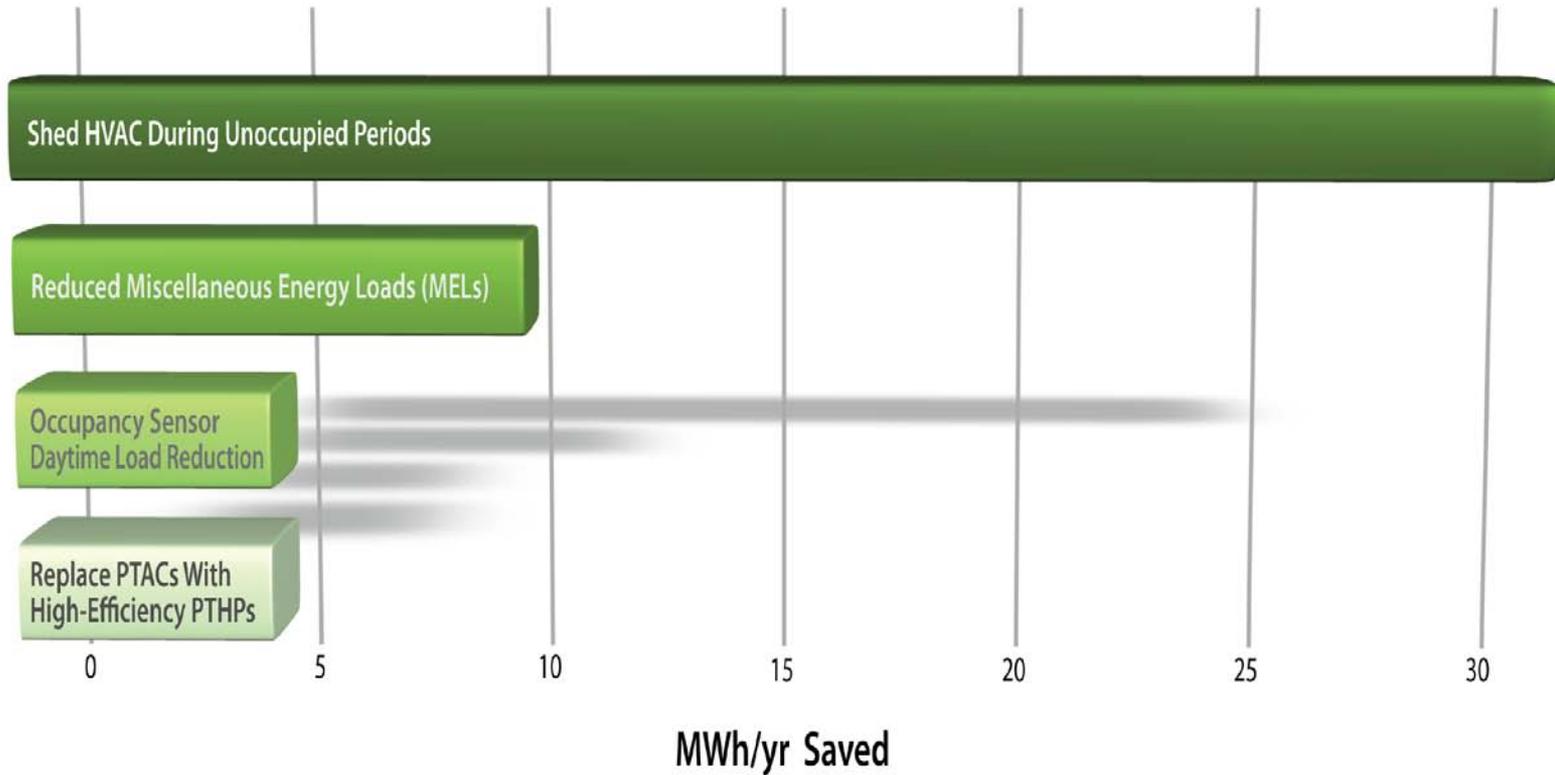
The new biomass-fueled boiler will produce 60,000 pounds of steam per hour. Combined with the Cleaver-Brooks super boiler nearly eliminating the Lab's fossil fuel consumption.

- **Reduce fossil fuel use by >85%**
- **Reduce water use by 170M gallons per year**
- **Reduce energy intensity by 50%**
- **Implement 100% advanced electrical metering**
- **Provide 21% of energy from renewable sources**



**Steam Biomass Plant**

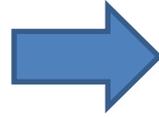
### NZEB: 3156 Energy Reduction Measures



# DOE's first net-zero energy building, first retrofitted NZEB commercial building



IT computer power settings, central printers and smart power strips: 10 MWh/yr saved



New PTHPs: 5 MWh/yr saved



Occupancy Sensors:  
Day time savings of 5  
MWh/yr saved



Solar PV array:  
Provides 50 MWh/yr  
**GovEnergy 2010**



Building 3156 reaches net-zero energy  
Consumption reduced from 100 to 50  
MWh/year, solar provides remaining  
demand

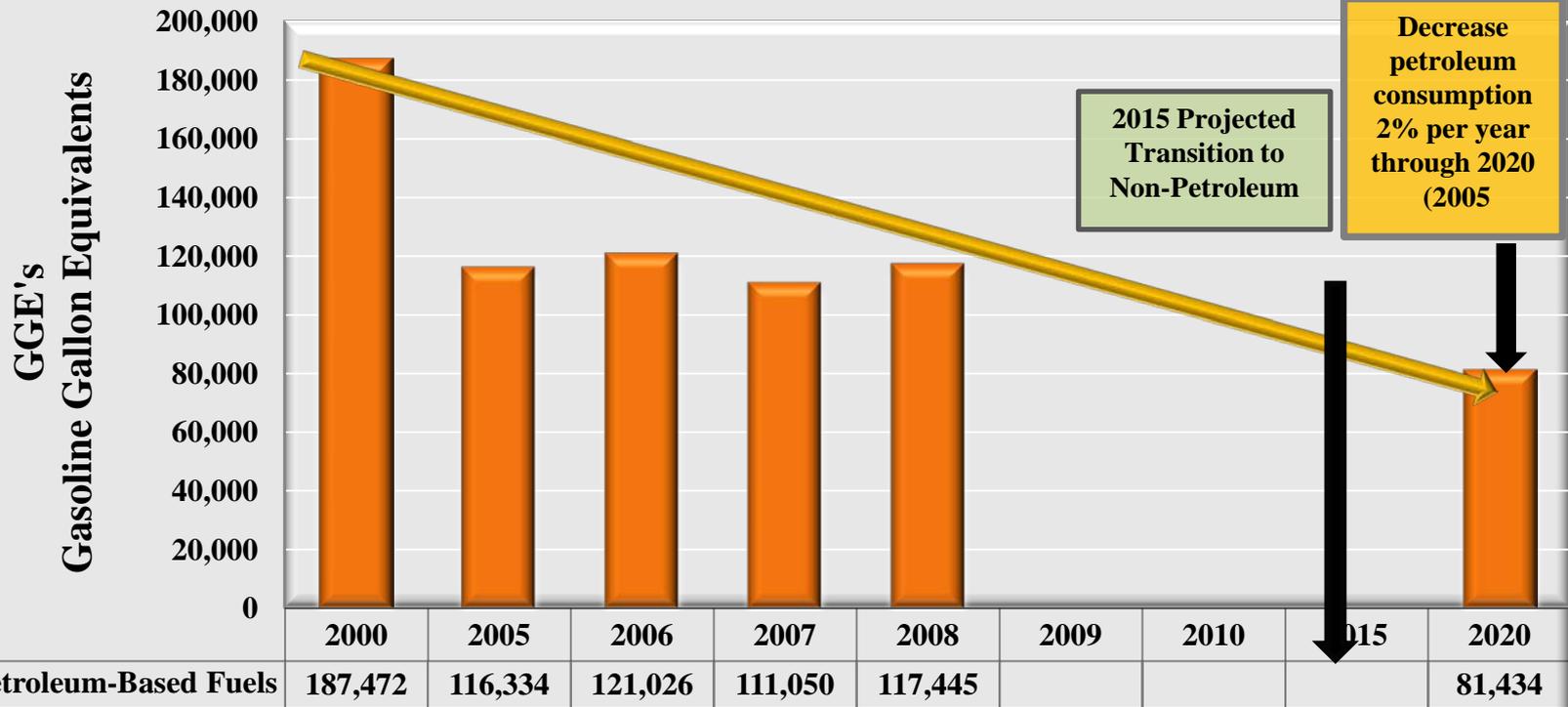


New Metasys: HVAC  
Shed during unoccupied  
periods, 30 MWh/yr saved



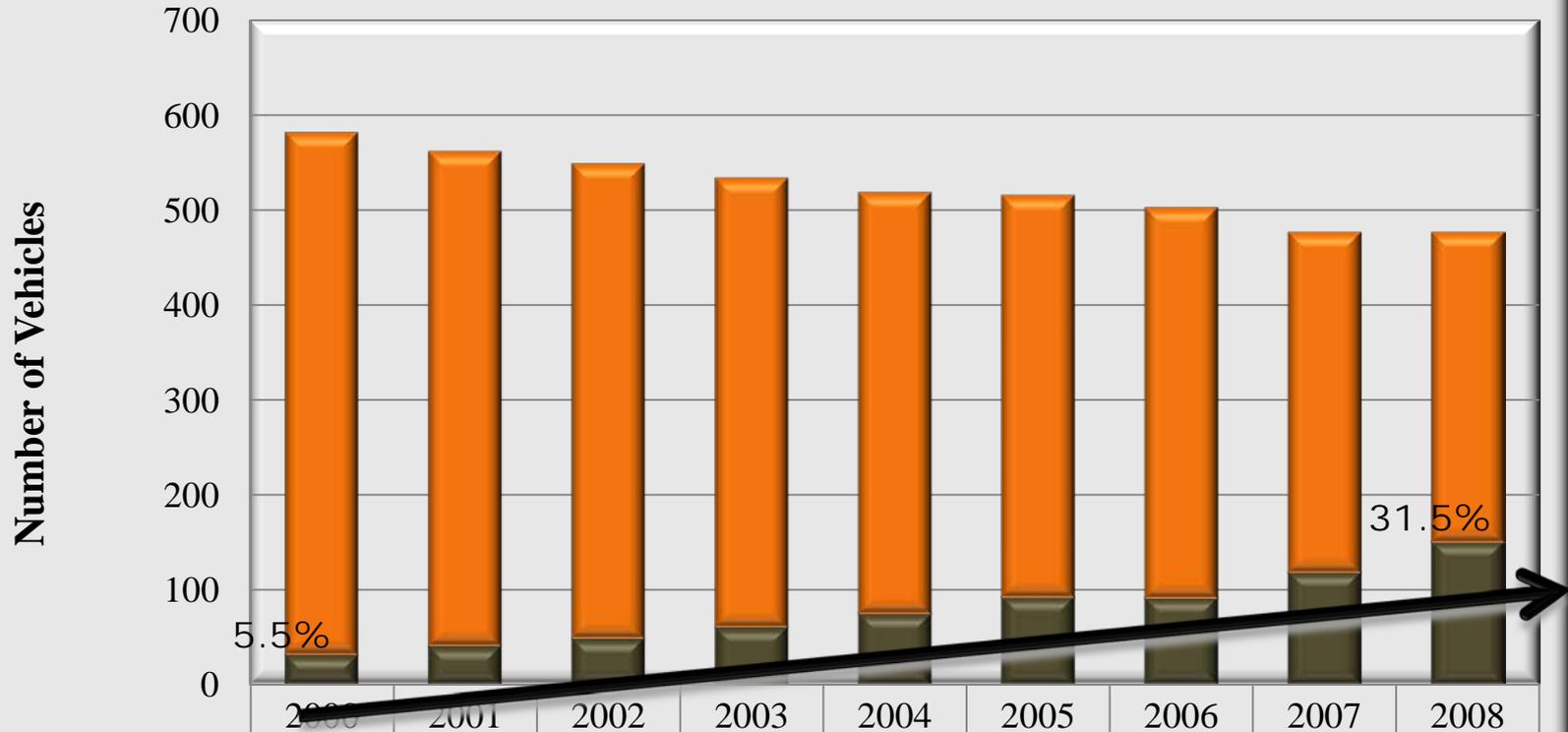
- 1. Sustainability in the ORNL Vehicle Fleet**
- 2. Sustainability in Employee Transportation**
- 3. Solar-Assisted Charging with EV**

**Petroleum Fuel Consumption - Fleet**



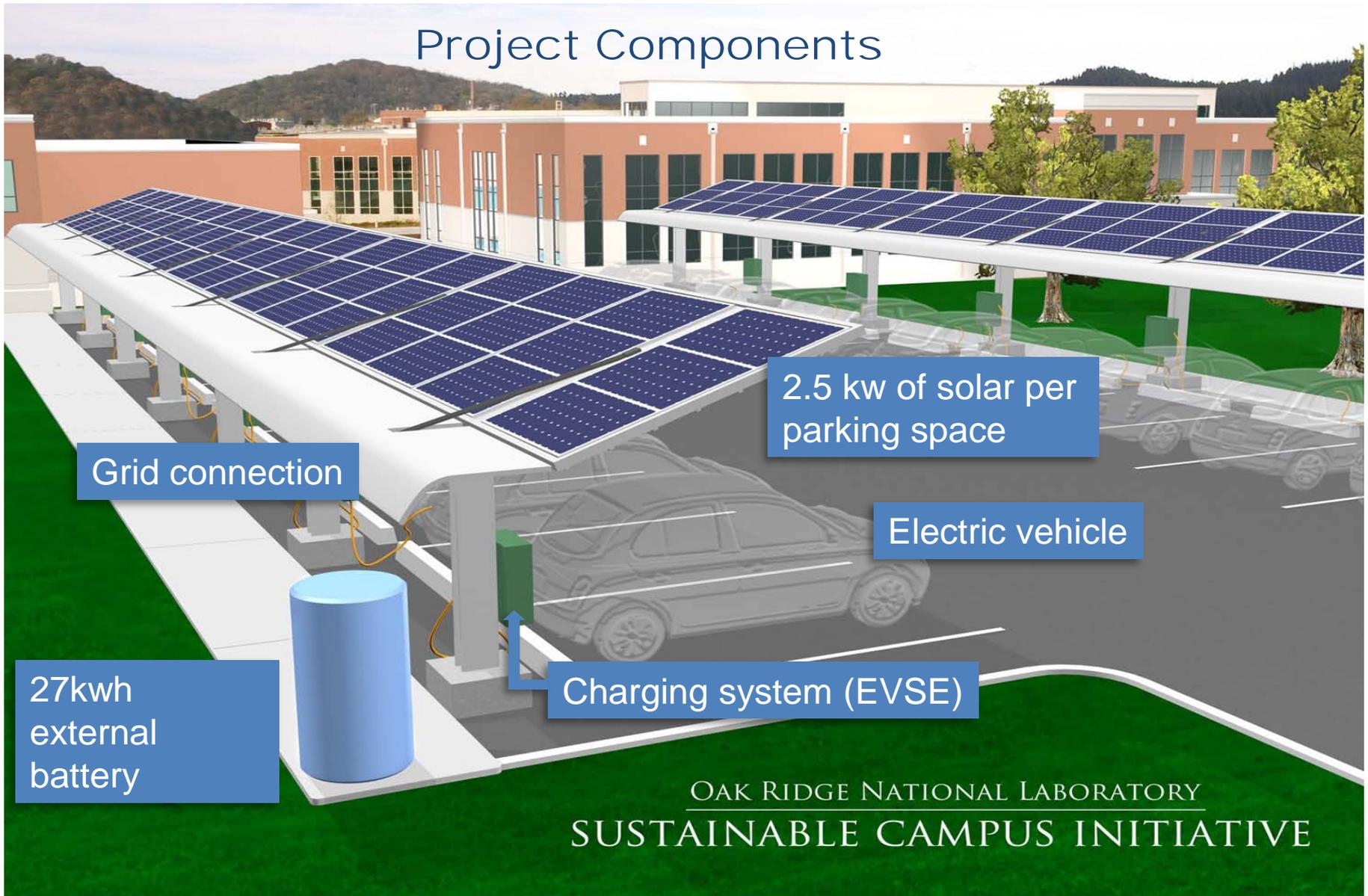
Actual
Projected
SCI Goal
EO 13514
EO 13423

**Vehicle Inventory**



	2000	2001	2002	2003	2004	2005	2006	2007	2008
Traditional Inventory	549	520	499	472	443	423	411	358	326
Alternative Inventory	32	41	49	61	75	92	91	118	150

# Project Components



Grid connection

2.5 kw of solar per parking space

Electric vehicle

Charging system (EVSE)

27kwh external battery

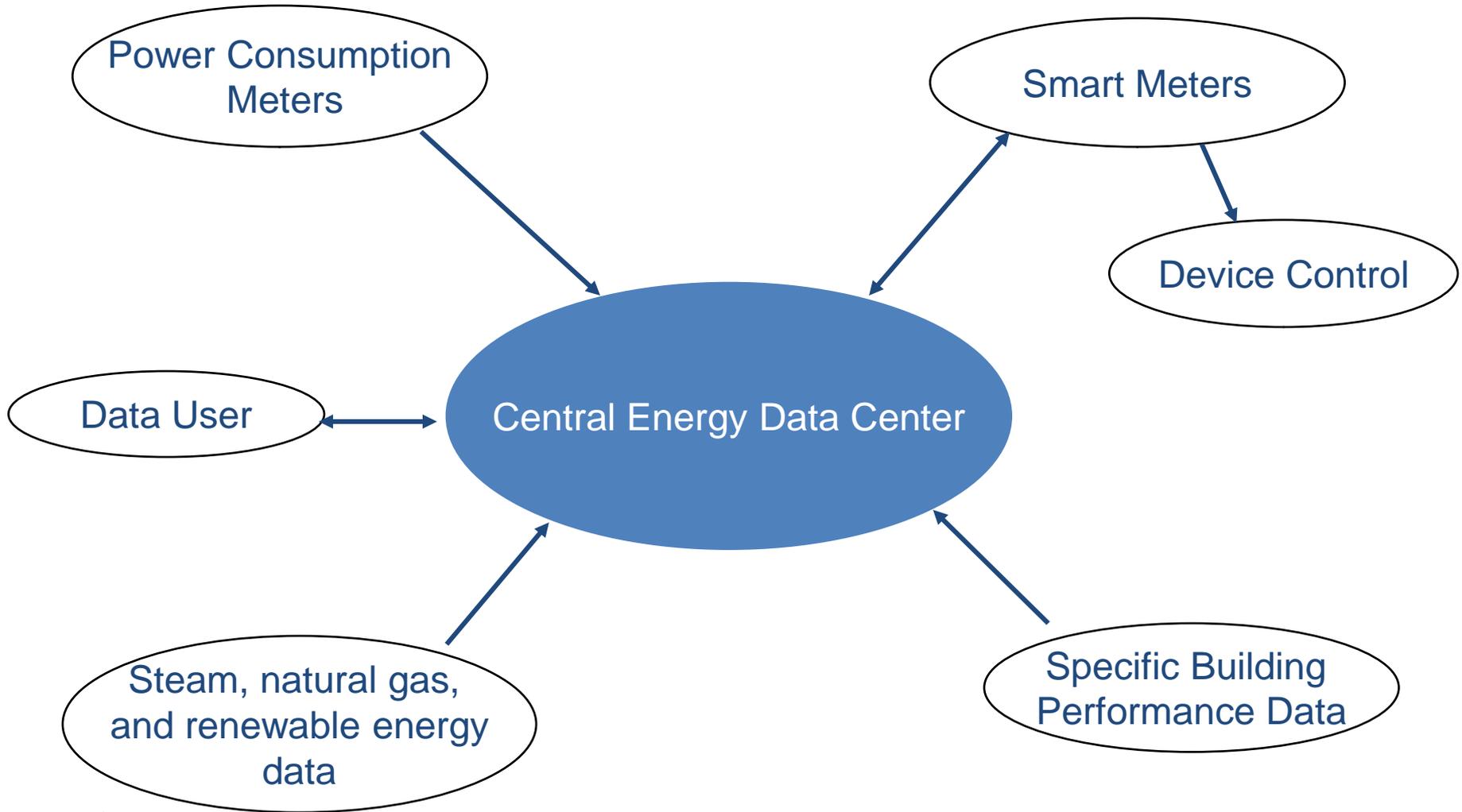
OAK RIDGE NATIONAL LABORATORY  
SUSTAINABLE CAMPUS INITIATIVE





- 1. Grid Efficiency, Smart Grid**
- 2. Energy Storage and Peak Power Management**
- 3. Wireless Energy Data**
- 4. Low Carbon Energy Sources**
- 5. Water Management**

# Common Architecture for Energy Data





- 1. Employee, Family, and Community Engagement**
- 1. Information Technology**
- 2. Green Procurement**



View All Site Content

## Lists

- Winners of Earth Day Contests

## Home

About Sustainable Campus Initiative

## Lessons Learned

Questions, Comments, Ideas

- Information Exchange
- Questions

## Resources

Contacts

Webmaster

Disclaimer



The Sustainable Campus for the Year 2018 Initiative is an Oak Ridge National Laboratory-wide effort. It builds upon ORNL's strength as a premier science and technology organization in integrating energy efficiency, robust and cutting-edge technologies, operational and business processes, and behavior to achieve sustainability. A recent [presentation](#) describes the goals and components of this ORNL initiative.

Sustainability embodies how we make choices in business practices; environmental stewardship, safety, and health; and employee, family, and community engagement. These choices run the gamut from using cutting-edge technologies to such simple actions as turning lights off when leaving a room, participating in work and community recycling programs, and buying [environmentally friendly products](#). Making these choices in a sustainable way increases our options for the future while meeting our needs today.

ORNL strives to be a sustainability leader by embracing sustainable practices and using our enormous expertise to help interested individuals, communities, commercial and industrial facilities, and the nation. Everyone at ORNL can participate in achieving this goal. By doing so, we also can benefit personally and improve our communities.



### R&D Initiatives

ORNL is leading the way in sustainability research and development in several key areas...



### Campus Facilities & Operations

Information on campus sustainability progress throughout ORNL's facilities and operations...



### Your Sustainability

Information to help you obtain sustainability at work, at home, and in your community...

**Learn about sustainability and win up to \$2500! Details at right.**

### Education

Details [here](#) on how to win gift cards by completing SEEC sustainability learning modules. **The seventh module, Reinventing the Wheels – about environmental transportation options, is now available.** Click [here](#) to access all modules.

### Moving Toward Sustainability



Staff working in Building 1509 (shown above) recently piloted a new ORNL recycling program for offices.

Read about [recycling](#) at ORNL, including details about what can and what cannot be fed to the ORNL paper recycling bins. Then check [this report](#) on a "dumpster dive" undertaken to see if ORNL's recycling programs are effective.

### Winners of \$ 50 SEEC gift cards announced!

Click [here](#) to see the list of 80 ORNL staff members who had completed the first four SEEC modules by May 31 and had their names drawn to win \$ 50 gift cards. Eighty individuals who have completed modules 1-7 by August 31st will win \$75 gift cards in early September. Read the [details](#) about how you, too, can be a winner.

### Information Exchange

Share and discuss your [Comments, Ideas, & Expertise](#) about working toward sustainability. Let others know about your successes, frustrations, and failures.

### Questions

Ask [Questions](#) to learn about ORNL's efforts to move toward sustainability.

**Sign in to make comments or ask questions. You must be signed in to the site as an ORNL user to post items.** Click on "Sign In" at the top right of the page. Use "ornl\UID" (note that you must use a backslash) and your UCAMS password.

# Desktop Energy Savings (37%) 7,500 Clients Projection



## Baseline Energy Comparison Clients as of 12-25-09

### Summary of Annualized Energy Consumption Data

	Annual Per PC Average	All 7,500 PCs
Baseline Energy Consumption	834 kWh	6,255,000 kWh
Energy Consumption with SURVEYOR	525 kWh	3,939,175 kWh
<b>Energy SAVINGS</b>	<b>309 kWh</b>	<b>2,315,825 kWh</b>
Greenhouse Gas Emission REDUCTION	421 lbs	3,156,469 lbs
Energy REDUCTION %	37.0 %	

### Summary of Annualized Energy Costs

	Annual Per PC Average	All 7,500 PCs
Baseline Energy Cost	\$50.04	\$375,300.00
Energy Cost with SURVEYOR	\$31.51	\$236,350.51
<b>Cost SAVINGS</b>	<b>\$18.53</b>	<b>\$138,949.49</b>
Cost SAVINGS %	37.0 %	

The annualized data is projected cost and usage data for each reporting interval to an equivalent value for an entire year.



**Recycle and Reuse, Routine Waste – 50%  
reduction by September 2010 compared  
to FY08**

Key Deliverable: 30% run-rate reduction in waste

Current condition

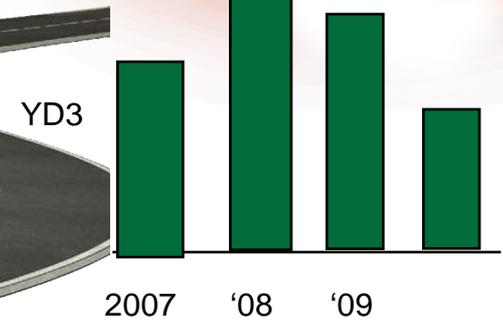
30% run rate reduction 9/09

50% run rate reduction 9/10

On-going evaluations and targeted reductions

Zero Construction Waste to Landfill

Waste to the Landfill



Recycle and Reuse, Routine Waste

**EO 13514:**

- ❖ 50% reduction in landfill waste by 2015 vs 2008
- ❖ Increase diversion of compostable material from landfill
- ❖ Minimize waste through source reduction
- ❖ Reduce printing paper use

**FY 10 Deliverables:**

- Enhanced recycling services in all buildings
- Composting pilot and plan for implementation
- Increase recycle for conference center and special events
- Resolve issue regarding disposal of wood ash from biomass steam plant

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