



# Energy & Greenhouse Gas Management

ENERGY STAR  
Monthly Partner Web Conference  
October 21, 2009

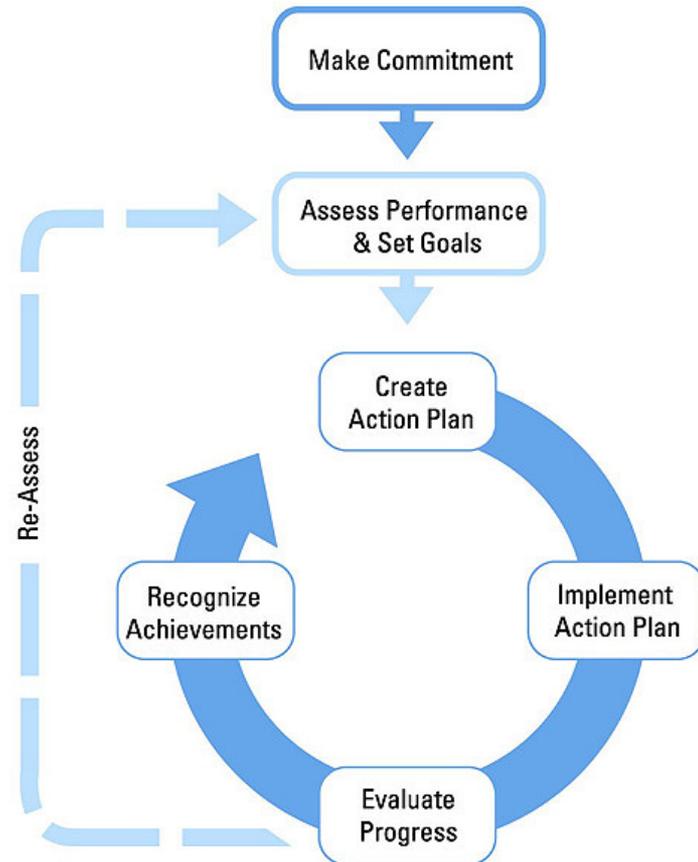


Learn more at [energystar.gov](http://energystar.gov)

# About The Web Conferences



- Monthly
- Topics are structured on a strategic approach to energy management
- Help you continually improve energy performance
- Opportunity to share ideas with others
- Slides are a starting point for discussion
- Open & interactive



# Web Conference Tips



- Mute – To improve sound quality, all phones will be muted.
- Use # 6 to un-mute and \* 6 – to mute
- Presentation slides will be sent by email to all participants following the web conference.

# Today's Web Conference

---



## Energy and Greenhouse Gas Management:

- John Parodi – Roche
- Kevin Shelton – Johnson Controls Inc.
- Walt Tunnessen – US EPA
- Discussion
- Announcements

# Energy & GHG Management at Roche US

*John Parodi*

*Director of Energy Management, Roche*

*Energy Star Web Conference*

*October 21, 2009*



# A Global Perspective *About the Roche Group*



## **Our Mission**

**Our aim as a leading healthcare company is to create, produce and market innovative solutions of high quality for unmet medical needs. Our products and services help to prevent, diagnose and treat diseases, thus enhancing people's health and quality of life. We do this in a responsible and ethical manner and with a commitment to sustainable development respecting the needs of the individual, the society and the environment.**

# Global Energy and Greenhouse Gas (GHG) Goals



- Reduce energy per employee by 10% (2005-2010)
- Reduce GHG emissions per sales by 10% (2003-2008)
- Elimination of halogenated hydrocarbons



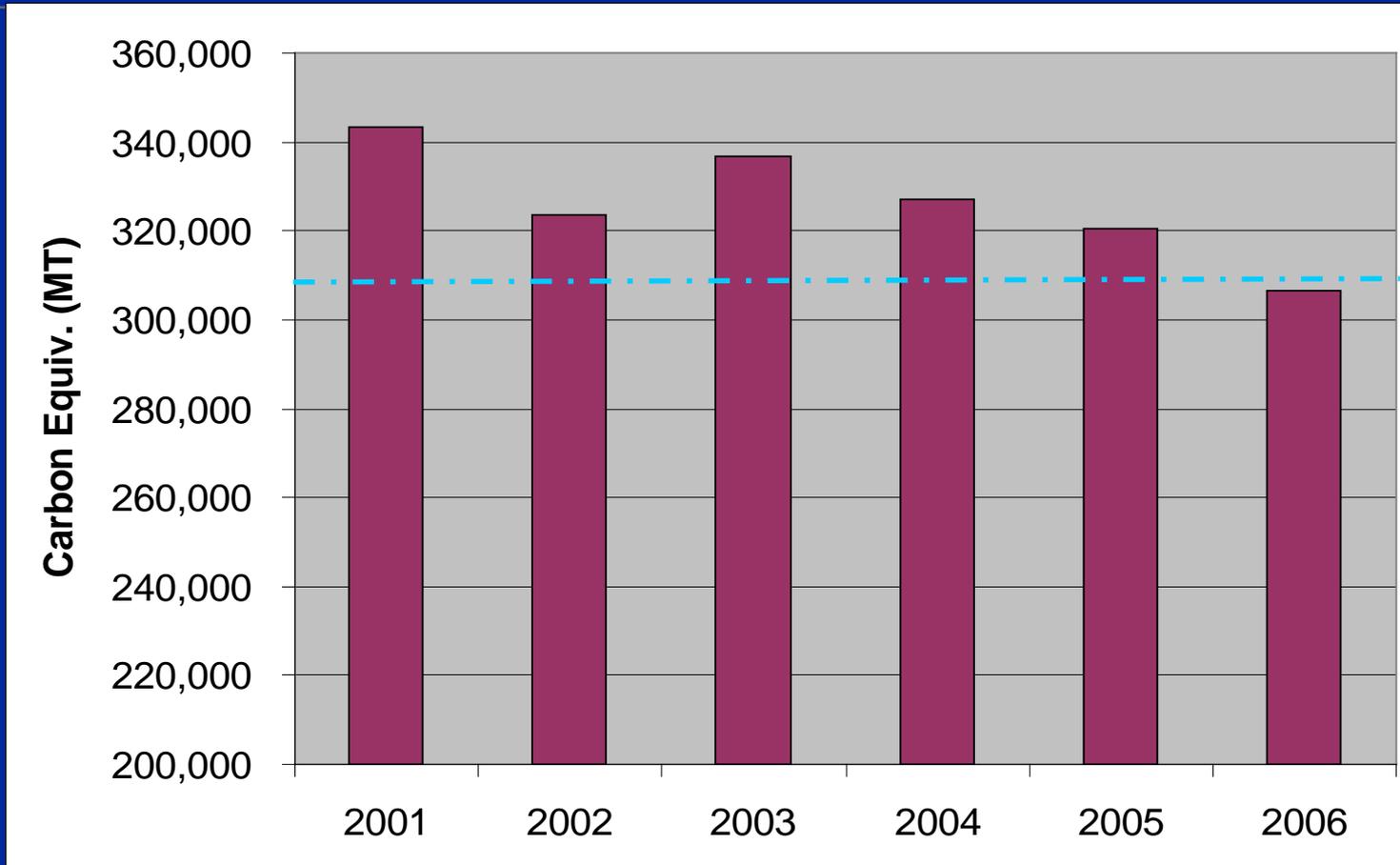
# 2004: Roche Joins Climate Leaders



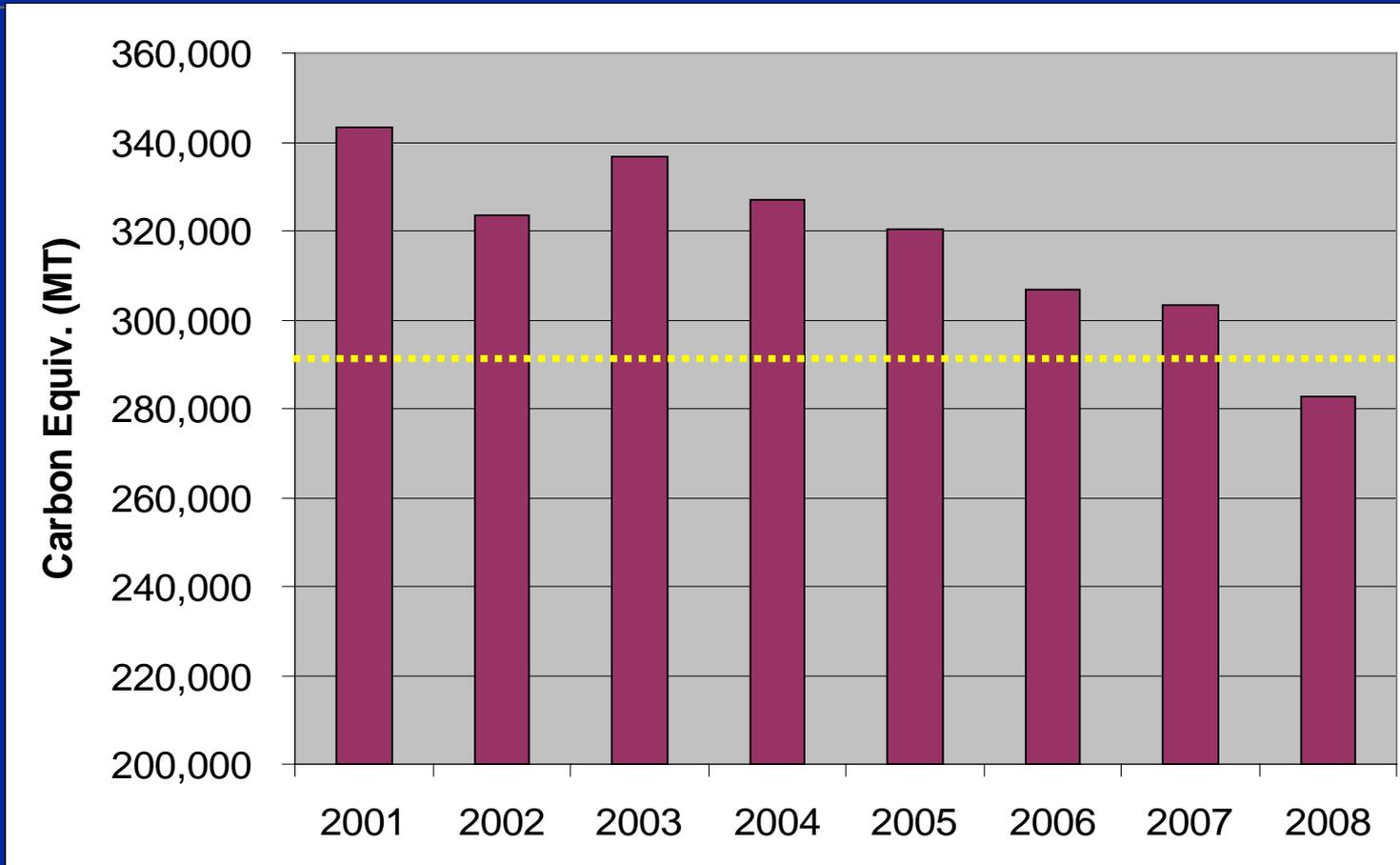
- **Original Goal to Reduce GHG at US & Puerto Rico Sites By 10% (Absolute)**
- **Base Year 2001**
- **Target Year 2008**



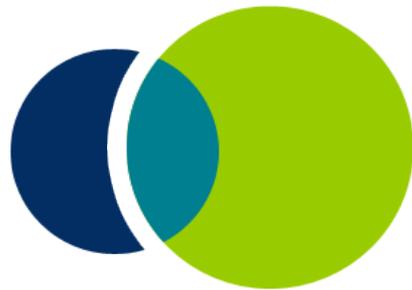
# 2006: Roche Achieves First Climate Leaders Goal



# 2008: Achieve Second Goal



# Roche Re-Selected for Dow Jones World Sustainability Index for Fifth Time



**Dow Jones  
Sustainability Indexes**

# The “Green Light” for Energy Conservation



- Corporate directive on energy conservation issued late 2006
- Applicable to all Roche sites and activities globally
- Designed to *“ensure that all decision-making at Roche supports efficient, appropriate and cost-effective energy use”*
- Specifies the development of “energy conservation process” at each site
- Mandated standards
- Investments based on **life cycle costs**



# Roche Approach to Energy Management



- **Site-Level**
  - Site-Specific Goals
  - Site Energy Manager
  - Program/Project Implementation
- **Corporate-Level**
  - Policies/Goals/Directives
  - Site Support
  - Roche Energy Team



# Cogeneration



Turbine Being Removed From Truck

# Boiler Plant Improvements



# Chiller Plant Improvements



# Removing Halogenated Hydrocarbons



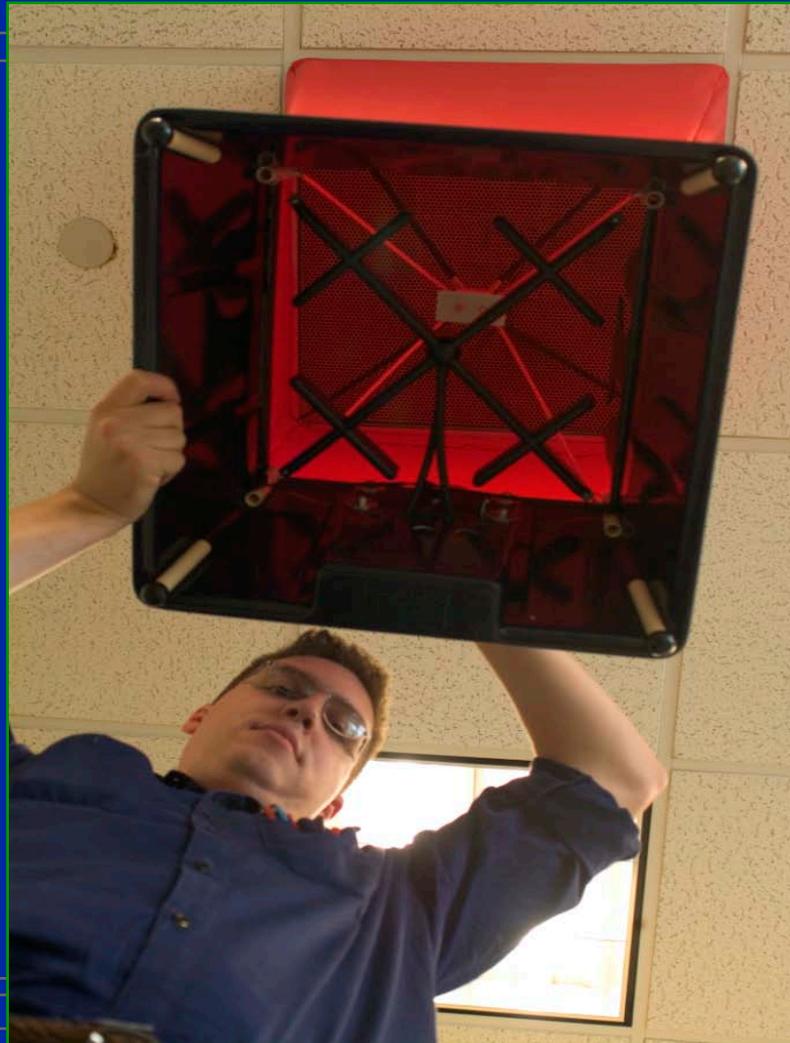
# Modifications to Laboratory Ventilation



# Lighting



# RetroCommissioning



# VFD's



# Fleet Efficiency



# Renewable Energy



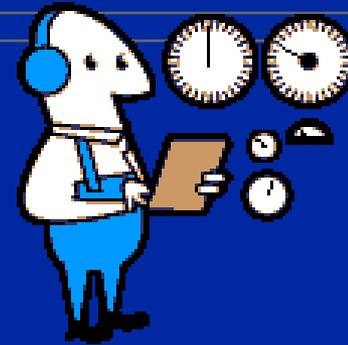
# Employee Energy Awareness



# Optimized Building/System Control



- **Temperature/Airflow Setbacks**
- **Lighting Controls**
- **Equipment Dispatch**
- **Economizer Cycles**
- **Set-point Adjustments**
- **Demand Control**
- **Continuous Commissioning**



# Where Do We Go From Here?



- **Standard Design Requirements**
- **Continuous Commissioning**
- **Low-E Travel**
  - **Vehicle Efficiency**
  - **Virtual Travel**
- **Increased Employee Awareness**
- **Key Personnel Training**
- **Knowledge Sharing**
- **FOCUS ON PROJECT IMPLEMENTATION**



Energy Star Monthly Partners Meeting

# Energy Management Best Practices

for a more comfortable, safe and sustainable world



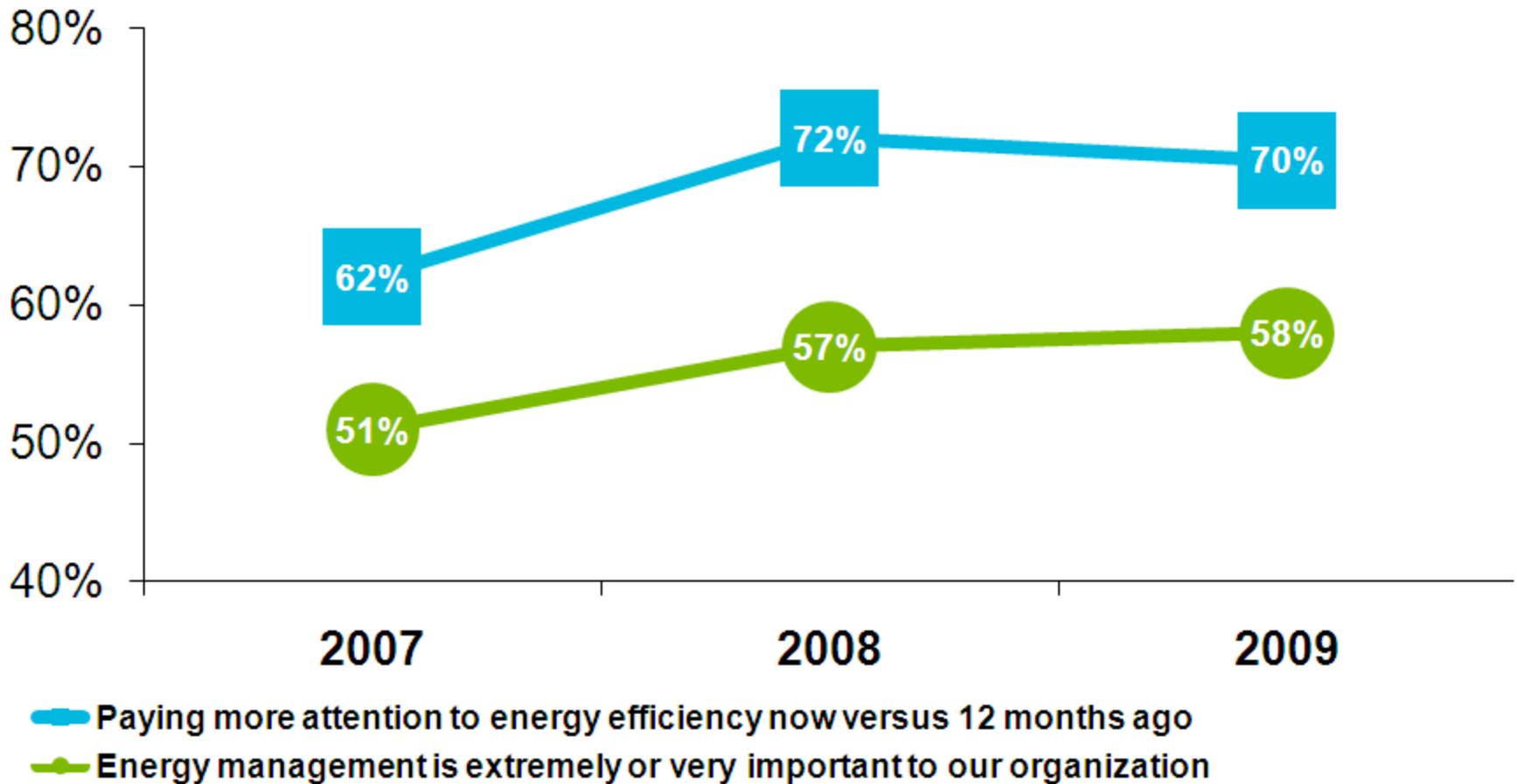
---

Kevin Shelton  
VP of Facilities, Real Estate & Construction  
October 21, 2009



## Some Context

Energy efficiency has never been more important



# Sustainability is a cornerstone for Johnson Controls

## OUR VISION

A more comfortable, safe and sustainable world.

### Sustainability

Environmental sustainability will be a key element of our business. We will reduce our greenhouse gas intensity and more than offset our total emissions through the beneficial environmental impact of our products and services. The materials in our products will be recyclable or recoverable. We will be a leading global provider of advanced energy storage systems.

## 10-YEAR MARKER

### Integrity

We will behave with unquestioned integrity and in accordance with our ethics policy. The strength of personal relationships across businesses and functions will allow us to win. We will treat each other with dignity and respect. We will be stewards of our culture. Our workplaces will be physically and emotionally safe.

### Global Growth

We will be recognized as a global growth company. We will thrive in the global economy because we act with speed and discipline, and we will seize opportunity. We will take share from our competitors.

### Employee Engagement and Leader Development

As we grow so will our people. We will build a culture of global employee and leader development that will be a benchmark. Our employees will be involved and engaged as individuals and as team members. Our employee and leader diversity will mirror our global markets and population.

### Customer Satisfaction

We will be known for customer satisfaction. Our leaders will be customer advocates and have strong market and customer knowledge. We will define our success by market share and market leadership. We will be proactive, hard-driving and competitive.

### Continuous Improvement

We will achieve global competitiveness by driving continuous improvement across all activities and all functions.

### Innovation

Innovation will be a significant driver of our global growth and profitability. Ingenious products, services, solutions and processes will create new value and exceptional customer experiences. We will continuously rethink the way we do business.

### Sustainability

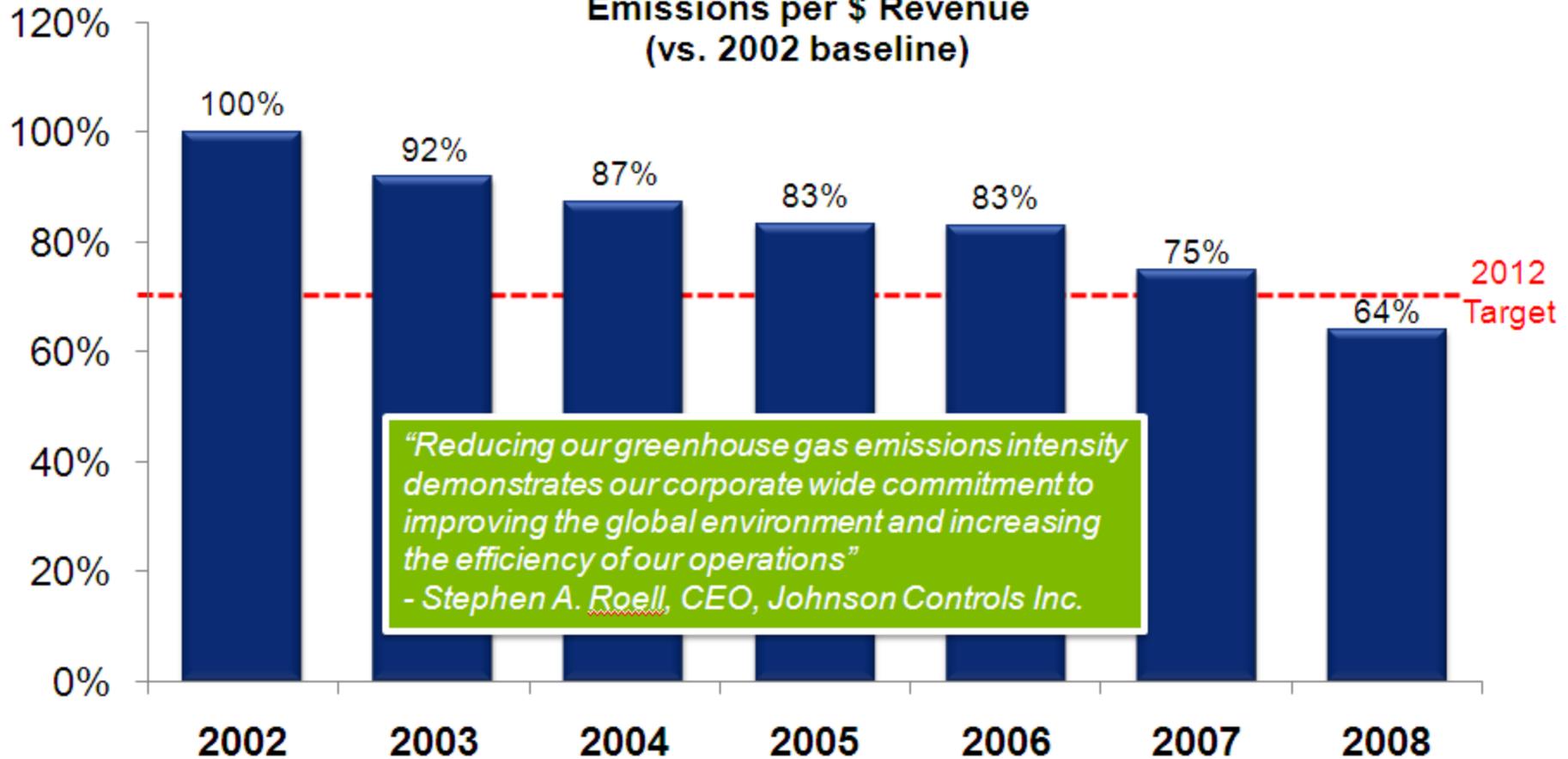
Environmental sustainability will be a key element of our business. We will reduce our greenhouse gas intensity and more than offset our total emissions through the beneficial environmental impact of our products and services. The materials in our products will be recyclable or recoverable. We will be a leading global provider of advanced energy storage systems.

### Shareholder Value

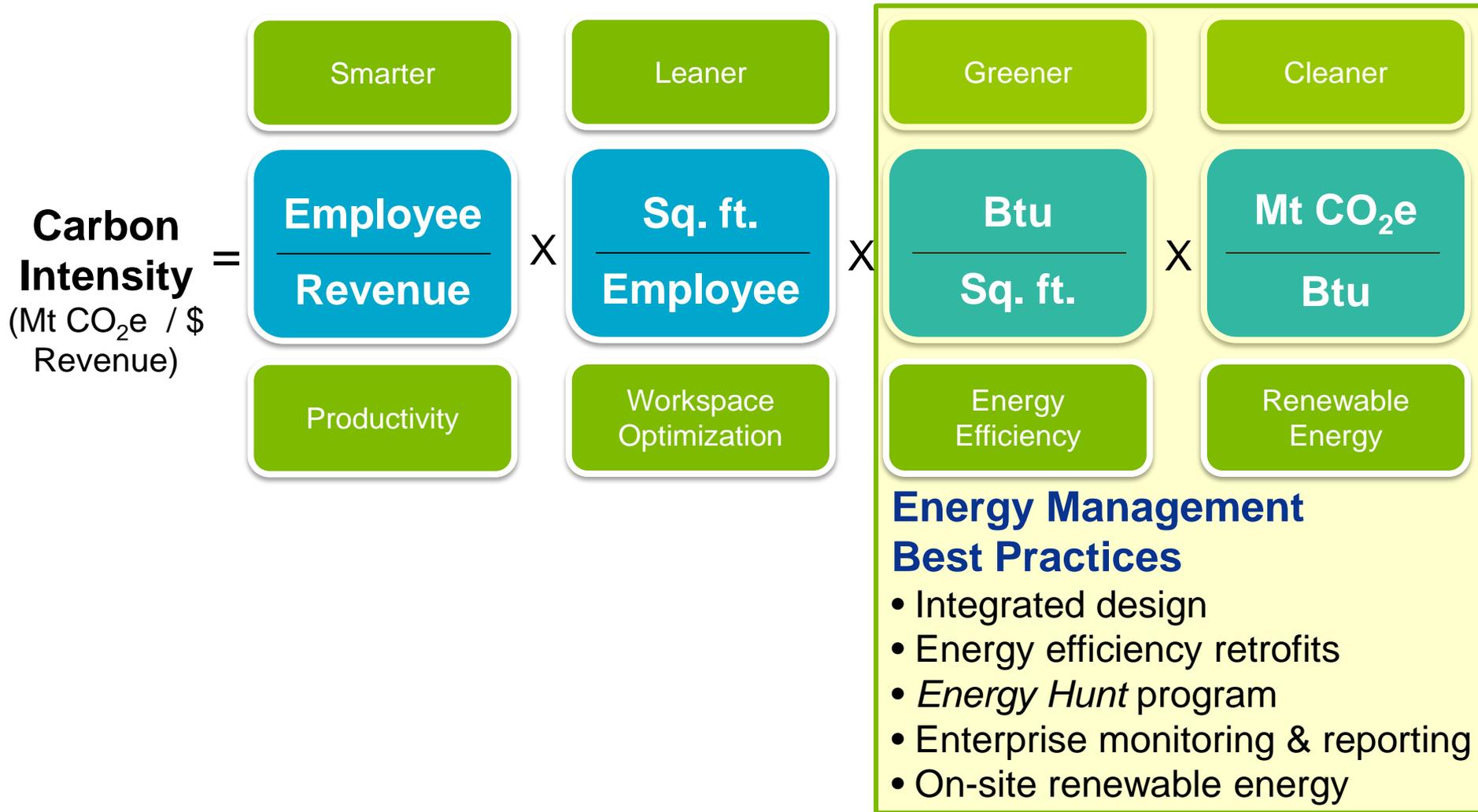
We will demonstrate the value of our multi-industry business model by transferring talent, technology and processes across the company. Our shareholder value will increase, and our stock will be accorded a price/earnings multiple among the best of the diversified manufacturing companies.

# Our carbon reduction commitment

Johnson Controls Global Greenhouse Gas Emissions per \$ Revenue (vs. 2002 baseline)



# Strategies for reducing our climate impact



# Integrated design in new construction & renovation

## Brengel Technology Center

Seven-story, 130,000 sq ft building

adjacent to our 100 year-old original  
HQ building downtown Milwaukee, WI

LEED-NC Silver certified

First LEED building t  
certified **Gold**  
under LEED-EB



Minimum  
Energy Use



Controllability

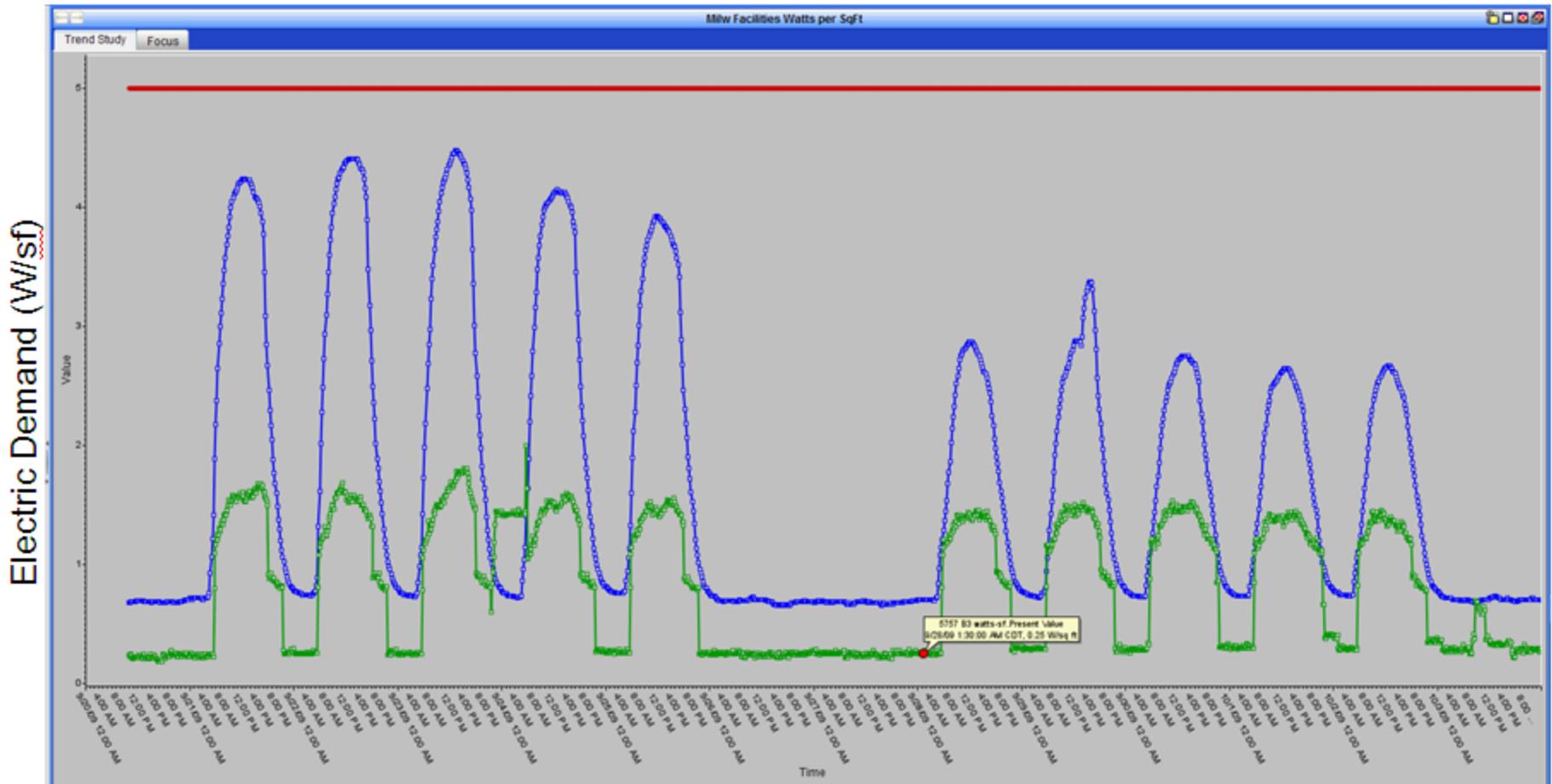
# Integrated design in new construction & renovation

## Headquarters campus renovation



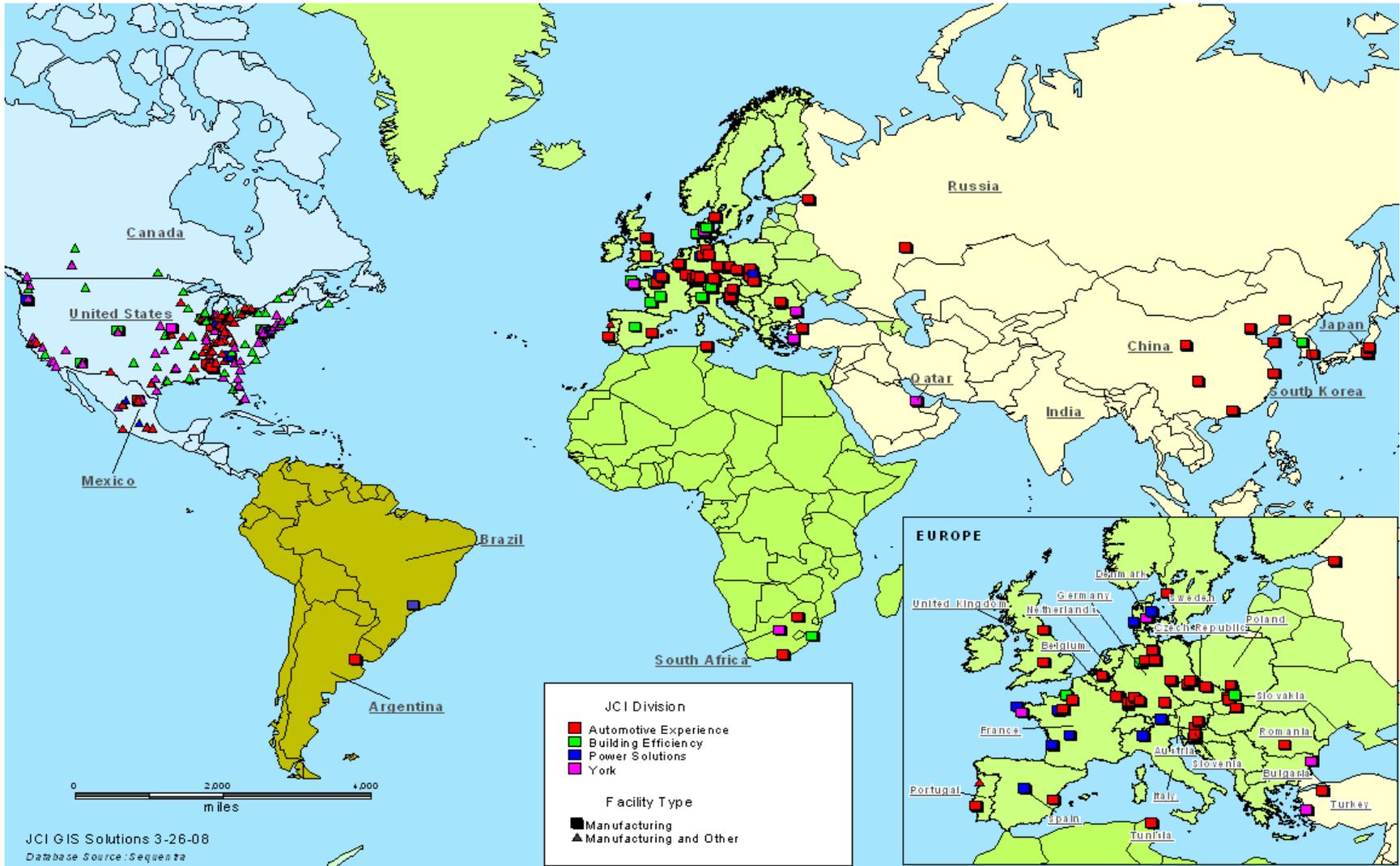
- 5 buildings, 500,000 sq ft
- Targeting highest concentration of **LEED Platinum** certified buildings in the world
- >90<sup>th</sup> %tile **Energy Star** ratings
- 272 wells for ground-source heat pumps reduce energy by 29%
- Extensive daylight harvesting and shade control
- 385 kW combined ground and roof mounted photovoltaic arrays (Wisconsin's largest PV system)
- 1,330 sf solar thermal collectors used to heat hot water in building
- BMS integration to IT monitoring system in data center

# Monitoring for continuous energy optimization



— Typical Office Building Average    — Brengel Technology Center    — Corporate Headquarters Building 3

# Johnson Controls Manufacturing Footprint



# Energy Hunt Program



1. Form Team



2. Kick-off Energy Hunt



3. Communicate Plant-wide



4. Measure, Implement, Improve



5. Communicate Best Practices



## Results to Date



Over 50 sites have undergone an Energy Hunt since March 2009



116 projects have been completed; 137 in the pipeline



\$2.3M hard savings achieved; \$1.1M savings expected with current projects in pipeline

# Energy Hunt Program

## Main Focus Areas of the Energy Hunt:

- **Motors, Fans, & Pumps:**

- Supply Systems
- Exhaust Systems

- **Process:**

- Hydraulic Systems
- Injection Molding
- Drying
- Heating
- Cooling
- Material Handling
- Painting
- Stamping
- Welding, Weld Gas

- **Building Envelope:**

- Dock Doors
- Building Operations



- **Utilities:**

- Chiller System
- Steam System
- Compressed Air
- HVAC
- Water Treatment

- **Energy:**

- Utility Best Rates
- Peak Load Management
- Rebates or Incentives

- **Lighting:**

- High Bay
- Process
- Office

- **Operations:**

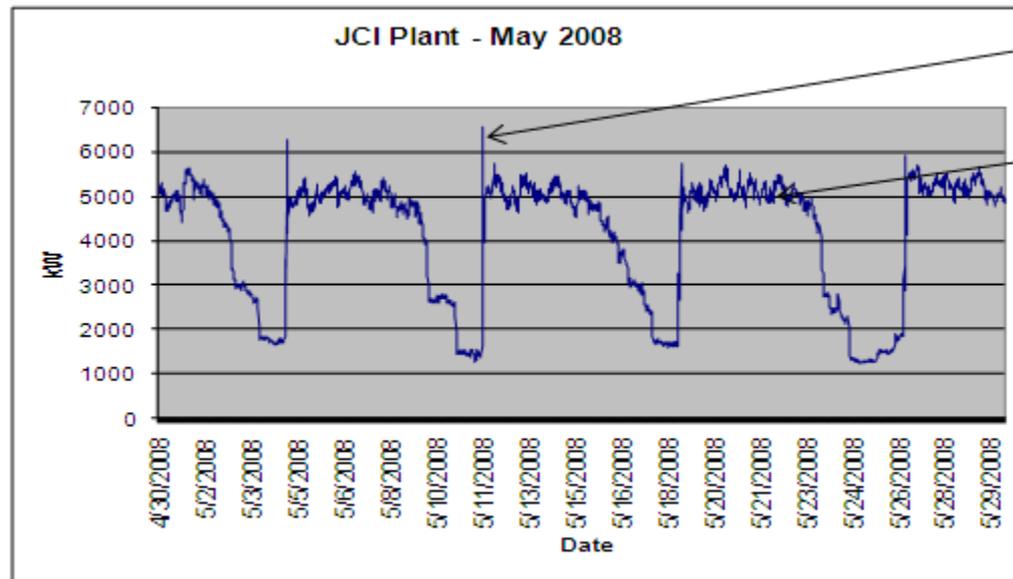
- Process or Procedure improvement
- Scrap and Waste reduction
- Start up and shut down procedures

# Energy Hunt Example: Southview Electric Peak Demand Management

Plant demand was peaking on Sunday night start up by turning on several machines simultaneously.

New procedure was written to stagger start the equipment eliminating the excess peak demand.

Plant eliminated 700 to 900 kW @ \$8.64/month/kW



Annual savings of  
\$92K

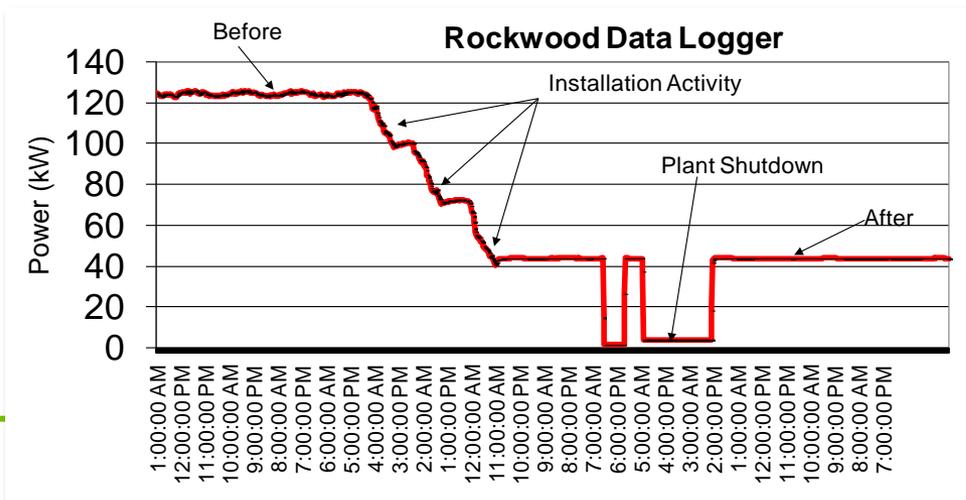
# Lighting Retrofit Projects

Retrofit of metal halide lighting with T-5 fluorescent in manufacturing facilities

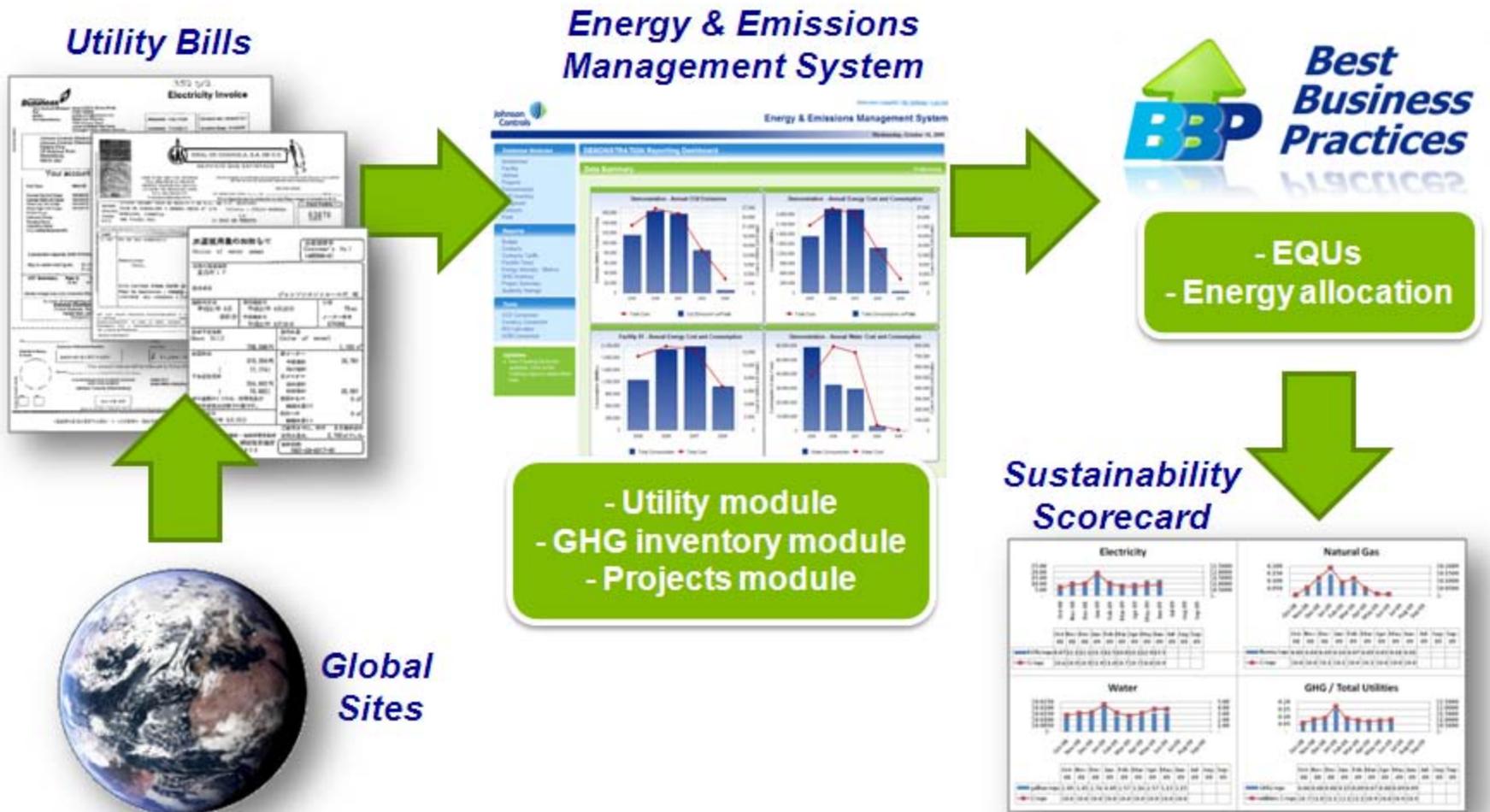
*Completed Projects (others pending)*

Business	Capital (\$)	Annual Savings (\$)	Tons CO <sub>2</sub>
Automotive Experience	\$2,449,421	\$1,312,903	10,108
Building Efficiency	\$1,965,956	\$1,239,998	7,852
Power Solutions	\$1,755,838	\$710,469	5,075
	\$6,171,215	\$3,263,370	23,035

Simple payback period: 1.9 years



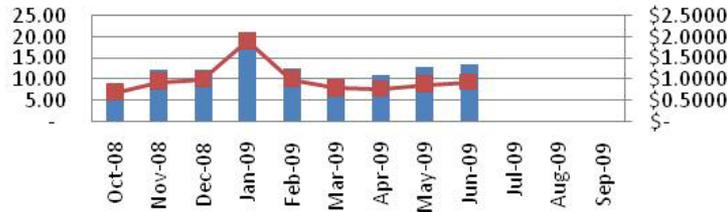
# Global Enterprise Monitoring and Reporting



# Plant Sustainability Scorecard

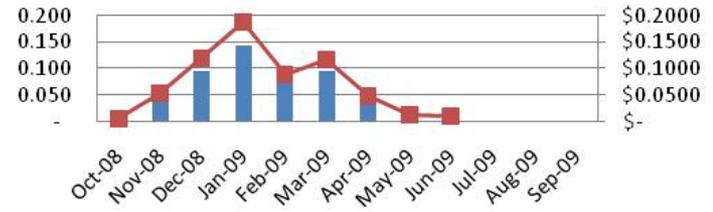
## Sample Sustainability Scorecard – Athens, TN Plant

### Electricity



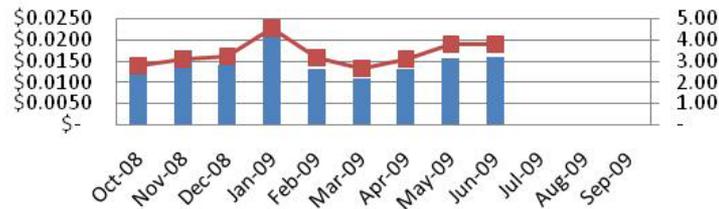
	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
kWh/equ	8.87	12.1	12.1	12.3	12.5	10.0	11.1	12.9	13.5			
\$/equ	\$0.6	\$0.9	\$0.9	\$1.9	\$1.0	\$0.7	\$0.7	\$0.8	\$0.9			

### Natural Gas



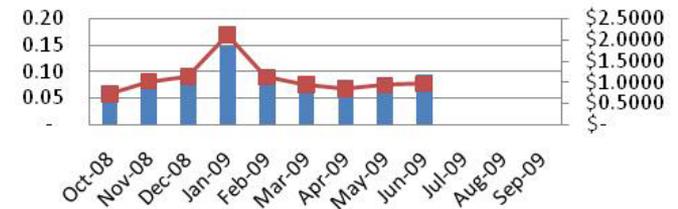
	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
therm/equ	0.00	0.04	0.09	0.14	0.07	0.09	0.03	0.01	0.01			
\$/equ	\$0.0	\$0.0	\$0.1	\$0.1	\$0.0	\$0.1	\$0.0	\$0.0	\$0.0			

### Water



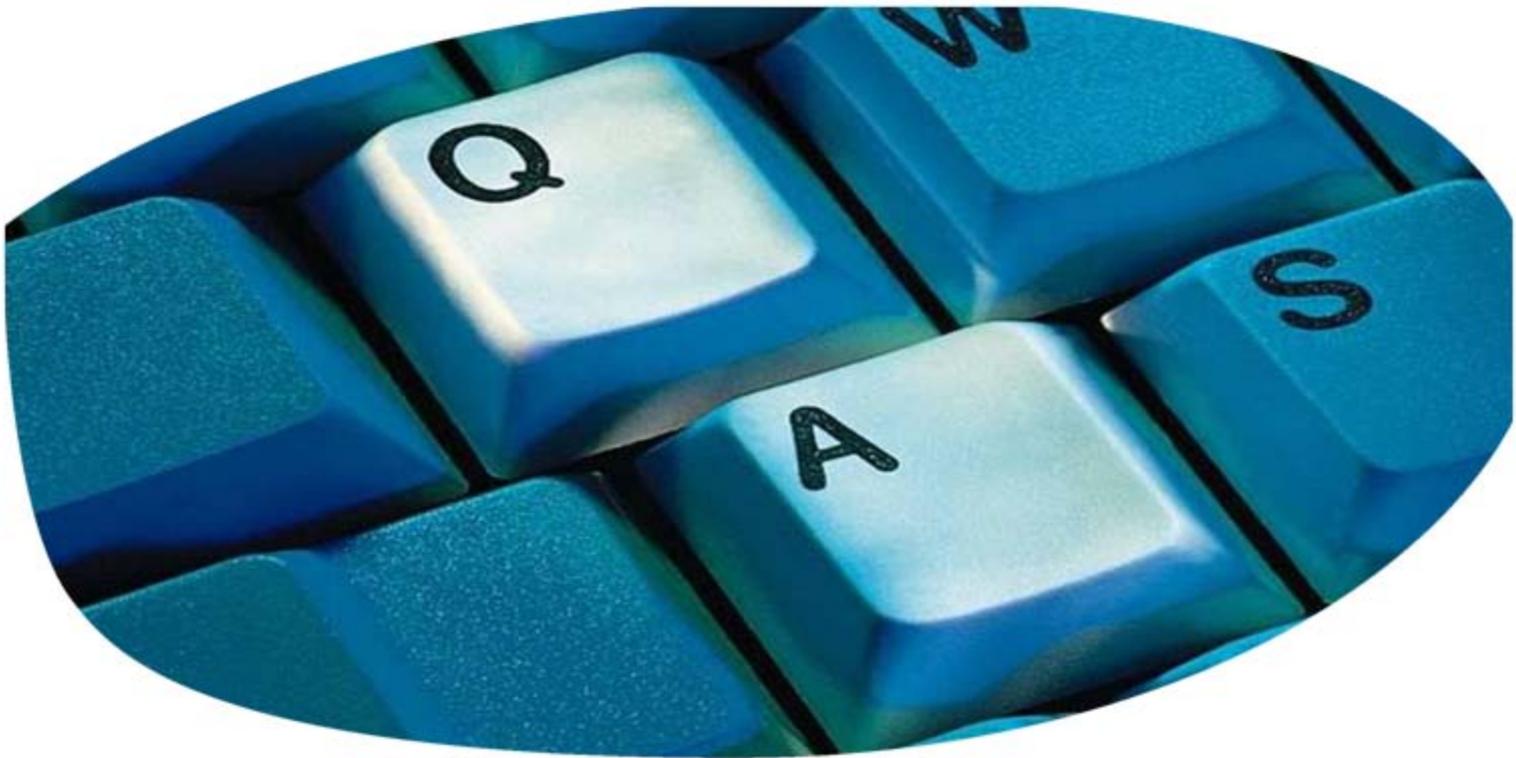
	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
gallon/equ	2.49	3.45	2.76	4.49	2.57	2.16	2.57	3.13	3.15			
\$/equ	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0			

### GHG / Total Utilities



	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
GHG/equ	0.06	0.08	0.08	0.15	0.09	0.07	0.08	0.09	0.09			
utilities \$/equ	\$0.7	\$1.0	\$1.1	\$2.1	\$1.1	\$0.9	\$0.8	\$0.9	\$0.9			

***Questions ?***



# **Federal Mandatory GHG Reporting Rule**

## **Overview**

**Walt Tunnessen  
US EPA  
Climate Protection Partnership Division**



# Purpose of the Rule



- Provide accurate and timely data to inform future climate change policies and programs
  - Better understand relative emissions of specific industries, and of individual facilities within those industries
  - Better understand factors that influence GHG emission rates and actions facilities could take to reduce emissions
- Collecting this information under the CAA:
  - Does not require an endangerment finding
  - Does not make greenhouse gases a regulated pollutant under the Prevention of Significant Deterioration (PSD) program
- Does not require control of GHG
- Signed September 22, 2009

# Key Elements of the Rule



- Annual reporting of GHG by:
  - Direct emitters (25 source categories)
  - Suppliers of fuel and industrial GHG (5 categories)
  - Motor vehicle and engine suppliers
- 25,000 metric tons CO<sub>2</sub>e per year or “All-in” reporting threshold for most sources; capacity-based thresholds where feasible
- Direct reporting to EPA electronically
- EPA verification of emissions data

# Source Categories in the Final Rule\*



<b>Upstream Sources</b>	<ul style="list-style-type: none"> <li>• Suppliers of Coal-based Liquid Fuels</li> <li>• Suppliers of Petroleum Products</li> <li>• Suppliers of Natural Gas and Natural Gas Liquids</li> <li>• Suppliers of Industrial GHGs</li> <li>• Suppliers of Carbon Dioxide (CO<sub>2</sub>)</li> </ul>
<b>Downstream Sources</b>	<ul style="list-style-type: none"> <li>• General Stationary Fuel Combustion Sources</li> <li>• Electricity Generation</li> <li>• Adipic Acid Production</li> <li>• Aluminum Production</li> <li>• Ammonia Manufacturing</li> <li>• Cement Production</li> <li>• Ferroalloy Production</li> <li>• Glass Production</li> <li>• HCFC-22 Production and HFC-23 Destruction</li> <li>• Hydrogen Production</li> <li>• Iron and Steel Production</li> <li>• Lead Production</li> <li>• Lime Manufacturing</li> <li>• Miscellaneous Uses of Carbonates</li> <li>• Nitric Acid Production</li> <li>• Petrochemical Production</li> <li>• Petroleum Refineries</li> <li>• Phosphoric Acid Production</li> <li>• Pulp and Paper Manufacturing</li> <li>• Silicon Carbide Production</li> <li>• Soda Ash Manufacturing</li> <li>• Titanium Dioxide Production</li> <li>• Zinc Production</li> <li>• Municipal Solid Waste Landfills</li> <li>• Manure Management</li> </ul>
<b>Mobile Sources</b>	<ul style="list-style-type: none"> <li>• Vehicles and engines outside of the light-duty sector (light-duty in NPRM to <i>Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Fuel Economy Standards</i>)</li> </ul>

\* EPA delayed inclusion of the following source categories as we consider the comments and options: Electronics Manufacturing, Ethanol Production, Fluorinated GHG Production, Food Processing, Magnesium Production, Oil and Natural Gas Systems, Sulfur Hexafluoride (SF<sub>6</sub>) from Electrical Equipment, Underground Coal Mines, Industrial Landfills, Wastewater Treatment, Suppliers of Coal

# GHG's to be reported



## Direct emissions of:

- CO<sub>2</sub>
- CH<sub>4</sub> (methane)
- N<sub>2</sub>O (nitrous oxide)
- Fluorinated GHGs
  - HFCs (hydrofluorocarbons)
  - PFCs (perfluorocarbons)
  - SF<sub>6</sub> (sulfur hexafluoride)
  - Other fluorinated gases (except CFC and HCFC and gases <1 mm Hg @25°C)
- Indirect emissions, Scope 2 or Scope 3 emissions, as defined by the WRI GHG Protocol are not reported.

# Level of Reporting



For Downstream sources:

- Facility based reporting for all source categories for which there are methods
- Annual Reporting to EPA
  - Data collection will begin January 1, 2010 with first reports submitted to EPA March 31, 2011.
  - Exception: Those facilities already reporting quarterly for existing mandatory programs (e.g., Acid Rain Program) will continue to report quarterly

# Who must report?



1. Sites in “All in Source Categories”
2. Sites in “Threshold Sources Categories” with emissions-based threshold of 25,000 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) per year
3. Sites with “Stationary Fuel Combustion” units with emissions-based threshold of 25,000 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) per year for most sources (other than mobile sources)

Approximately 85% of total U.S. greenhouse gas emissions covered by rule (about 10,000 reporters)

# All-in Source Categories



Sites meeting the definition of this source category must report

**Electricity Generation** if report CO<sub>2</sub>  
year-round through Part 75

**Adipic Acid Production**

**Aluminum Production**

**Ammonia Manufacturing**

**Cement Production**

**HCFC-22 Production**

**HFC-23 Destruction Processes** that  
are not collocated with a HCFC-22 production  
facility and that destroy more than 2.14  
metric tons of HFC-23 per year

**Lime Manufacturing**

**Nitric Acid Production**

**Petrochemical Production**

**Petroleum Refineries**

**Phosphoric Acid Production**

**Silicon Carbide Production**

**Soda Ash Production**

**Titanium Dioxide Production**

**Municipal Solid Waste Landfills**  
that generate CH<sub>4</sub> equivalent to 25,000  
metric tons CO<sub>2</sub>e or more per year

**Manure Management Systems**  
with combined CH<sub>4</sub> and N<sub>2</sub>O emissions  
in amounts equivalent to 25,000 metric  
tons CO<sub>2</sub>e or more per year.

\*Source categories are defined in each subpart.

# Source Categories with thresholds



Facilities meeting the definition of a source category must report if emissions from both process and stationary combustion units exceeds 25,000 metric ton of CO<sub>2</sub>e

- Ferroalloy Production.
- Glass Production.
- Hydrogen Production.
- Iron and Steel Production.
- Lead Production.
- Pulp and Paper Manufacturing.
- Zinc Production.

# Stationary fuel combustion



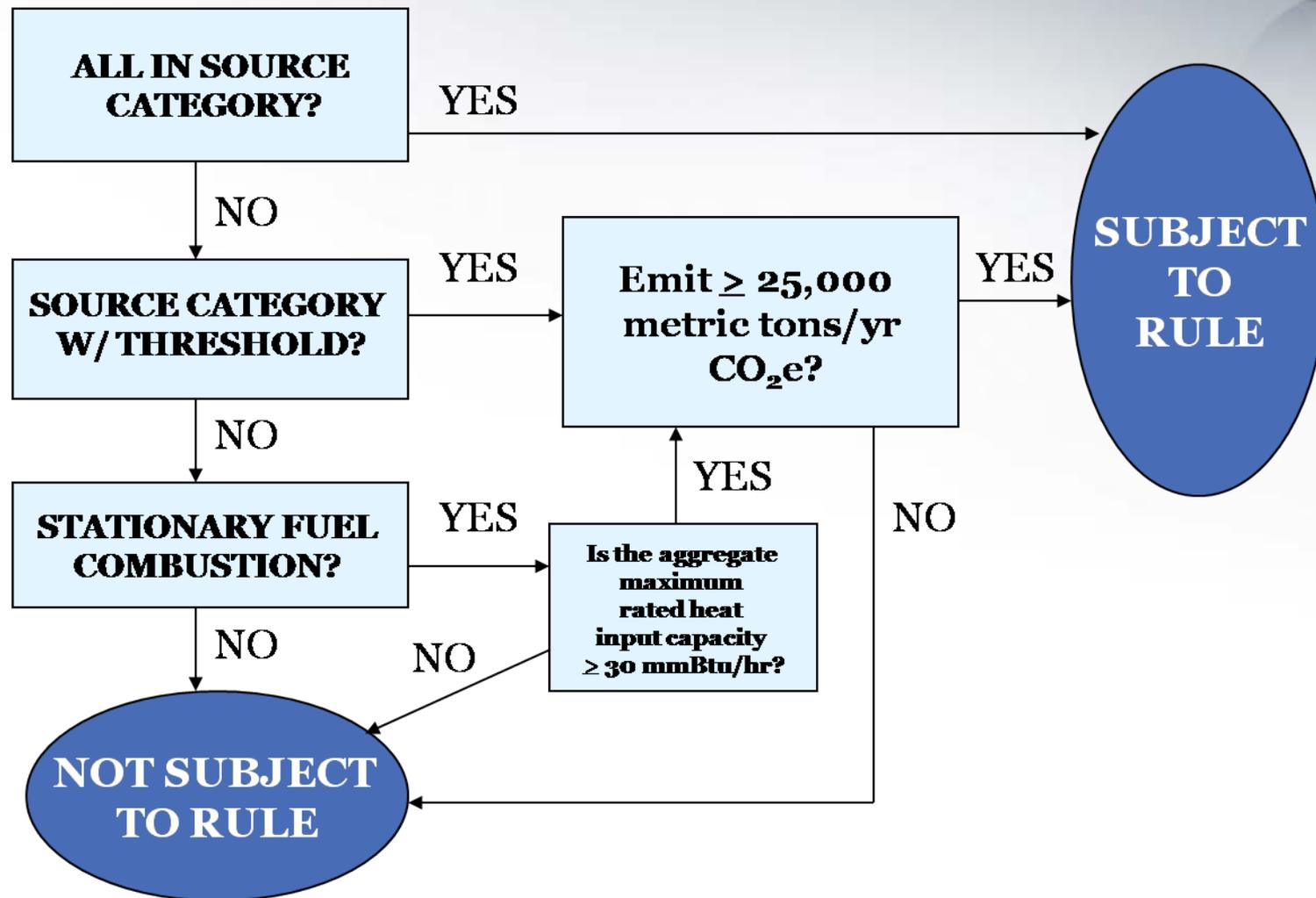
- Stationary fuel combustion sources are devices that combust any solid, liquid, or gaseous fuel generally to:
  - Produce electricity, steam, useful heat, or energy for industrial, commercial, or institutional use; or
  - Reduce the volume of waste by removing combustible matter.
- These devices include, but are not limited to:
  - boilers,
  - combustion turbines,
  - engines,
  - incinerators, and
  - process heaters.
- But generally excludes:
  - Flares (unless otherwise required by another subpart),
  - portable equipment, and emergency generators,
  - emergency equipment,
  - ‘agricultural irrigation pumps, and
  - combustion of hazardous waste (except for co-fired fuels).

# Assessing Applicability to the Rule



- A facility can have multiple source categories.
- You must evaluate each source category separately to assess applicability to the rule.
  - “All-in” source categories
  - Threshold categories
  - Stationary fuel combustion
- If rule applies, report emissions for all source categories for which methods are provided in the rule.
- All GHG, except CO<sub>2</sub> from biomass, must be converted to CO<sub>2</sub>e to determine total annual emissions.

# Does the Rule Apply to My Facility?



# How much is 25,000 MTCO<sub>2</sub>e?



- Equivalent to:
  - Annual greenhouse gas emissions from the energy use of approximately 2,300 homes
  - Annual greenhouse gas emissions from approximately 4,600 passenger vehicles
- Majority of commercial building owners not likely to meet reporting threshold
- **Applicability Tool** available online to help facilities assess whether they are required to report:
  - [www.epa.gov/climatechange/emissions/GHG-calculator/index.html](http://www.epa.gov/climatechange/emissions/GHG-calculator/index.html)

# GHG Calculation Methods



- Methods for calculating GHG emissions are provided in the rule's subparts.
- Subpart C applies to stationary source combustion units.
  - There are four different “Tiers” for calculating GHG emissions under Subpart C
- Monitoring and data requirements provided in Subparts.
- Most of methods follow established GHG inventory and calculation approaches for direct emissions.
- Will involve collecting energy data.

# Monitoring Plan



## Facilities must establish an monitoring plan - see 98.3(g) (5)

- Identifies responsibilities (i.e., job titles) for data collection
- Explains processes and methods used for data collection
- Describes QA/QC procedures for monitors
- May rely on references to existing corporate documents (e.g., standard operating procedures)

## Records that must be maintained:

- A list of all units, operations, processes, and activities for which GHG emission were calculated
- All data used to calculate the GHG emissions for each unit, operation, process, and activity, categorized by fuel or material type
- The annual GHG reports
- Missing data computations
- A written GHG Monitoring Plan
- Certification and QA tests
- Maintenance records for measurement equipment

# Electronic Data Reporting System



Facilities will report using an electronic reporting system:

- Electronic format and system under development
- Web-based system
  - Will guide reporters through data entry and submission
  - Built-in emissions calculations
- Mechanism to submit file directly using standard format (e.g., XML)

# Emissions Verification



- **Self certification**
  - Designated representative certifies and submits report
  - Rule allows one designated representative for each facility and supplier
- **EPA verification**
  - Reports submitted through an electronic system
  - Built-in calculation and completeness checks for reporters
  - Additional EPA electronic QA and consistency checks
  - Electronic verification and targeted audits

# Schedule for Monitoring and Reporting



<b>1/1/10</b>	<b>Start collecting data using best available monitoring methods OR CEMS, if installed</b>
<b>3/31/10</b>	<b>Monitors installed Monitors calibrated Begin using required monitoring methods (if extension request not obtained)</b>
<b>12/31/10</b>	<b>Complete 2010 data collection</b>
<b>1/1/2011</b>	<b>Must have installed and certified CEMs for collecting CO2 emissions data</b>
<b>1/30/11</b>	<b>Submit certificate of representation</b>
<b>3/31/11</b>	<b>Submit GHG report for 2010</b>
<b>Ongoing</b>	<b>Submit corrected report 45 days after each discovery</b>
<b>Ongoing</b>	<b>Submit annual reports on 3/31 each year</b>

# Stopping Annual Reporting



- If annual reports demonstrate CO<sub>2</sub>e <25,000 metric tons/yr for 5 consecutive years.
- If annual reports demonstrate CO<sub>2</sub>e <15,000 metric tons/yr for 3 consecutive years.
- If you shut down all processes/units/supply operations covered by the rule.

(See 98.3(h)(i)), p. 621-622)

# Technical Assistance



- On-line applicability tool:
  - Assists potential reporters in assessing whether they are required to report
- Technical assistance materials (e.g., Information Sheets on rule subparts)
- EPA will host several trainings and webinars
- Telephone hotline
- For complete list of materials and training schedule, see: [www.epa.gov/climatechange/emissions/ghgrulemaking.html](http://www.epa.gov/climatechange/emissions/ghgrulemaking.html)

# For More Information



- Preamble and final regulatory text available at our website
  - After publication in the FR at [www.regulations.gov](http://www.regulations.gov)
- Additional information including a training schedule:  
[www.epa.gov/climatechange/emissions/ghgrulemaking.html](http://www.epa.gov/climatechange/emissions/ghgrulemaking.html)
- Hotline:
  - Telephone: 1-877-GHG-1188
  - Email: [GHGMRR@epa.gov](mailto:GHGMRR@epa.gov)

*This presentation is provided solely for informational purposes. It does not provide legal advice, have legally binding effect, or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person.*

# Discussion

---



- Use \* 6 to un-mute phone
- # 6 to re-mute phone

# November Web Conferences

---



Energy management financing strategies:

- David Hitchings, Northrop Grumman unique project accounting approach
- Derek Supple, JCI's Survey on Energy Efficiency Indicator

Register at:

[Energystar.webex.com/meeting](https://energystar.webex.com/meeting)

- 
- Thank you