

# The Economic Benefits of Greenhouse Gas Emissions Reductions through Energy Conservation

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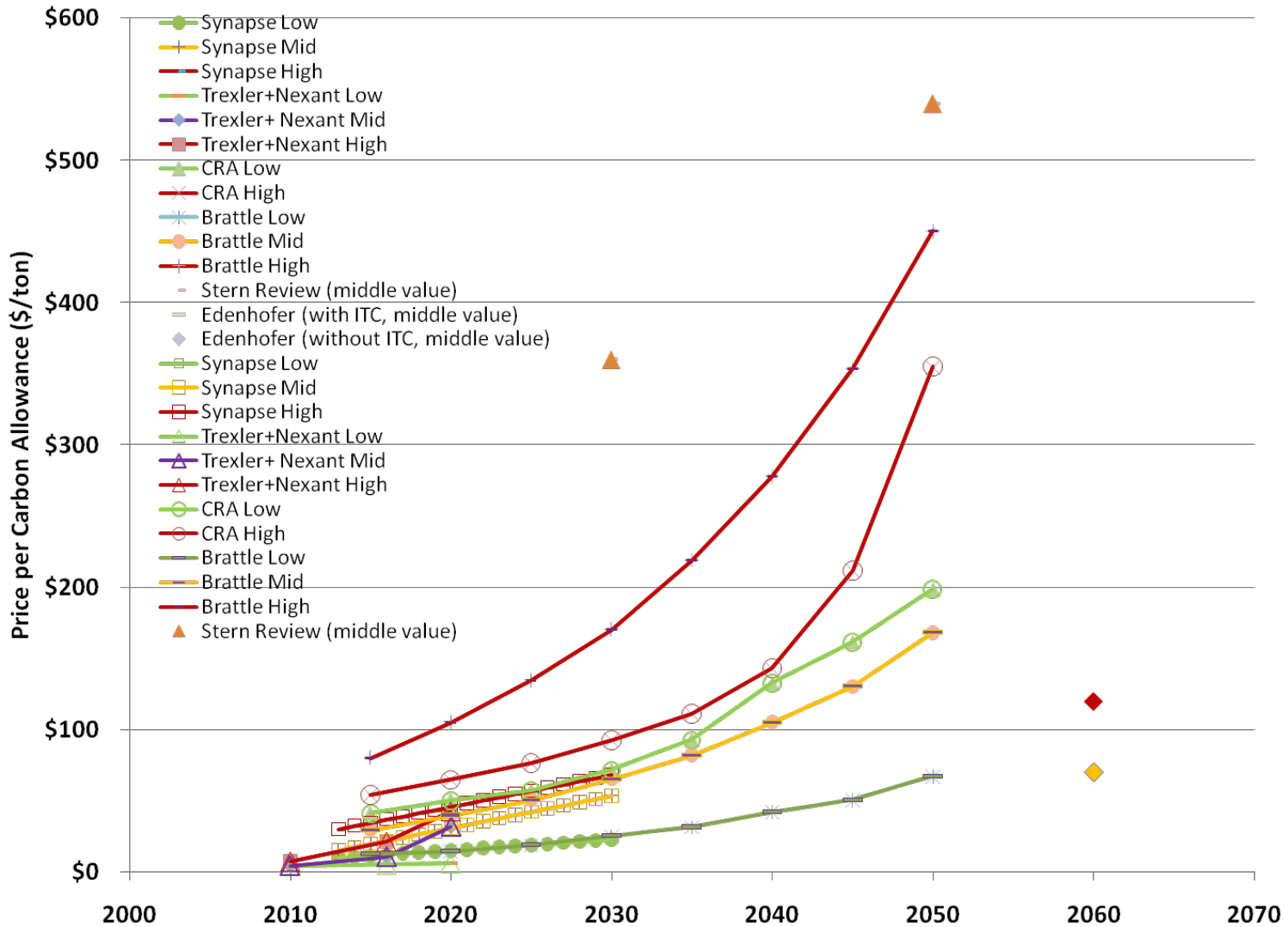
# Federal Drivers – Legislative and Regulatory



Date	Legislative Action (Cap-and-Trade Bill)
3/31/2009	Release of ACESA <ul style="list-style-type: none"><li>• 20% reduction in 2005 GHG emissions by 2020</li><li>• 83% reduction in 2005 GHG emissions by 2050</li></ul>
5/21/2009	Bill passed by House Energy & Finance Committee
6/26/2009	Bill passed by U.S. House of Representatives

Date	Regulatory Action (U.S. EPA)
3/10/2009	Release of proposed “Mandatory GHG Reporting Rule” <ul style="list-style-type: none"><li>• Generally covers direct emitters &gt;25,000 MTCO<sub>2</sub>e/yr;</li><li>• 85-90% of total U.S. GHG emissions</li></ul>
4/17/2009	EPA finding – GHGs “endanger human health and welfare” <ul style="list-style-type: none"><li>• Follow up to 04/02/07 Supreme Court ruling – CO<sub>2</sub> as “air pollutant”</li><li>• Gives EPA authority to regulate CO<sub>2</sub> emissions under the Clean Air Act</li></ul>

# Future Projected Price of Carbon

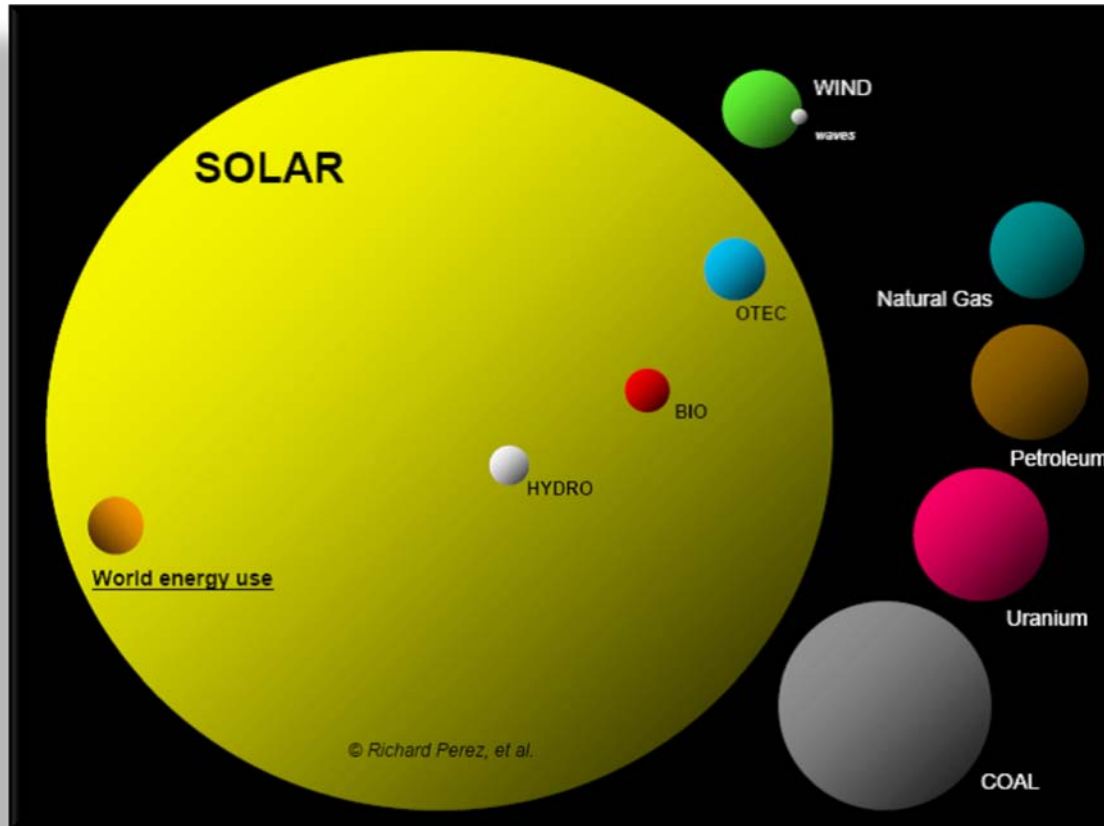


# GHG and Energy

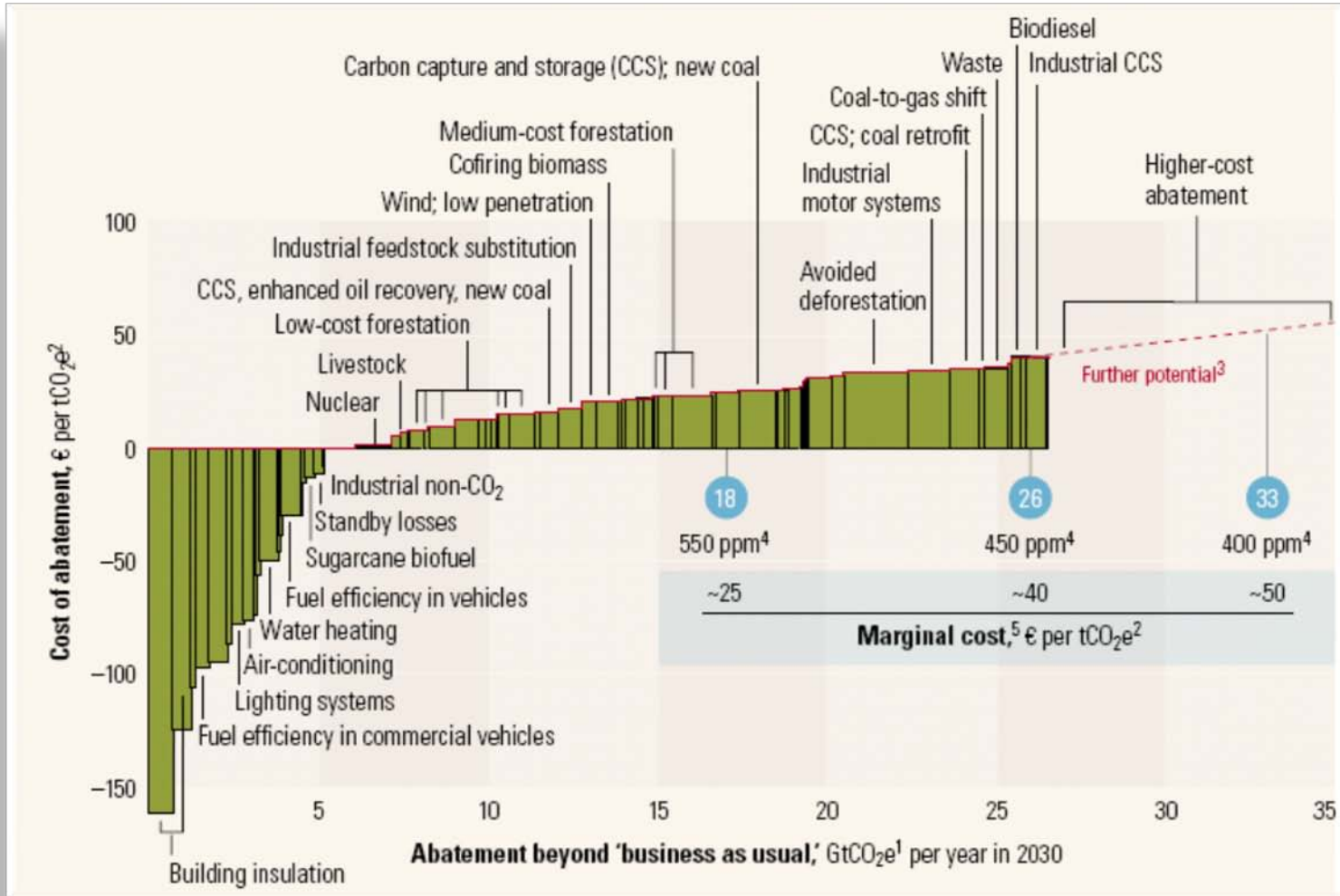
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- Energy for heating: 1 CCF of natural gas = 5 kg CO<sub>2</sub>E
- Energy for transportation: 1 gallon of gasoline = 9 kg CO<sub>2</sub>E
- Energy for power: 1 kWh = 0.5 kg CO<sub>2</sub>E
  
- GHG regulation is energy regulation
  - American Clean Energy and Security Act
  
- Reducing GHG emissions will require energy conservation and/or alternative energy sources
  - Demand and supply side management

# Our Energy Future

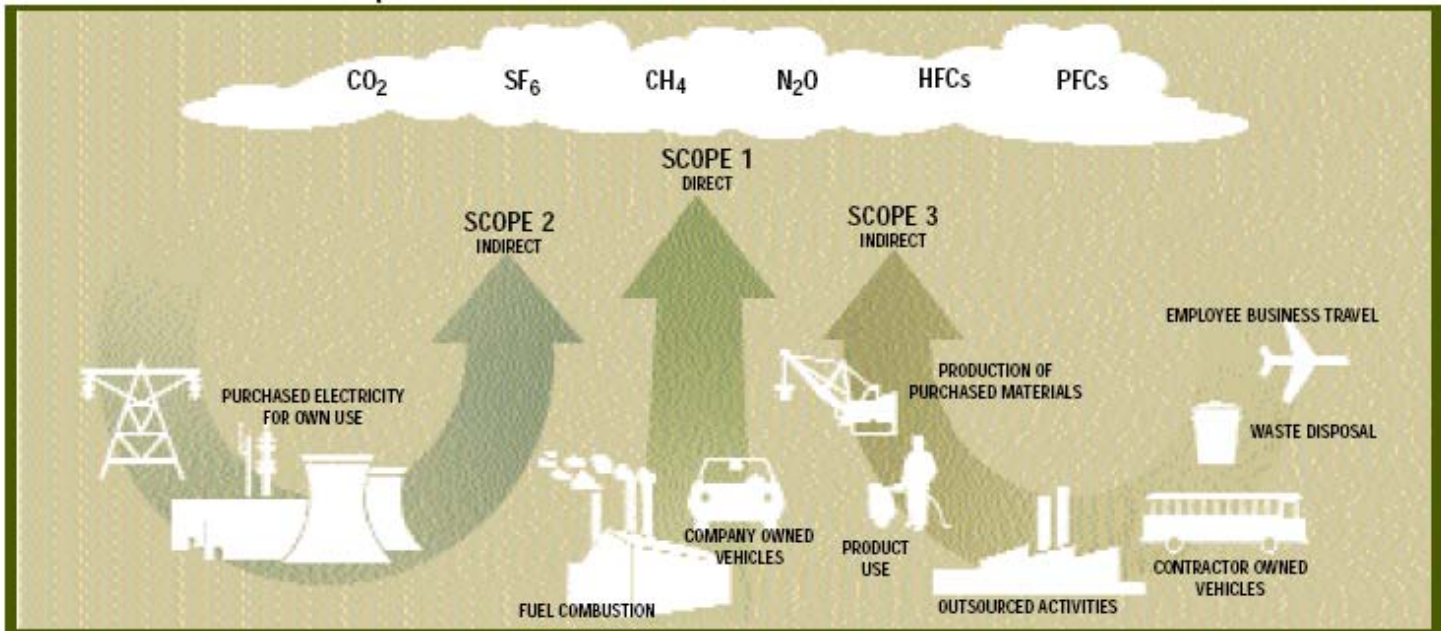


# Our Energy Reality



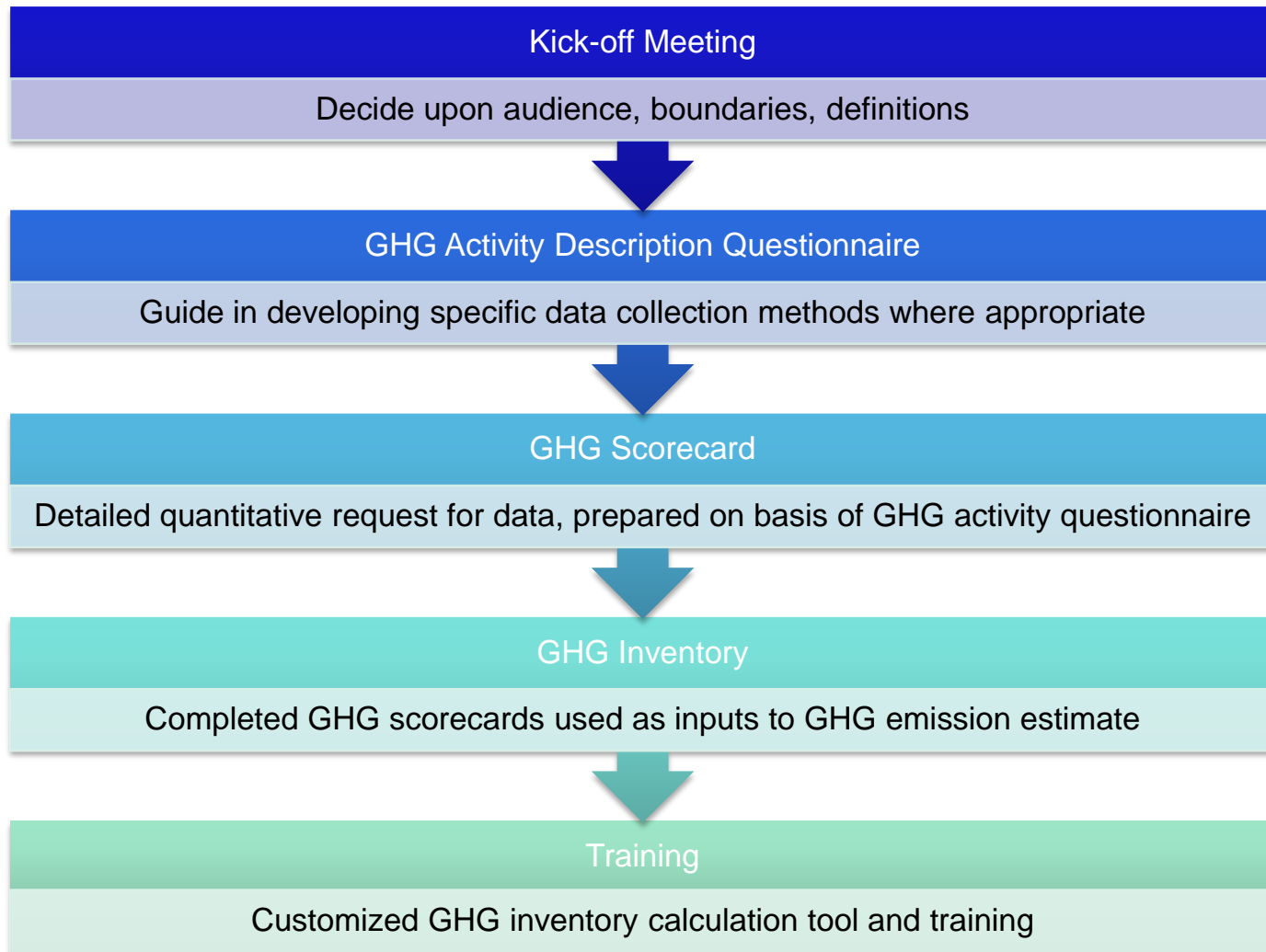
# Greenhouse Gas Accounting

- Scope 1: Direct emissions – stationary, mobile, process, fugitive
- Scope 2: Indirect emissions from purchased electricity, steam, heat, or chilled water
- Scope 3: Other indirect emissions



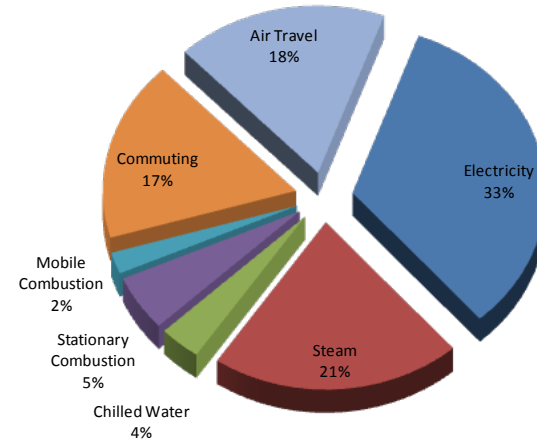
Source: WRI/WBCSD, The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard

# Greenhouse Gas Inventory Process

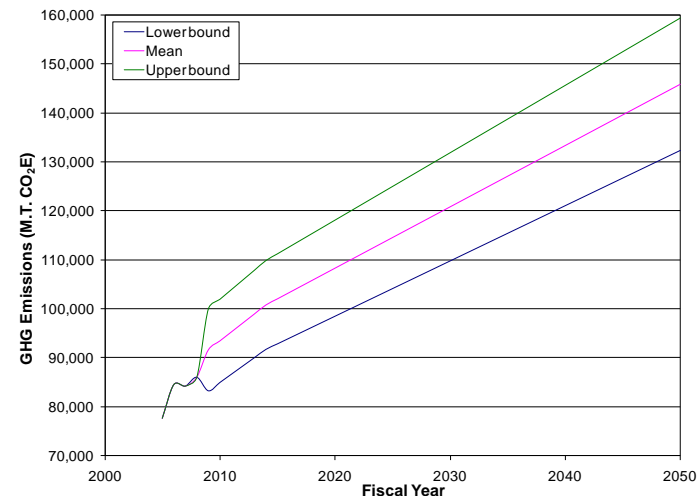
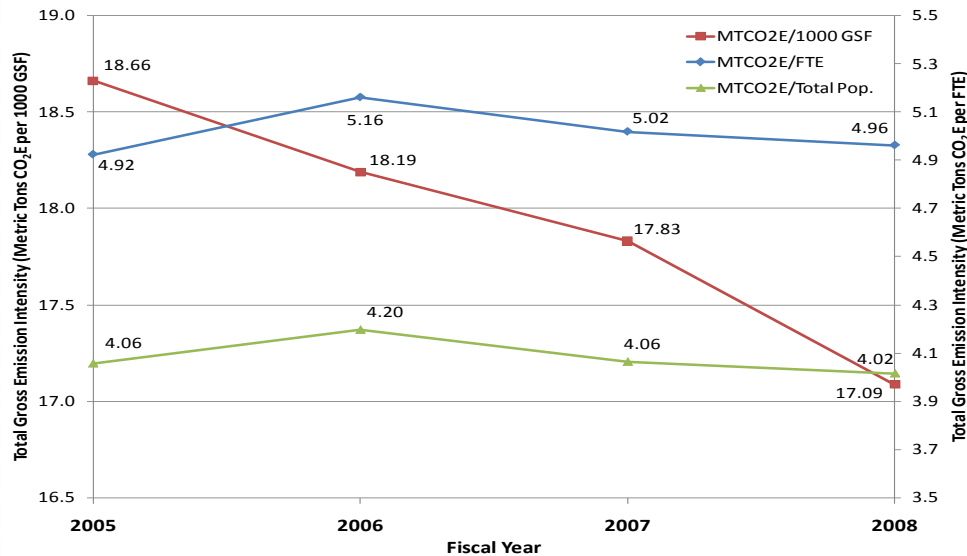


# Example Inventory

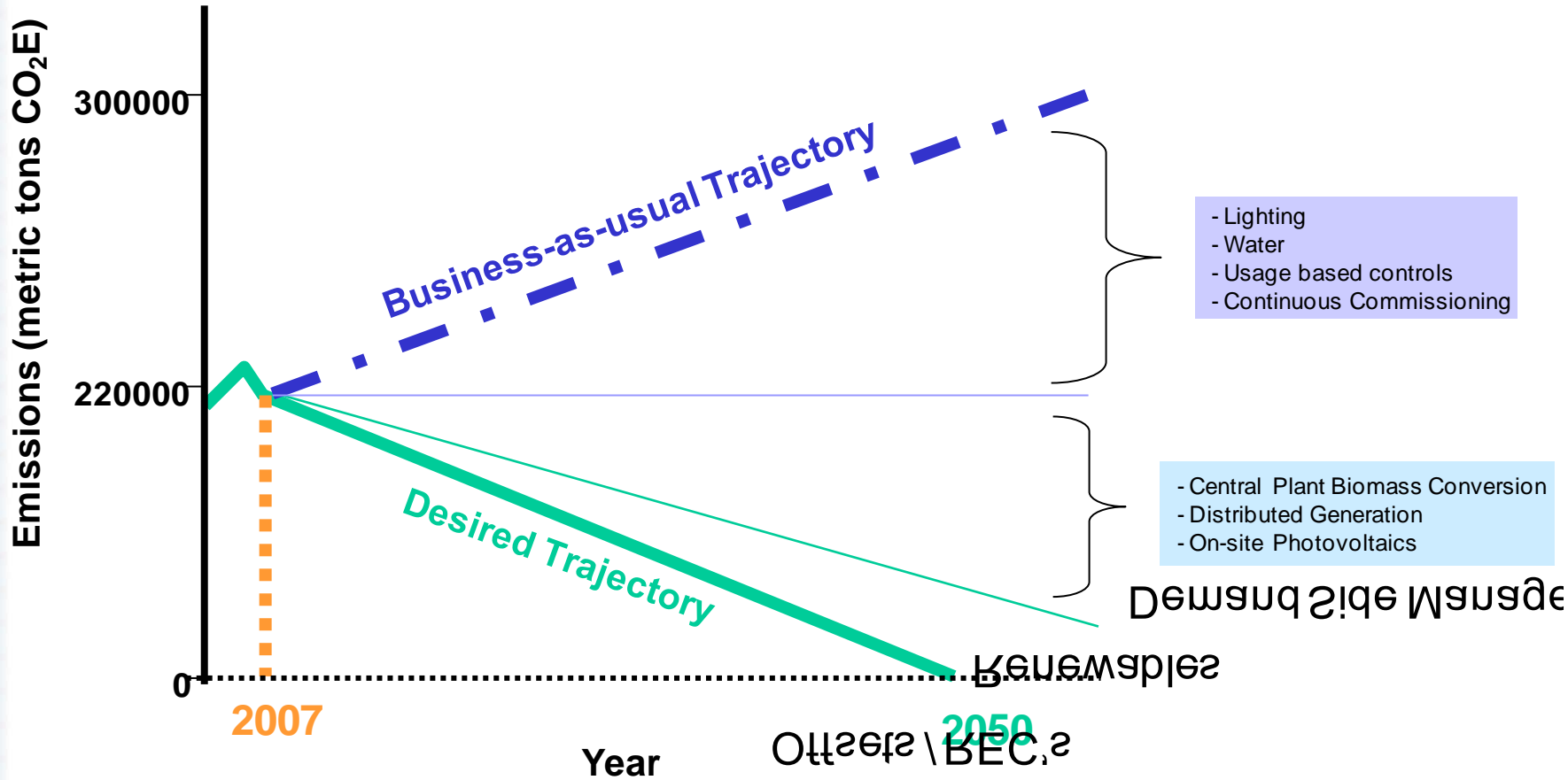
- Baseline emissions
- Emissions trend
- Emissions forecast



Total GHG Emissions = 115,684 metric tons CO<sub>2</sub>E



# Climate Stabilization



# Mitigation Strategy



# Carbon Mitigation Model (CMM)



- Identify target date(s) for achieving environmental goal
- Estimate total annual GHG emissions reductions required to achieve target
- Apportion total annual GHG emissions reductions to Scope 1 to 3 emission sources
- Translate GHG emissions reductions to energy/resource usage reductions

Scope	Source	Annual GHG Emissions Reduction (m.t.CO <sub>2</sub> E)	Corresponding Annual Usage Reduction	Usage Units
1	Stationary Sources	121	2,280	MMBTU
	Mobile Sources	42	4,636	Gallon
2	Purchased Electricity	878	2,110,067	kWh
	Purchased Steam	444	6,535	MMBTU
3	Commuting	391	3,407,143	Miles
	Air Travel	340	435,923	Miles

# Carbon Mitigation Project Classes



Demand Side Management (Technology)	Demand Side Management (Behavior)	Supply Side Management	Offset Projects
<p>“Smart” Buildings</p> <p>LEED Design Standards</p> <p>High Mileage Vehicles</p> <p>Advanced Metering</p> <p>Efficient Lighting and Controls</p> <p>Continuous Commissioning</p> <p>High Performance Heating/Cooling Plants</p>	<p>Work-From-Home Programs</p> <p>Behavioral Protocols for Equipment Idling</p> <p>Broadening Acceptable Temperature Range</p> <p>Commuter Incentives for Public Transportation</p>	<p>Fuel Switching</p> <p>Combined Heat and Power</p> <p>Biofuel – Biodiesel, Ethanol</p> <p>Landfill Gas/Biogas</p> <p>Renewable Power – Solar Project Developer</p> <p>Purchasing RECs</p>	<p>Forestry / Wetland Sequestration</p> <p>Green Space Conservation Easements</p> <p>Geological Sequestration</p> <p>Chemical Sequestration</p>

# Project Identification



## Project Tasks to Identify Opportunities

- Review of Capital Plans
- Benchmarking with peers
- Department of Energy and Utilities Management
  - Auditing, procurement, metering, utility projects
  - Additional assessment as needed
- On-site renewable energy evaluation

## Basis for Prioritizing

- Payback
- NPV
- ROI
- \$/MTCO<sub>2</sub>E
- Other?

# Example Mitigation Projects for Shipyards



- Efficiency projects
  - use of energy-efficient lighting
  - variable-frequency pump drives
  - boiler condensate heat recovery
- Waste Minimization
  - waste oil recovery
  - on-site wastewater treatment
  - recycling



# Project Prioritization



- Projects to be evaluated based on:
  - GHG reduction potential, project costs, energy savings, and ease of implementation

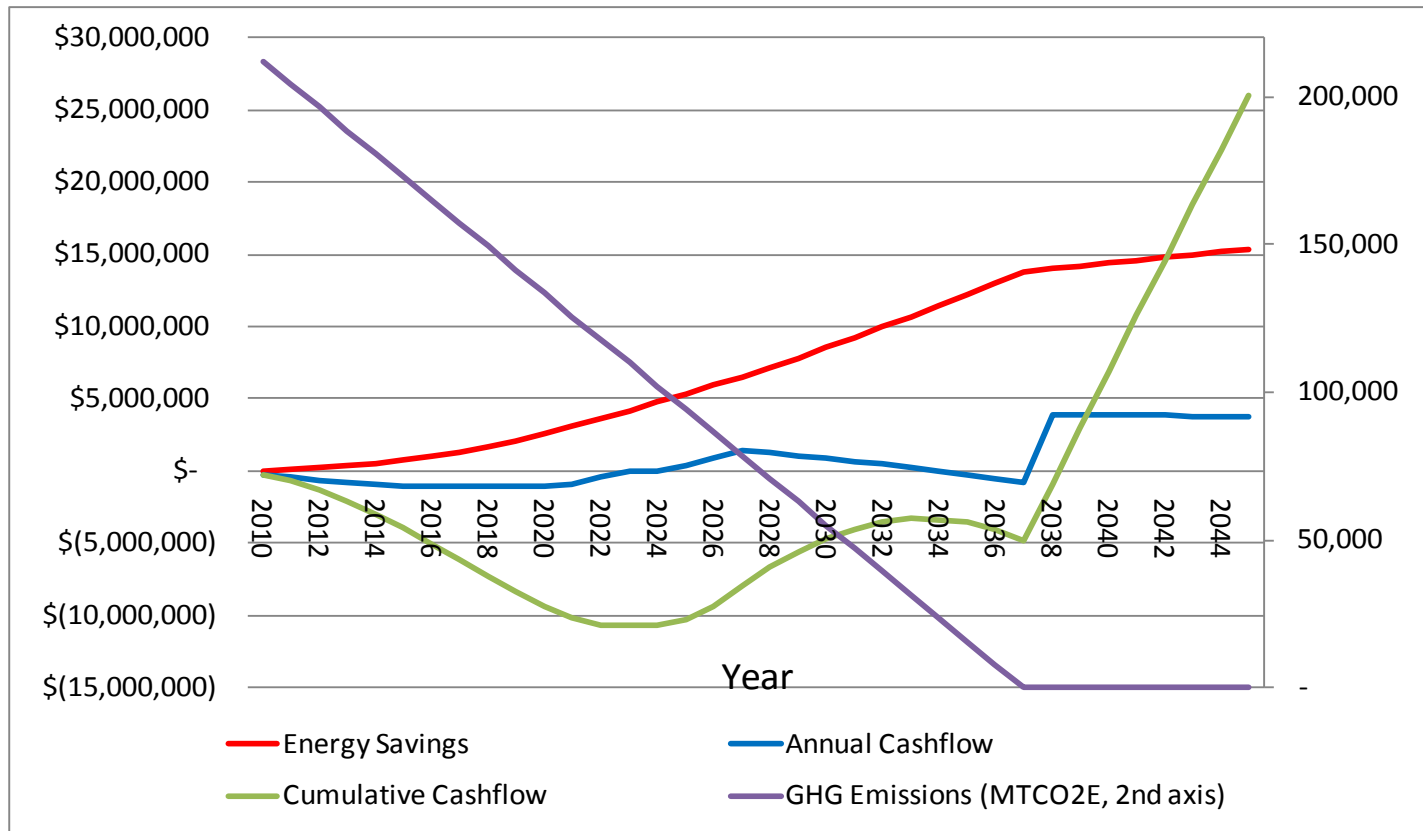
Strategy Type	Timeframe (years)
Short-Term	0-5
Medium-Term	5-15
Long-Term	15+

EXAMPLE TABLE OF EMISSIONS REDUCTIONS OPPORTUNITIES							
Project <sup>a</sup>	Simple Payback	Net Present Value	Project Cost	Annual Energy Savings	Annual GHG Savings	Cost-Benefit Index	Achievability
Pipe Insulation	1.9 yrs	\$292,959	\$71,250	\$37,500	92 MTCO <sub>2</sub> E	48	●
Interior Lighting/ Controls	6.5 yrs	\$238,850	\$475,000	\$73,500	291 MTCO <sub>2</sub> E	45	●
Green Computing	8.4 yrs	\$73,742	\$700,000	\$56,500	223 MTCO <sub>2</sub> E	18	●
Exterior Lighting/Controls	7.6 yrs	\$66,007	\$237,500	\$31,250	123 MTCO <sub>2</sub> E	16	●
Expanded Video Conferencing	1.9 yrs	\$390,612	\$95,000	\$50,000	325 MTCO <sub>2</sub> E	171	●

# Financial Model



Example Financial Trajectory to Carbon Neutrality



- Make business case for financial costs and benefits of GHG reduction

# Mitigation Planning Process



# Summary



- Greenhouse gas emissions reductions
  - Establish a baseline
  - Develop a mitigation plan
  - Implement plan
- By focusing on energy efficiency and conservation, both environmental and economic benefits can be realized.

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### GREENHOUSE GAS (GHG) MANAGEMENT PROGRAM

**OVERVIEW**

Climate change presents a fundamental challenge to the way organizations use energy and resources. An organizational greenhouse gas (GHG) management program is a means to address and act upon this challenge. The benefits of taking a proactive approach to reducing an organization's GHG emissions are far reaching and can have economic, environmental, and social impacts on an organization's performance, while helping to mitigate the problem of climate change.

**BENEFITS OF O'BRIEN & GERE'S GHG MANAGEMENT PROGRAM**

**Manage Risk**

Assess what climate change will cost the organization with regard to regulations and environmental impacts.

**Cost Savings for Clients**

Demand-side management programs and improves the efficiency with which an organization uses energy and resources.

**Ability to Study, Plan, and Act**

Through a 30P life-cycle delivery model, O'Brien & Gere leverages its staff of scientists, engineers, construction, and operation personnel to carry projects through the entire project life cycle.

**WE STUDY, WE PLAN, WE ACT**

**CLIMATE CHANGE SERVICES**

**Inventory Services**

- Baseline GHG Inventories
- Regulatory Risk Assessment
- Third Party Inventory Review
- Forecasting GHG Impacts of Proposed New Construction
- Carbon Disclosure Reporting
- GHG Emissions Certification
- Supply Chain Reporting

**Mitigation Services**

- Mitigation Planning / Climate Action Planning
- Energy Auditing
- Facility Siting/Tracking
- Financial Modeling
- Stakeholder Engagement

**RESPONDING TO A CHANGING ENVIRONMENT**

With climate change policy constantly developing, O'Brien & Gere helps organizations respond to a number of voluntary and mandatory GHG programs, including:

- American College and University Presidents Climate Commitment (ACUCC)
- Dow Jones Sustainability Index
- Carbon Disclosure Project
- New York State Environmental Quality Review Act (SEQRA)
- United States Environmental Protection Agency (EPA) Mandatory Reporting Rule
- Climate Registry
- Corporate Sustainability

