

Industrial Energy and Environmental Programs

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Nexus between Energy Generation and Carbon Emissions

- **New world agenda compels them to be inextricably linked**
- **Heightened focus on Energy Management**
 - ◆ Energy security and independence
 - ◆ Reduced energy consumption through increased efficiency
 - ◆ Alternative energy sources
 - ◆ Energy procurement

coupled with

- **Increasing GHG regulatory, economic, and social drivers**

Alignment of Energy and Carbon Management Programs

An integrated strategy leads to:

- Operational efficiency
- Energy conservation
- Energy security
- Reduced GHG emissions
- Positive environmental impact
- Proof of social responsibility



Supply Side – Future reliance on mix of Energy Sources to Lower/Offset GHG Emissions

- **Fossil fuel energy sources**
 - » Emergent Clean Technology
 - » Repowering – energy efficient technology and/or cleaner fuels
 - » Co-generation
 - » Distributed generation
- **Low-emitting renewable energy sources**
 - » Biomass
- **Non-emitting renewable energy sources**
 - » Wind
 - » Solar
 - » Geothermal
- **Lower carbon impact fuels**
 - » Nuclear
 - » Landfill gas
 - » Facility residual waste

Thermal Energy Efficiency Measures

System	Average Annual Energy Savings (% of total facility energy use)
Boiler efficiency measures	2.8%
Steam Systems	2.0%
Heat Containment	1.5%
Waste Heat Recovery	4.6%
Process Cooling	1.1%
Air Compressors	0.4%
Source: US EPA Climate Wise Wise Rules for Industrial Efficiency	

Other GHG Reduction Options - Offsets/Green Power Purchase

- **Carbon Markets, e.g.,**
 - ◆ Voluntary Emission Reductions (VERs)
 - ◆ Voluntary Carbon Standard (VCS)
 - ◆ Chicago Climate Exchange
 - ◆ Climate Action Reserve
- **Sources of Offsets vary from renewable energy to agro-forestry**
- **Some stakeholders question the value of offsets vs. reducing demand and efficiently generating power on-site**
- **Renewable Energy Certificates (RECs)**
 - ◆ Used to offset emissions from electricity purchased from the grid
- **Green power available for purchase from utilities (RPS)**

Who wants to know about your carbon emissions? Seems like everyone!

- **CEO, President, CFO, Director of Sustainability – Business Opportunities and Risks**
- **US EPA – Mandatory GHG Reporting Rule, GHG-related air regulations**
- **Congress/Obama Administration – Emerging National Legislation (e.g., Cap and Trade)**
- **State Agencies – Voluntary and mandatory GHG reporting**
- **Shareholders – Concerns for their investment and how you are managing Climate Change business risks**
- **Employees and Students – Taking a keen interest in the Company they work for or school they attend**
- **SEC and Investors – Disclosure of GHG emissions and carbon risks and management plan**
- **Customers – Greening of Supply Chain**
- **Other stakeholders – Social responsibility and sustainability**

US EPA Final GHG Reporting Rule (40 CFR Part 98) – Covered Sources

Category	Examples	Emissions Threshold	Sources to Include
Named Source Categories	<ul style="list-style-type: none"> • Petroleum Refineries • Cement Plants • Aluminum Production • Electricity Generation 	None	Listed sources in source category
Named Source Categories	<ul style="list-style-type: none"> • Glass Production • Pulp and Paper Manufacturing • Iron and Steel Production 	25,000 metric tonnes CO ₂ e actual emissions	Listed sources in source category
Sources not otherwise named	<ul style="list-style-type: none"> • Manufacturing • Universities and Colleges 	25,000 metric tonnes CO ₂ e actual emissions	Stationary fuel combustion sources only (est. 3,000 facilities)

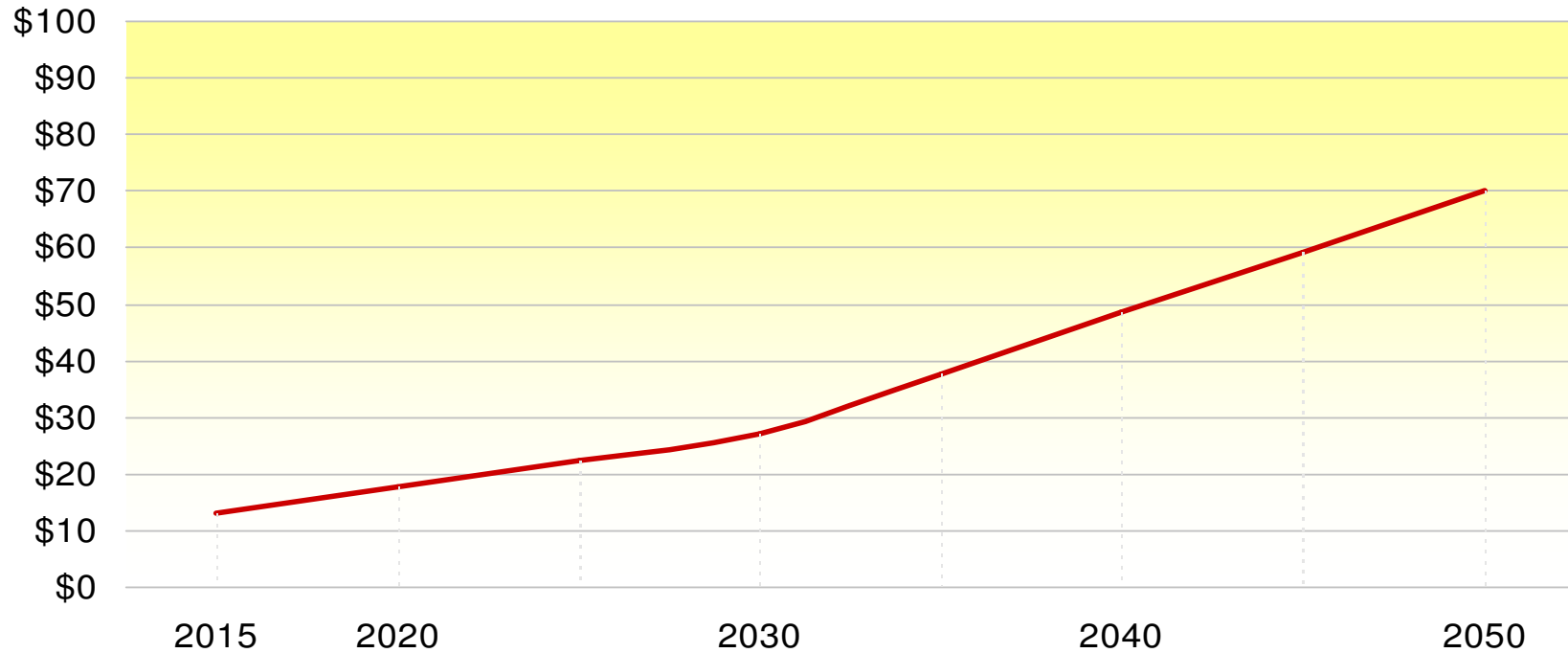
Looking Forward - National Climate Change Legislation

- **Underpinnings of Waxman-Markey and Boxer-Kerry House and Senate Bills**
 - ◆ Create “Clean Energy” jobs
 - ◆ Make America energy independent
 - ◆ Address global warming through GHG reductions
- **Still a long way to go with much debate**
- **What will be a given (as it relates to ICI energy production):**
 - ◆ Emphasis on decarbonizing power generation
 - ◆ Investment in energy efficiency
 - ◆ Promotion of clean technology
 - ◆ Some form of a carbon market
- **US EPA using tactical strategy to move Congress**

Cost of Carbon and Why GHG Accuracy is Important

Projected cost of carbon allowances (\$/ton in 2005 constant dollars)

Source: EPA preliminary analysis of Waxman-Markey



Boxer-Kerry “Carbon Collar” @ \$28/ton

- Small Facility (25,000 tpy) @\$25/ton → **\$625,000** Value at Risk
- Larger Facility (250,000 tpy) @\$25/ton → **\$6,250,000** Value at Risk

Looking Forward (cont'd) – US EPA GHG Air Regulatory Initiatives

US EPA Actions

- Finalizing light duty vehicles GHG emissions regulation will establish GHG as CAA “regulated” pollutant
- Triggering a domino effect with “tailored” program?
 - ◆ New Source Review (PSD and BACT ...)
 - ◆ Title V Operating Permitting

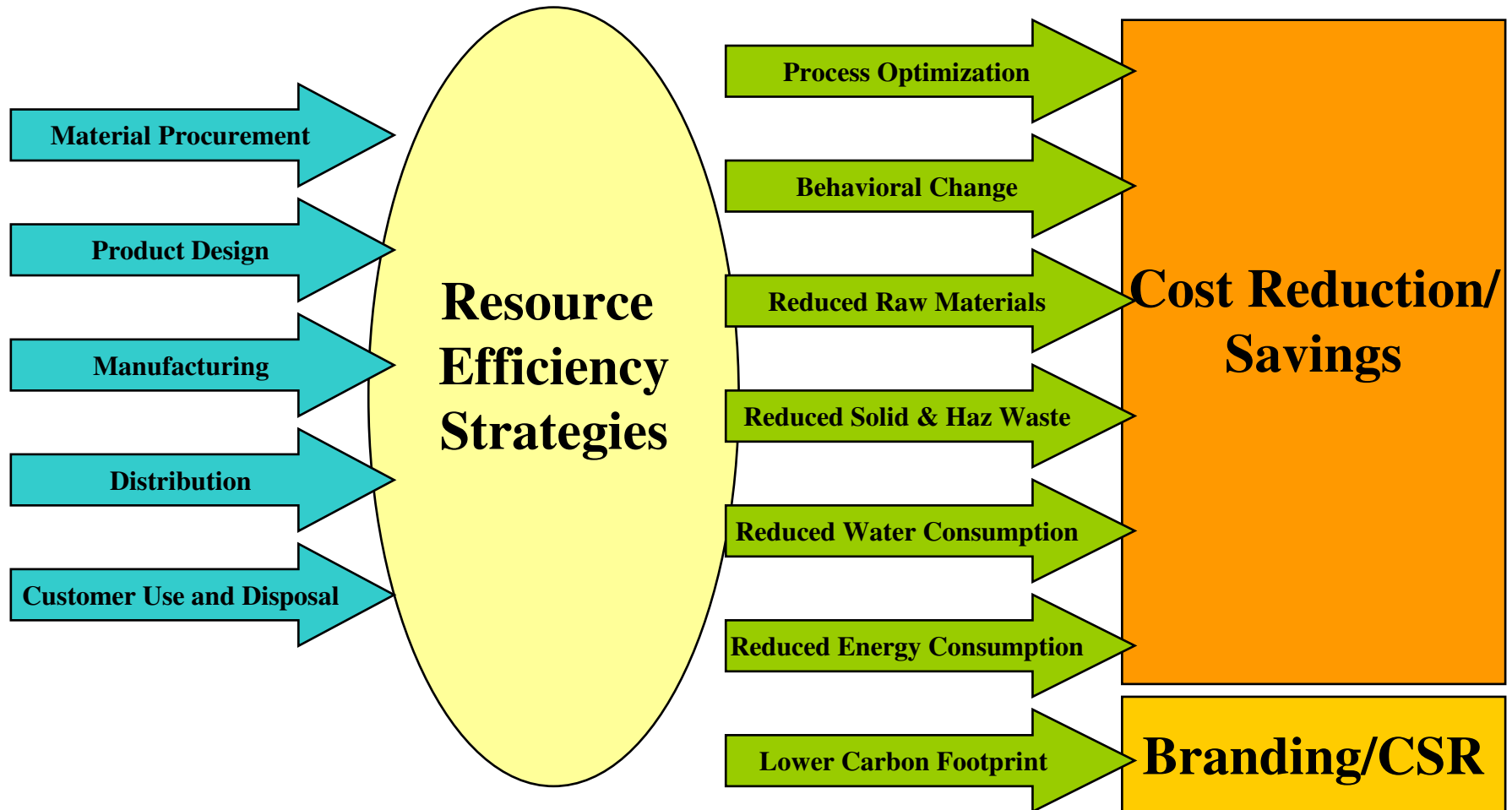
Consequences

- Stakeholders’ have “...little or no understanding of the diversity and technical complexities...”
- Disconnect with state PSD programs
- Overburdening an already stressed federal and state permitting system
- Difficult BACT issues
- Questionable added value and redundancy with national and state programs in place to reduce GHG emissions

Meeting Carbon Management Obligations - Creating a New Business Paradigm

- **GHG impacts of a project now assessed as part of Capital Appropriation Funding Requests**
- **Integrated in M&A/Due Diligence transactions**
- **Leading driver for Corporate, Institution and Community Sustainability Programs**
- **GHG Reduction Project Identification and Prioritization**
 - ◆ Build marginal abatement cost curves to maximize financial advantage of options
 - ◆ Becoming a key criterion for evaluating projects in the capital planning pipeline
- **Industry leaders securing position by installing low-carbon technology**

Resource Efficiency is Part of Every Day Business



Closing Thoughts

- **You have an ever increasing role in managing your organization's business risks and associated impacts (upside and downside)**
- **Need to develop strategies now to minimize the impacts of operating in a carbon-constrained world or otherwise forfeit control and suffer the consequences**
- **Ensure the quality of your data sources and accuracy of your GHG emission estimates**
- **Document your energy efficiency successes and keep a detailed accounting of GHG reductions**