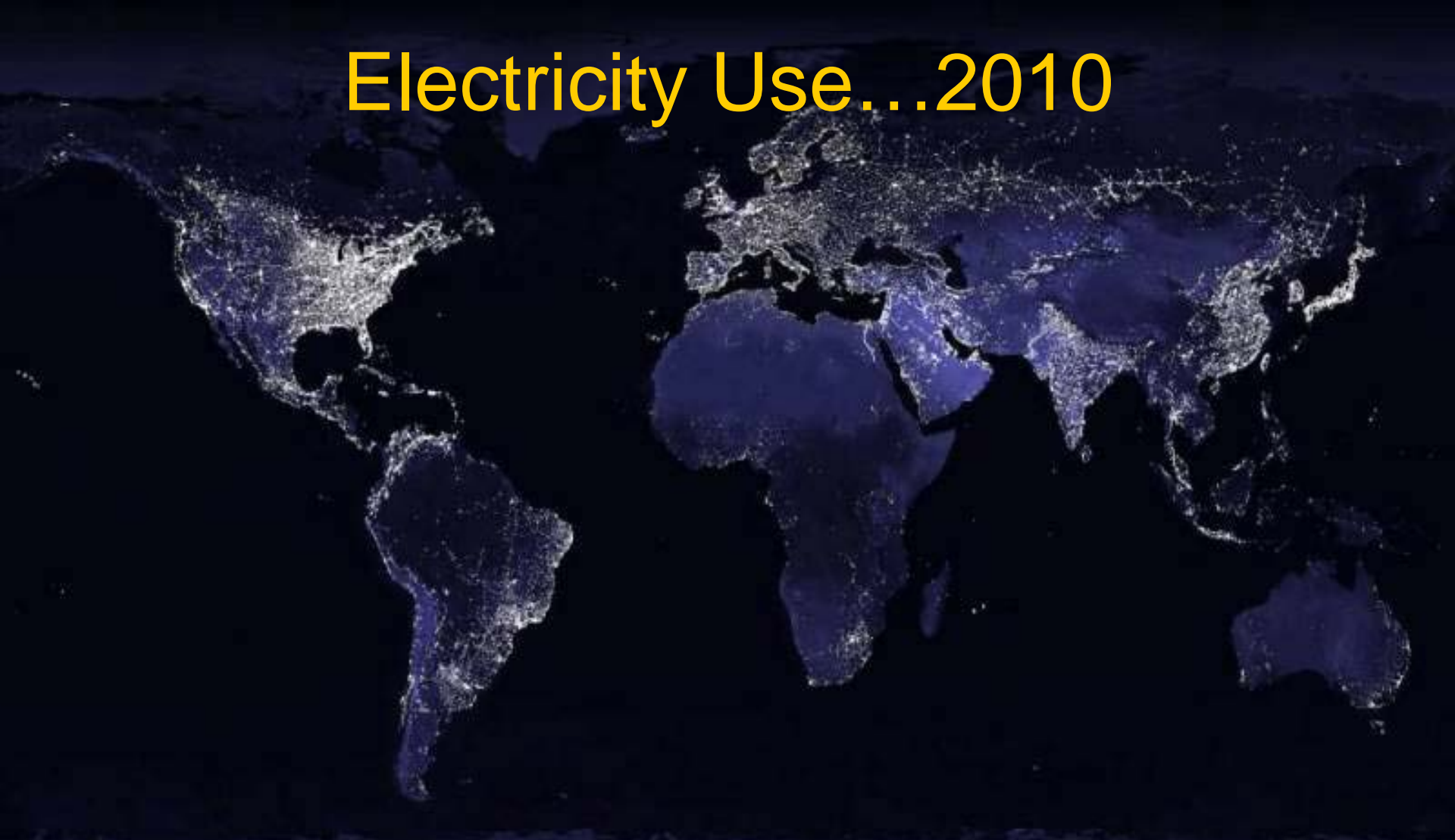


Greening the Supply Chain



Jeffrey G. Ruebesam, P.E.
March 2010

Electricity Use...2010



Electricity Use...2030



Significant long-term growth

Global dynamics ...



Energy Demand ...
continues to increase



Environmental requirements ...
are increasing, requiring higher efficiency,
lower emissions and new technologies



Political landscape ...
is uncertain, dynamic and difficult to anticipate

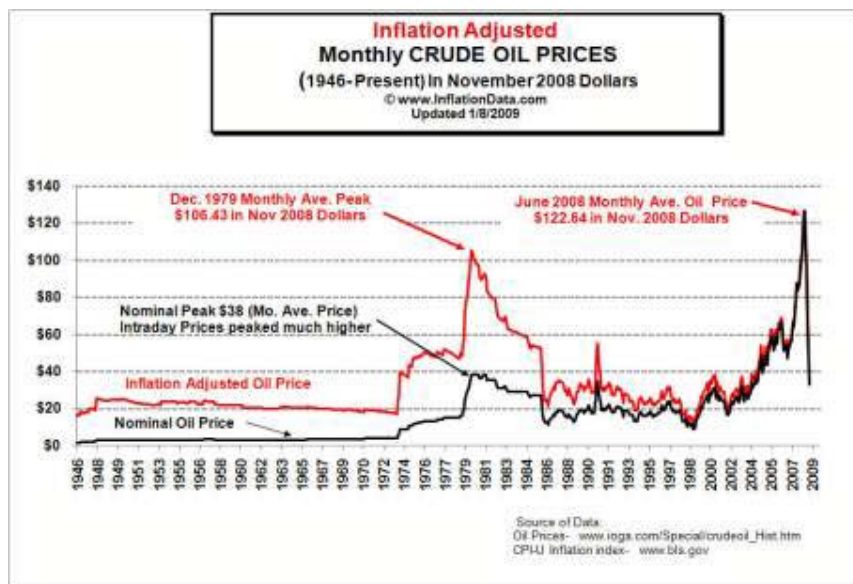


Energy security ...
rising concerns with infrastructure investment
in all areas



Fuel prices ...
continue to be volatile, increasing interest in
alternatives

Energy



Key Implications

- Increased/rapidly fluctuating energy costs
- Growing interest for new and leapfrog technologies within developing world

Global Warming



Key Implications

- Increased interest in lower-carbon products, energy and supply chain
- Increased need to monitor, measure and manage carbon footprint
- Some companies have increased appetite to learn from their suppliers...
- ... while others teach/push their suppliers

ecoTrends (cont.)

Regulations & Standards



WEEE, RoHS
Waste Electrical and Electronic
Equipment

Restriction of Hazardous
Substances



EuP
EU Energy-Using Products
Framework Directive



IEC 60601-1-9
Environmentally conscious
design of medical electrical
equipment

Key Implications

- Increasing focus on EHS, product take-back, ecodesign and life cycle assessment

Green Marketing Guidelines



Canadian guidelines
revised in 2008
-Life cycle perspective
-No sustainability claims allowed



US FTC guidelines
under revision
-Will likely address life cycle
perspectives



EU guidelines
under revision
-Moving toward life cycle discussion
-Sustainability claims being
challenged

Key Implications

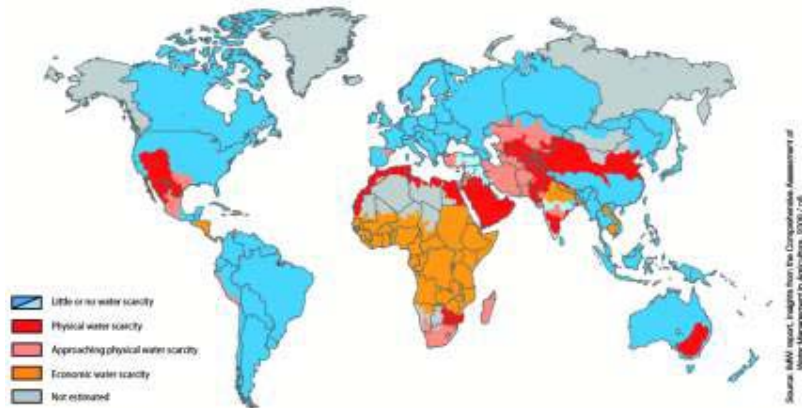
- Tighter environmental messaging
- Life cycle perspective becoming increasingly relevant to marketing

[link](#)

ecoTrends (cont.)

Water Scarcity

Areas of physical and economic water scarcity



Key Implications

- Growing concern about water scarcity, especially in developing countries where climate impacts will be felt
- Demand for products that can be used with limited or no potable water

Waste and Disposal Issues

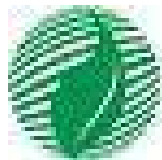


Key Implications

- To reduce household waste streams, many US & EU towns using “Pay as You Throw” schemes to charge consumers per unit waste
- Customers likely to increasingly value take-back and recycling programs

Sources: Catawba County Utilities & Engineering, WWF, GreenOrder

Green Initiatives/Partnerships



Green Suppliers Network

U.S. EPA & U.S. DOC's Manufacturing Extension Partnership (MEP)

Linking Lean & Clean since 2004

- Connects large manufacturers to their suppliers
- Project focus – cost reductions and sustainability improvements
- Lifecycle assessment & methodologies for reducing product GHG emissions

CARBON DISCLOSURE PROJECT

Launched in 2000, 1st report 2003

- Represents 475 institutional investors, purchasing org's and gov't bodies with \$55 trillion in assets under management
- Publishes annual report on how the largest companies around the globe (2204 companies in 2008, representing 26% of global anthropogenic emissions) are responding to climate change
- Maintains the largest corporate GHG emissions database in the world

Customers...more and tougher inquiries

Independent Utility...

“What are the supply chain emissions associated with nuclear power?”

Multinational Events Sponsor...

“What is the life cycle carbon cost of one 2.5 MW wind turbine?”

Product Retailer...

“What percentage of the total carbon life cycle is product manufacturing versus transit & use?”

We can't answer these questions without supplier Input!

GE's answer ... a business strategy

ecomaginationSM

Commitments

- **Grow** revenues to \$25B^{link}
- **Double** R&D to \$1.5B^{link}
- **Reduce** *our* Energy & Water use, and GHG emissions
- **Engage** the public



Ecomagination: GE Operations

Emissions & Energy Efficiency

1% Absolute GHG Reduction by 2012

30% energy efficiency improvement by 2012

30% GHG intensity reduction by 2008 ✓

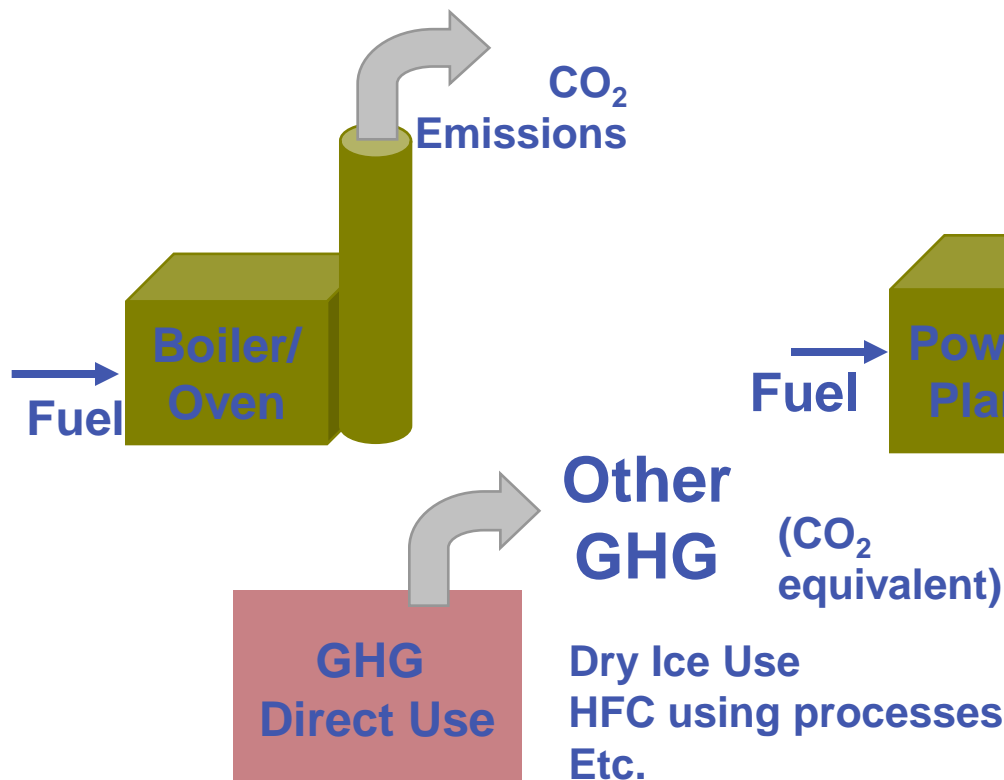
Water Use

20% Water use reduction by 2012

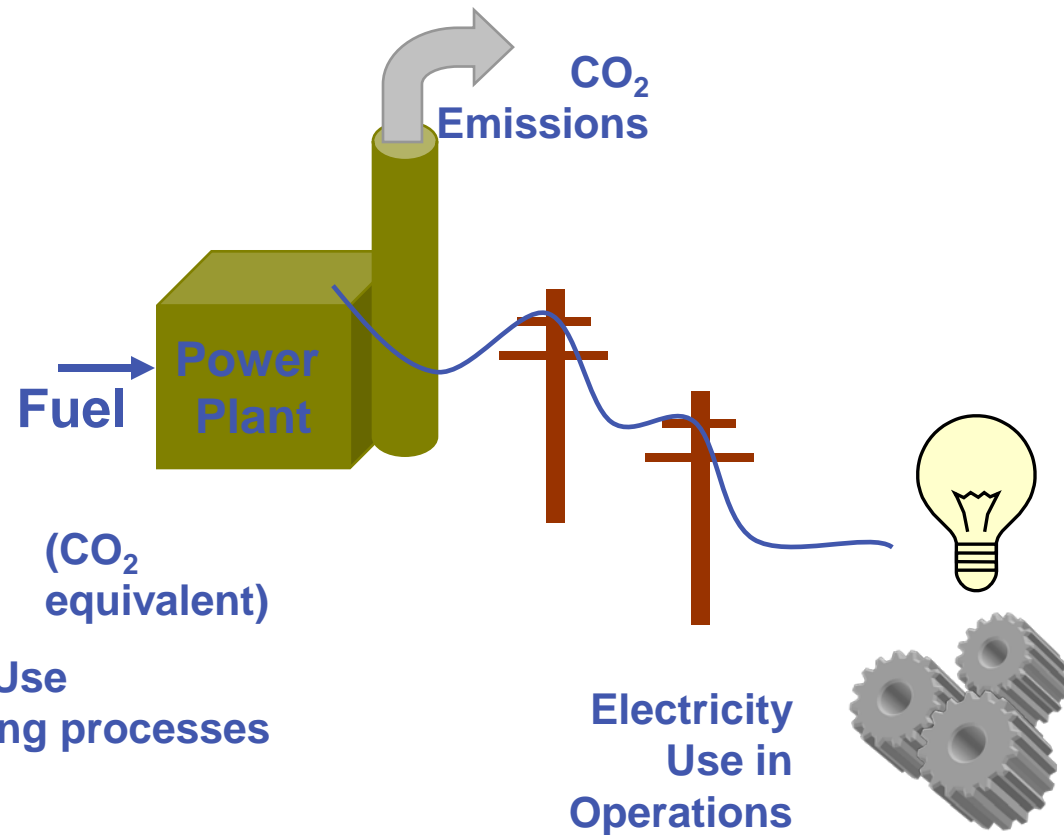


GHG Emissions...what we measure

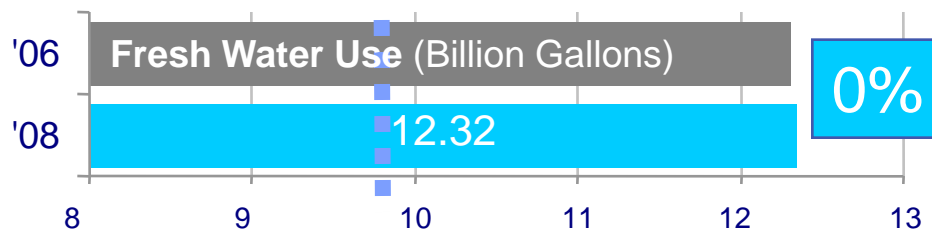
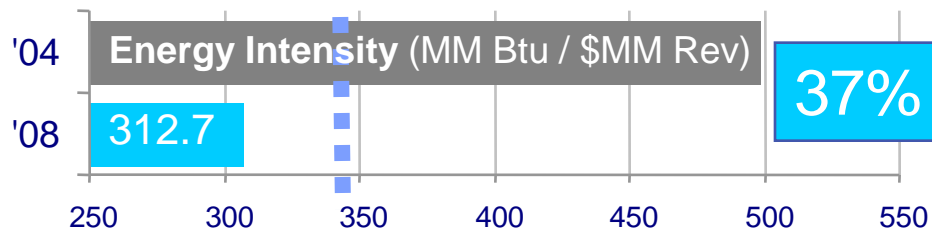
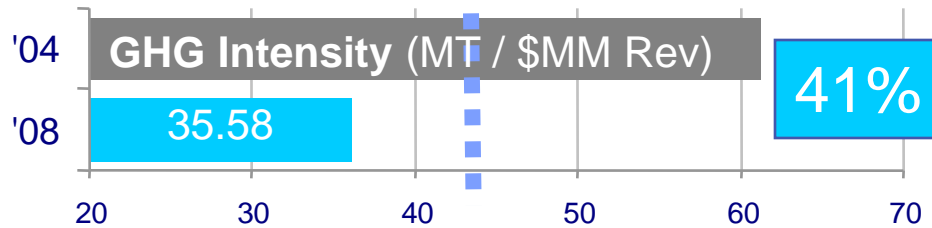
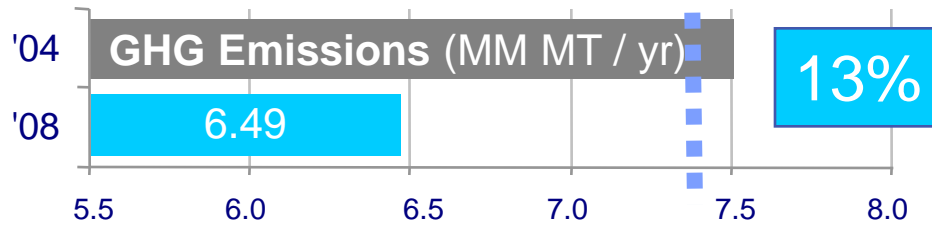
Direct Emissions from GE Operations



Indirect Emissions from GE Operations



Progress... (through 2008)



Accountability

- Leadership visibility

Creativity

- Employees Engaged

Links to Operational Goals

- \$100+ MM savings

■ ■ ■ ■ ■ Commitment

How we achieved results....Lean is Green

Energy Treasure Hunts

- Leveraged from Toyota
- Uses Lean Work-Out Approach
- Engages employees, suppliers, and utility providers
- Identifies & quantifies ROI & GHG reduction opportunities



Results:

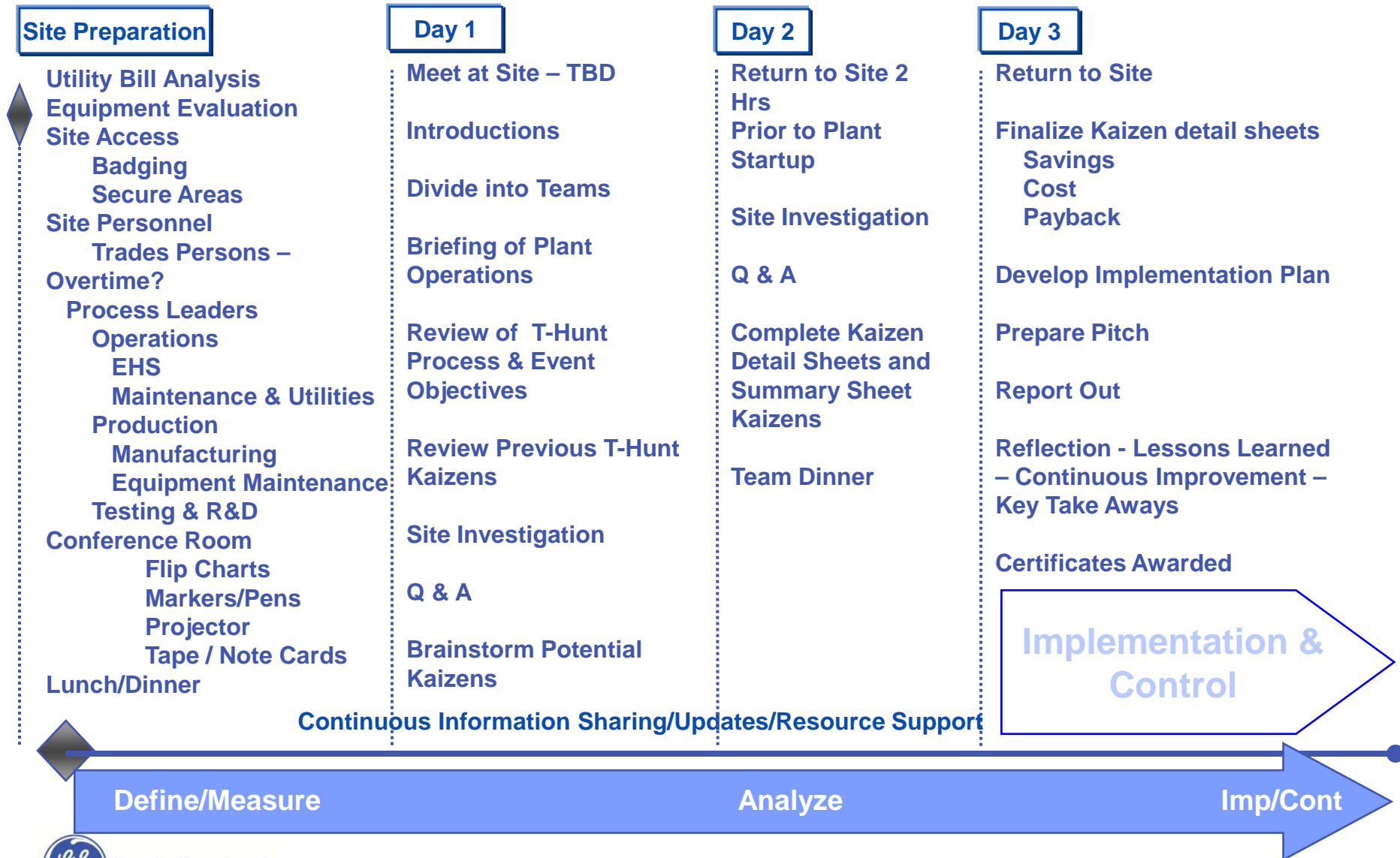
300+ Events since 2005
5,000+ projects
3,000+ GE employees trained

Top Findings:

Lighting
Leaks (air & steam)
Peak load (\$)

800,000 MT CO2 /\$140MM cost savings

Treasure Hunt Process Map



Energy Efficiency through Technology

Supply Chain

Work with Vendors:

Facility/supplier location

Logistics modeling

Engineering Efforts:

Product weight reductions

Part number reductions

Plant

Infrastructure Systems:

Electrical

Network

Steam

Gases

Waste

Cooling Water

Compressed Air

.....



Facility controls

Process



Machine controls, motors & drives



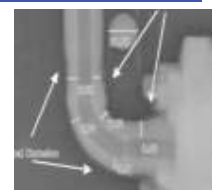
Sensors



Industrial Motors



Process step reduction

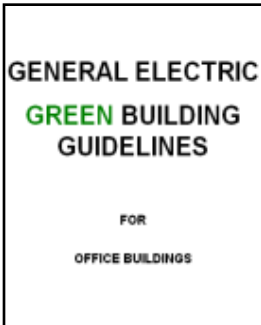


Inspection & test

Energy Efficient Building Tools



- ⇒ Optimize Site Potential
- ⇒ Optimize Energy Use
- ⇒ Conserve Water
- ⇒ Use Environmentally Preferable products
- ⇒ Enhance Indoor Air Quality
- ⇒ Optimize Operational & Maintenance Practices



Global Guidelines enhanced to incorporate green building and/or sustainable design language and specifications for each technology, product, and system.

Green Lease Standards – Integrated into EHS Transactions for CP&SO... Leverage throughout GE...



Guidelines developed to identify strategies to reduce lighting and cooling loads and increase productivity and worker health.



LEEDS:
 Norwalk, CT
 Shanghai, China
 Mississauga, Ontario
 Ontario, Canada
 Bangalore, India
 Schenectady, NY



Logistics: Carbon Footprint Initiative

Measure:

Partnership with MIT in 08-09 to benchmark industry standards and develop “CO2 calculator” for Logistics activities

Improve:

1. SmartWay

- GE Energy Logistics now SmartWay (US EPA Program) certified
- 2010 Initiative: Required for 100% of Wind carriers

2. Imagining innovative solutions

- Mode shift projects – air to ocean (2009 Savings: \$5.6M; 1000T CO2) & road to rail
- Opportunities to increase barge utilization in US



Working with Supply Chain Suppliers

Identifying opportunities for CO2 Reduction ... and Supplier Cost Savings!

- Treasure Hunt Methodology
- Efficiency through Technology

Participating Suppliers

Corradi	Jofal
Açoforja	SKF do Brasil
Termomecânica	Eletrisol
Cautec	Villares Metals
ASA Alumínio	Sacchelli
GEA do Brasil	DMI Isolantes
Fundição Alvorada	White Martins
Brastak	Acesita Arecelor
Fiacbras	Pirelli
Paulifer	Cosipa
Zollern	



What's Needed Moving Forward

- Emission Targets and price for carbon
- Clear, Stable Regulatory Framework
- Reliable Incentives
- R&D Support ...
Government & Industry

Long Term Vision and Clear

Back-up

ecomagination commitment ... to customers

New products every year that measurably:

Improve operating performance

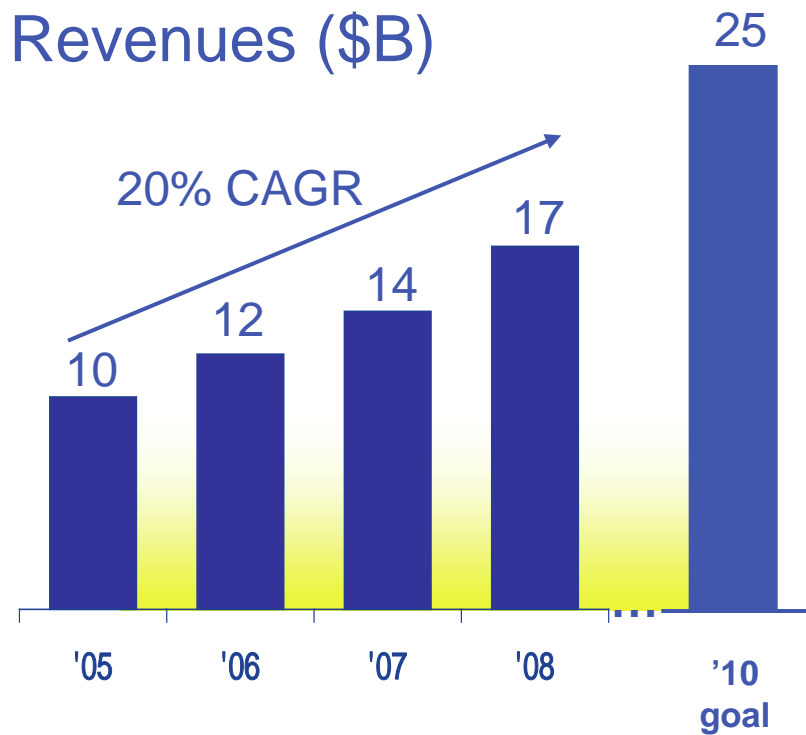
- ✓ Lower operating cost
- ✓ Improve value proposition
- ✓ Improve competitive position



improve environmental performance

- ✓ 'Inherently' "green" (wind & solar energy)
- ✓ Significantly better than installed base
- ✓ Meets third party standard (e.g., Energy Star)

Innovative technologies...now



- 80 certified products
- company-wide solutions

Carbon



Energy Efficiency



Water



ecomagination product portfolio

Products certified

Aviation

- GEnx
- GE90-115B
- LM2500+
- CFM56-3* Upgrade

Consumer Finance

- Earth Rewards Card

Rail

- Evolution
- Hybrid
- China Evolution
- Russia Modernization

Water

- Desalination
- Pure Water Membrane

Energy

- Wind
- IGCC
- Solar
- H Turbine
- Jenbacher CMM, Biogas & Landfill
- LMS100
- Nuclear ABWR & ESBWR

Consumer & Industrial

- Energy Smart CFLs
- Energy Star Refrigerators, Dishwashers, Washers & Water Coolers/Dispensers
- T8 & T5, Diamond Precise & Halogen HIR Lamps
- Ultra Motors

More in process

Rail

- SmartBurn

Fanuc

- Proficy Plant Applications Software

Oil & Gas

- PII Ultrascan Duo

Energy

- Max 9
- PulsePleat
- Hydro
- Environmental Services

Water

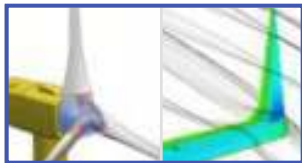
- Cooling Solutions
- Fuel Treatment
- Predator
- Demineralization with RO

Consumer & Industrial

- CMH Lamps
- LEDs
- Hybrid powertrain
- Eco Home

R&D...Innovative technologies for tomorrow

Wind



Solar



Carbon Capture



Energy Storage



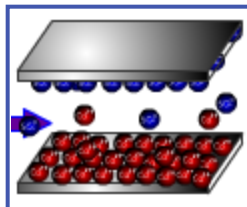
\$1.5B by 2010

doubling our
2005 investment

Advanced
Desalination



Zero Liquid
Discharge



Hybrid evo



OLEDs



GENx



Turbine Efficiency



Product Life Cycle Assessment

