Caterpillar's Climate Leaders Journey

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Corporate Environmental Affairs

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Who We Are

- Established in 1925 with merger of Holt and Best tractor companies: first diesel tractor model built in East Peoria, Illinois in 1931
- Global Enterprise
  - 95,000+ employees
  - 270+ Facilities
  - In 40 countries/6 continents
- Fortune 100 Company / Fortune 500 Global Company
- Three principal lines of business:
  - machinery, engines, financial products

Diversity of Product

Excavators

Backhoe loaders

Track-type tractors

Motor graders

Trucks

Paving products

Wheel loaders

Compact construction equipment

Engines

Logistics Services and Remanufacturing

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Corporate Footprint

- 30 Divisions, comprised of
  - 125+ Manufacturing facilities (includes Reman)
  - 80+ Cat Logistics Service facilities
  - 20+ Parts Distribution facilities
  - 10+ Research and Design Centers
  - 15+ Training and Demo facilities
  - 4 Proving Grounds

Climate Leaders History

- Set energy efficiency targets in 1998 and accomplished in 2002
- Looking for new challenge and joined Climate Leaders in 2003
- Assumptions in setting intensity goal
  - Meet $30 B revenue in 2006 and continued growth at rate of inflation through 2010
  - 5 to 10% energy efficiency from 6 Sigma projects

CO_2 reduction commitment:

- Climate Leaders goal of 20% intensity reduction by 2010
- Internal goal of 35% intensity reduction by 2010

Tools and Strategies

- Strategy is to integrate energy/CO_2 into existing strategies:
  - Utilize 6 Sigma Methodology
    - 300+ projects completed
    - 600+ active projects
  - More recently integrating into Caterpillar Production System (CPS)
    - Rapid Improvement Workshop (RIW), 5S
      - Ultimate goal is to chase waste
- Benchmark and accountability structure: Dow Jones Sustainability Index, Climate Leaders, Carbon Disclosure, Climate Resolve, SEE Change, and US CAP
- Transparency: Published 2005 and 2006 Sustainability Reports

Tools and Strategies

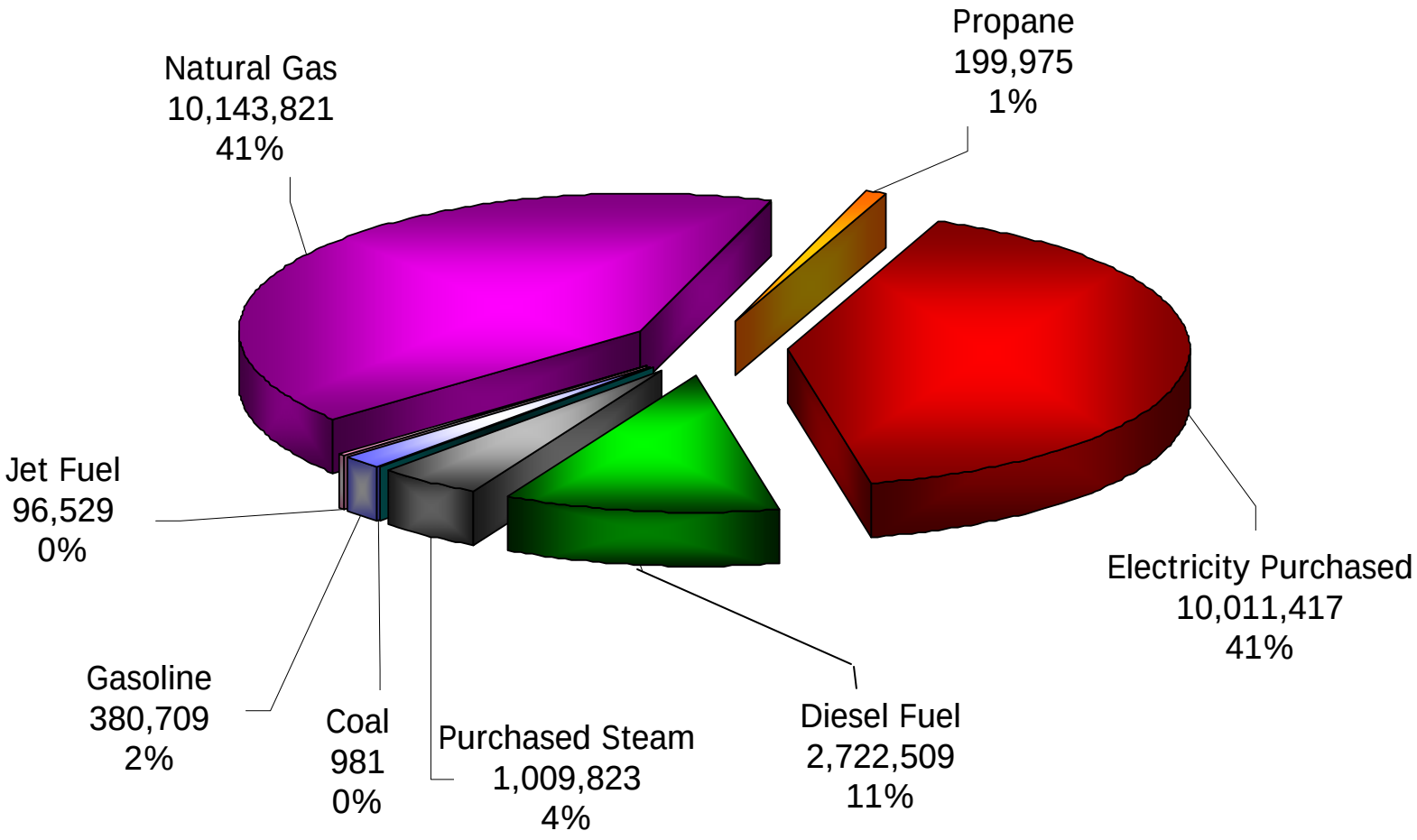
- Corporate strategy teams
  - SD Board
  - Operational Environmental Strategy Team
  - Energy Management Steering Team
    - Green Building Policy (LEED)
- Facility strategy
  - Facility Energy Teams
  - Energy Self Assessment
  - Environmental approval for process changes and new equipment

Facility CO_2 Drivers

- Operations
  - Foundry Operations
  - Heat Treat
  - Welding
  - Painting
  - Compressed air
  - Machining
    - (milling, drilling, lathe, honing, lapping)
- Building
  - HVAC
  - Pumps
  - Motors
  - Drives
  - Fans

For large facilities about 35 - 45% of energy is variable 60% period

Energy Consumed (GJ)



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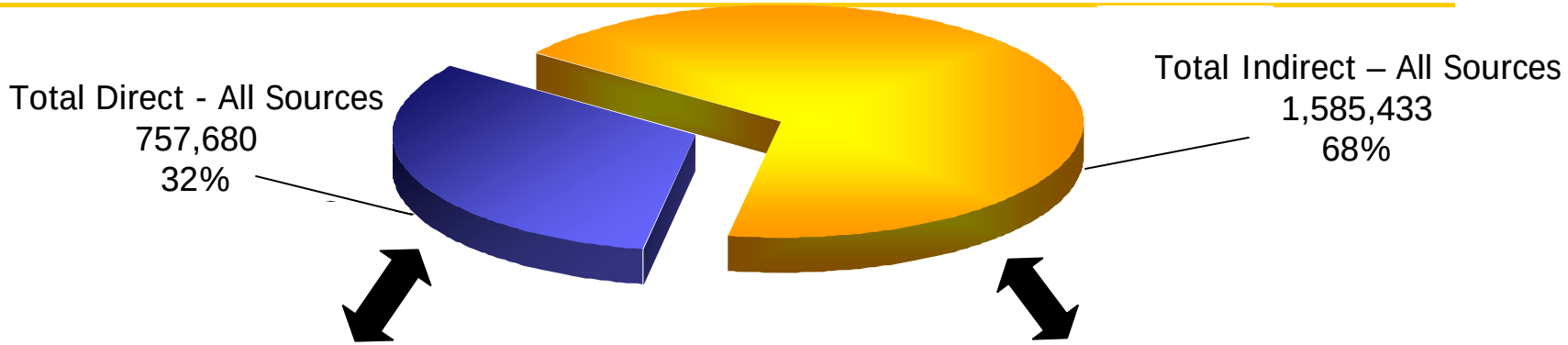
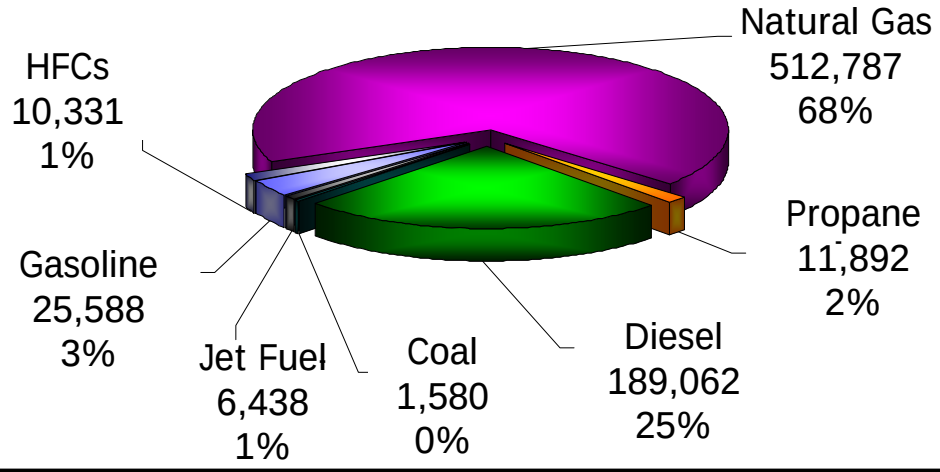
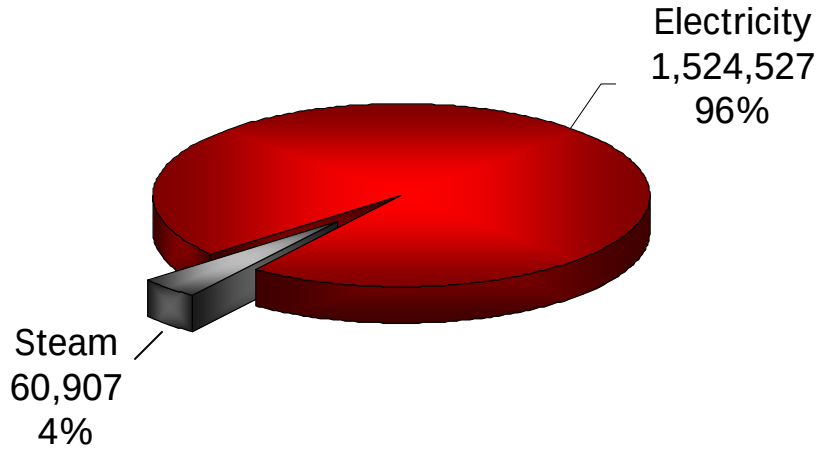
Emissions Breakdown (MT CO_2-eq)



Contributors to Direct Emissions – MT CO_2-eq



Contributors to Indirect Emissions – MT CO_2-eq



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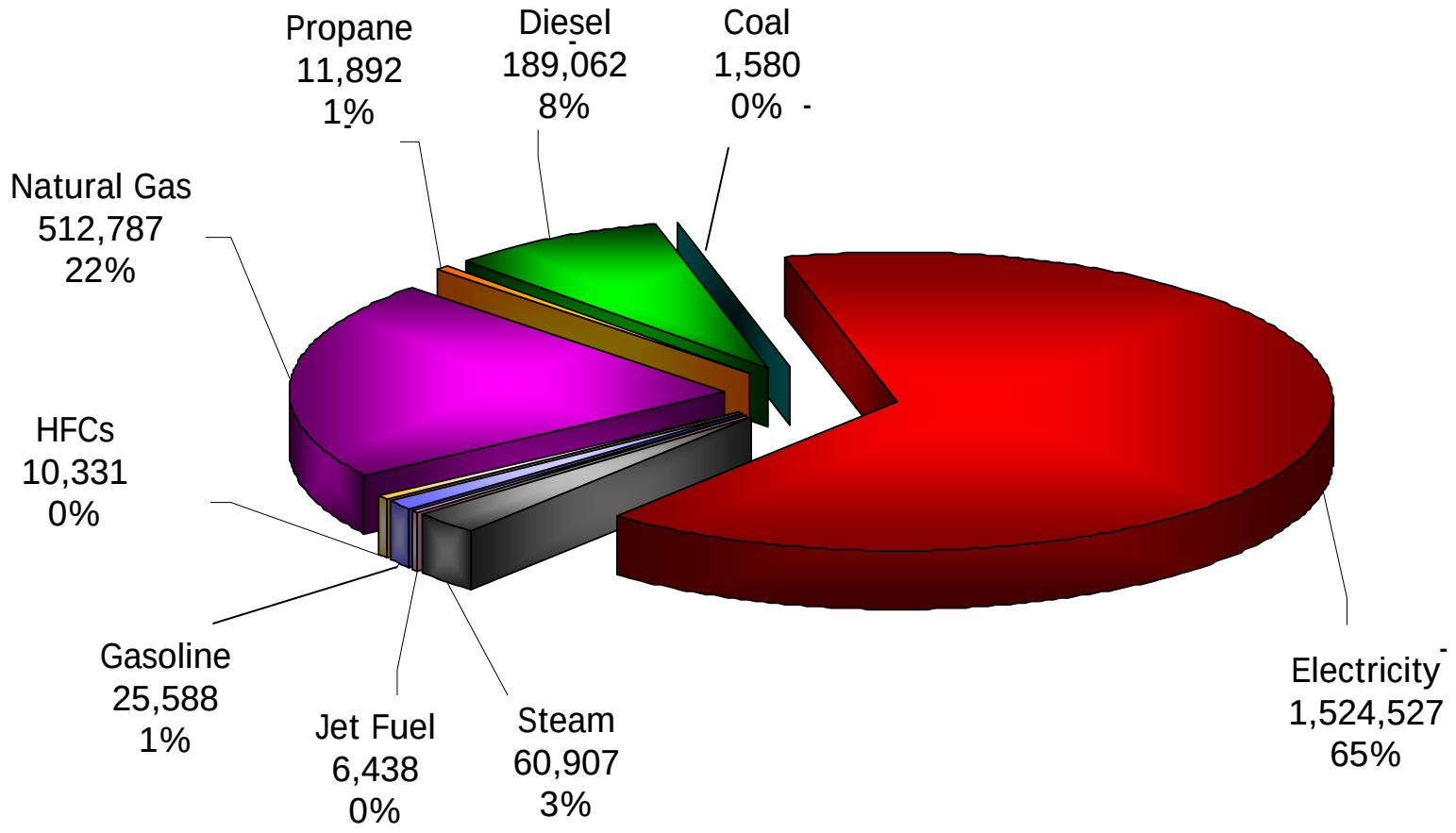
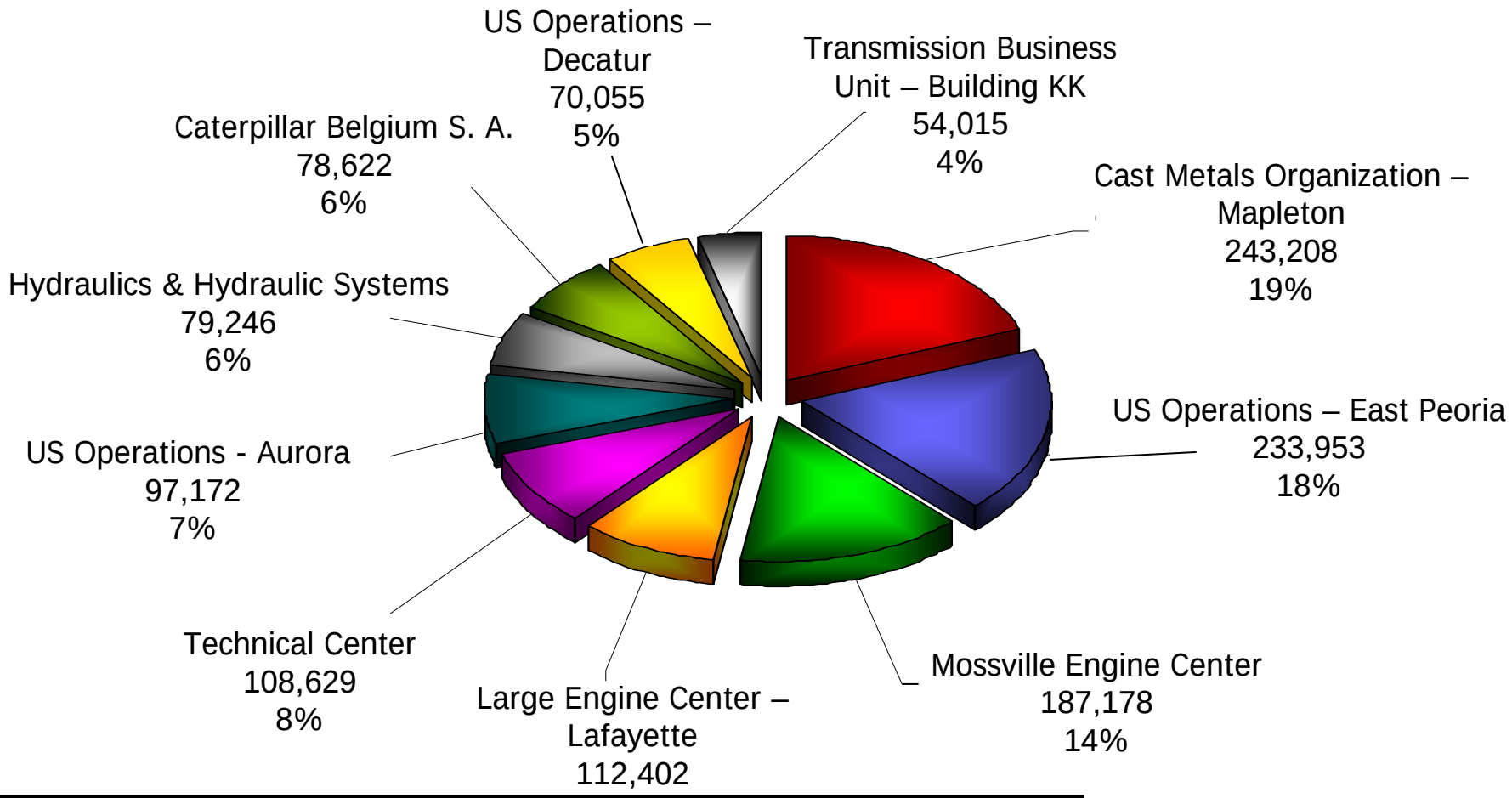
Emissions by Source (MT CO_2-eq)



Top 10 GHG Contributors (54 %)



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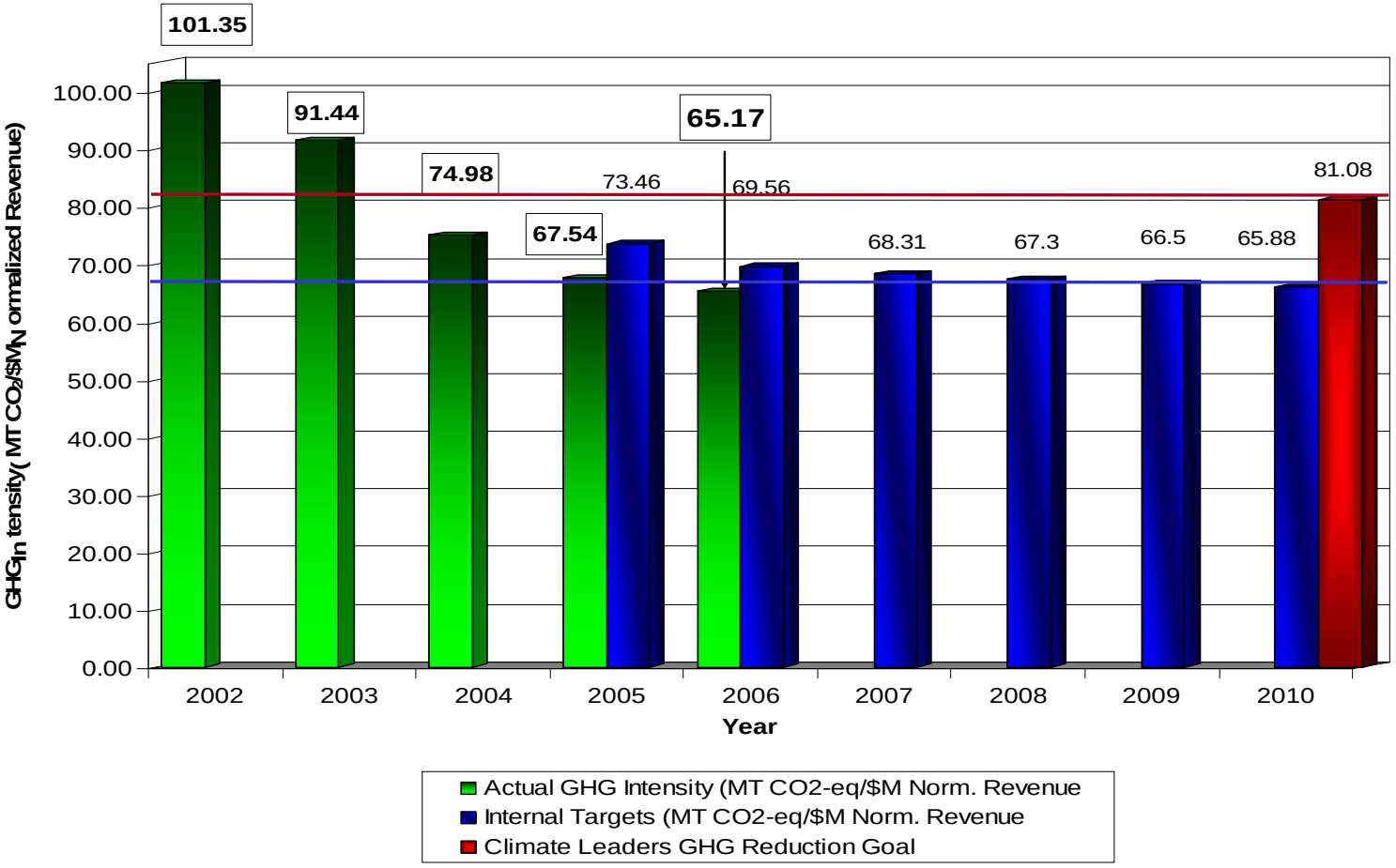
GHG Intensity Trends and Targets



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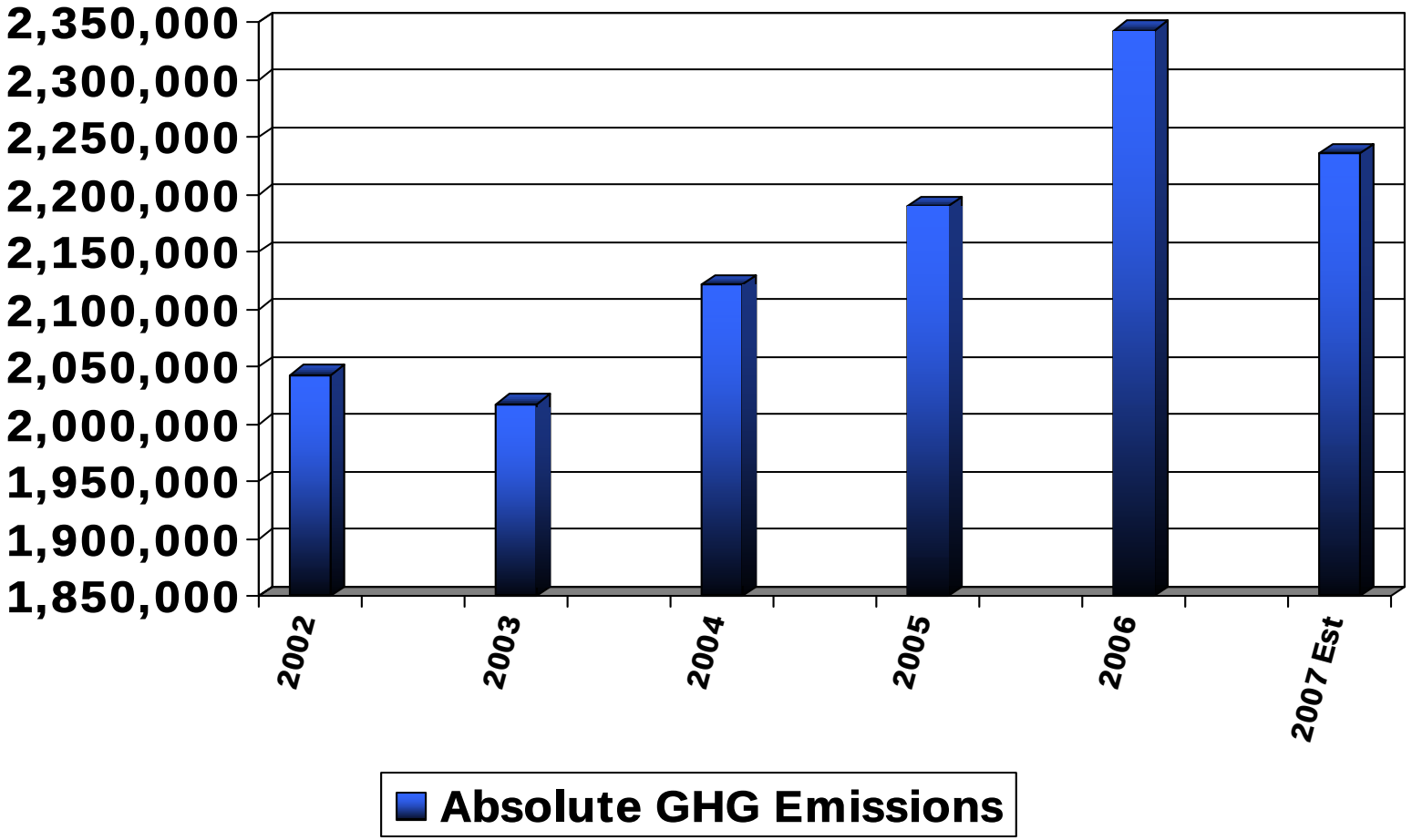
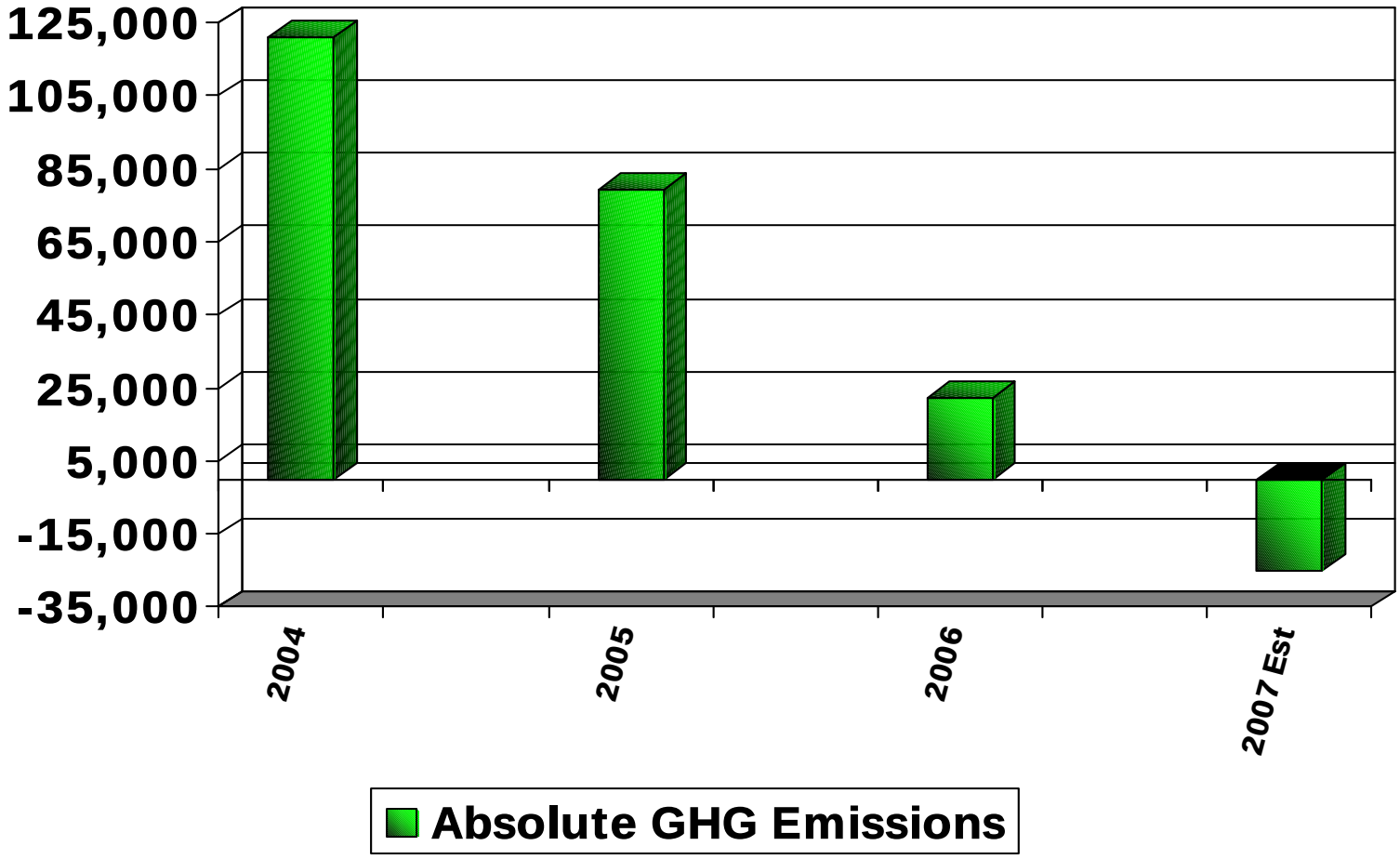
Absolute GHG Emissions



GHG Emissions Changes



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Where We Are Today

- 2006 results met 2010 targets (internal and external)
- Evaluating new absolute target
- Intensity reduction driven by
  - Strong revenue growth
  - Controlling GHG emissions growth
- Continuing Facility Projects for added reductions

- Lighting	- Air compressors	- Motors
- Heating	- Paint operations	- Variable speed drives
- Ventilating	- Machine improvements	
- Radiant heat	- Heat treat projects	

Best Practice - Piracicaba, Brazil

Automated Energy Utilization

- Issue
  - Improvement opportunities in energy utilization
    - 6 Sigma team created
    - Analyzed the process of energy consumption

- Results
  - Automation of the control process for lighting, motors and ventilation
  - 10,283 MWh annual savings (869 MT CO_2) 14% of facility total

Best Practice - Asia Trak (Tianjin)

Electric Power Consumption Savings

- Issue
  - Electrical power consumption
    - Pareto Analysis of plant power usage

- Results
  - Adjustments in cooling water system operations and lighting patterns led to an annual savings of 1,137 MWh (855 MT CO_2) 3% of facility total

Best Practice - Monterrey, Mexico

Load Shifting Strategies

- Issue
  - Electric energy reduction program
  - Shift electric energy load from costly peak billing periods

- Results
  - Reduction in plant's overall energy use while maintaining production goals (included: traditional lighting, compressed air, and HVAC components)
  - Annual savings of 6,000 MWh (3,571 MT CO_2) 14% facility total

Best Practice – Mossville, IL (MEC)

Steam Trap Leak Analysis

- Issue
  - Reduce energy usage by optimizing the delivery of steam
    - Steam trap leaks in the steam delivery system
    - Team identified root causes of steam loss
    - Determined energy losses due to the loss of the unused steam
    - Developed a process to ensure inefficient steam traps were repaired on a continuing basis
- Results
  - Annual Energy Reductions after Repairs = 4,890 MWh
  - Annual GHG Emissions Reduction = 2,757 MT CO_2

Best Practice – Aurora Cogeneration

Combined Heat and Power (CHP)

- Issue
  - Ensure innovative, reliable, uninterrupted utility service at WLED
  - Installed a Cogeneration Facility to replace coal-based steam production facilities and public utility service
  - Installed two dual-fuel Solar combustion turbines, two exhaust heat recovery steam generators and associated plant controls
- Results
  - First 100% CAT owned/operated CHP installation in manufacturing
  - Installation generates both steam and electrical power displacing the coal-based steam production
  - Annual savings - ~35,000 MT CO_2 (27% decrease in CO_2)