Energy Efficiency Planning at Genzyme

June 30, 2009
Genzyme - A Global Corporation

- >11,000 employees worldwide
- Helping patients in 100 countries
- 17 manufacturing sites
- 9 genetic testing lab sites
- 19 major marketed products
- 2008 revenue of $4.6 billion
- 85 locations in >40 countries
- Henri Termeer: Chairman, CEO
Genzyme – in Massachusetts and the Northeast

• Massachusetts
  – Genzyme Center – Corporate Headquarters in Cambridge, MA
  – Major Manufacturing sites in Allston, Framingham, Cambridge
  – Research Labs in Framingham, Waltham
  – Genzyme Genetics in Westborough
  – >5,000 employees
  – >2,000,000 sq ft

• Other Genzyme facilities in the Northeast
  – Ridgefield, New Jersey – Biosurgery Manufacturing
    • 170 employees
    • 83,000 sq ft
  – Manhattan, New York – Genetics laboratory
    • 390 employees
    • 80,500 sq ft
Awards and Recognition

• Consistently named a top employer by *Science*

• Rated among the most generous in-kind givers by *BusinessWeek*

• Consistently named to the Dow Jones Sustainability World Index

• Genzyme Center, LEED Platinum, among the most environmentally responsible U.S. buildings

• Recognized by EPA WasteWise Program

• Genzyme was named one of the most ethical companies by Ethisphere magazine

• Awarded the National Medal of Technology
Green Building Commitment

- Our corporate headquarters has received the highest ranking, Platinum, from the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) rating system.

- Genzyme at 675 West Kendall St. in Cambridge received LEED Commercial Interior Silver certification.

- Our new Science Center in Framingham received LEED Gold certification.

- Several current projects are being built to green standards including: Manufacturing expansion in Allston and Framingham, MA; Ridgefield, NJ; Distribution Center in Northborough, MA.
Genzyme Commitment to GHG and Energy Reduction

• Genzyme environmental professionals initiated plan to work towards GHG and Energy Reduction Goal – Genzyme Environmental Summit - October 2006

• Health, Safety & Environmental Senior Steering Committee
  – Agreed to concept – January 2007
  – Approved corporate goal to do energy audits – April 2007

• EPA Climate Leaders Partnership signed by Senior Management
  – June 26, 2007

• Genzyme GHG Inventory Management Plan and base year inventory approved by EPA – February 2009

• Genzyme announces GHG reduction goal – May 2009
  – 25 % reduction, normalized by revenue, from 2007 to 2012
The Challenge

• Rapidly Growing Company

• Limited Resources

• Spending Constraints – “Not in my budget.”

• Conflicting Priorities – Production, Quality, Compliance
The Opportunity

• Toxic Use Reduction Act (TURA) and 310 CMR 50.000 require Genzyme Manufacturing sites in Massachusetts to:
  – report annually on toxic chemicals use and byproduct
  – prepare initial Toxic Use Reduction Plan and biennial updates
    - TUR Planning had reached point of diminishing returns

• TURA revision allows facilities to develop a Resource Conservation Plan as an alternative to another TUR Plan update in 2008.

• Resource Conservation Plan can address **one or more** of the following:
  – Energy
  – Water
  – Materials that contribute to solid waste
  – Toxics below threshold amounts
  – Chemicals exempt from TURA reporting
Genzyme Decision - RCP focused on ENERGY for MA Manufacturing Facilities

• Alignment with commitment to EPA Climate Leaders Program

• Historic monthly Energy Use data already tracked

• Energy use of these two sites is significant – Ranking #2 and #13 on list of energy use by site for Genzyme Manufacturing and Laboratory facilities

• Cost Reduction opportunity / cost of energy expected to increase

• Relieves site environmental professional and employee team of TUR plan update requirement

• If successful, the Resource Conservation Plan approach could serve as a best practice to be shared with other sites and applied to other resources, e.g. water
Resource Conservation Plan – Preparation Q4 ’07 to Q1 ‘08

– Obtained information and training

– Secured Management Support
  • Staff time
  • Funds to hire Energy Auditor

– Developed Energy Audit guidance and detailed outline

– Selected Energy Auditor

– Planned kick-off meeting
Training and Information Resources

• Seminars and Workshops
  – Toxic Use Reduction Planners Association meeting – Sept ‘07
    • Preview of TUR Alternative RCP
    • Featured speakers from U.S. DoE and MA DoER
  – TURI Cleaner Technologies Demonstration Site Visti – Rohm & Haas Electronic Materials

• Websites – MA DEP, OTA, TURI

• TURA “Resource Conservation Planning Guidance” (working draft, December 2007)


• TUR Planner re-certification requirement
  – 12 CEUs to certify initial RCP
  – 9 additional CEUs every 4 yrs to maintain status
Implementation – Q1 through Q2 2008

• Assembled Resource Conservation Planning Teams
• Kick-off meeting
• Data Collection
  – Electricity, Natural Gas, Purchased Steam – monthly bills, 3 yrs
  – Major equipment list and specs
  – Building envelope
  – Drawings
• Energy Audit
• Meetings to review audit recommendations
• Wrote plan and submitted summary to DEP
RCP Team Roles & Responsibilities

• Environmental Dept.
  – Guide the planning process to ensure compliance with TURA requirements
  – Write the plan / submit plan summary and progress report to DEP
  – Engage services of Energy Auditor
  – Environmental impact evaluation of audit recommendations

• Facilities & Engineering
  – Provide information on building, equipment, operation, maintenance practices, history and future plans
  – Escort Energy Auditor during facility walk-through
  – Technical evaluation of audit recommendations

• Manufacturing
  – Evaluate impact of audit recommendations on the manufacturing process and schedule

• Finance
  – Economic evaluation of audit recommendations

• Site Management
  – Support the planning process with resources
  – Review and approve plan
Energy Auditor

• Role & Responsibility
  – On-site energy audit / physical inspection
  – Review and analysis of data – historical energy use, mechanical equipment specifications, building envelope
  – Expert advice, recommendations
  – Knowledge of utility incentive programs
  – Calculation of energy savings, costs, and environmental benefits of suggested energy conservation measures

• Lessons learned
  – Clearly define scope and expectations
  – Allow more time on-site
  – Provide access to site Facilities Maintenance & Engineering Staff
  – Most ECMs will require further analysis
  – Consultants tend to focus on their area of expertise – e.g., lighting – and dismiss other opportunities
RCP Team Lessons Learned

• Facilities & Engineering staff have wealth of knowledge, experience and ideas

• Energy conservation is already happening
  – large capital projects – steam, chilled water
  – ongoing maintenance programs
  – equipment upgrades
  – large and small renovation projects
  – unwritten energy efficiency standards
Data Analysis

Electricity Use for Framingham Mfg & Lab Facility

- Boilers: 11%
- Chillers: 9%
- AHUs: 12%
- Air Compressors: 11%
- Lab ventilation systems: 2%
- Process Equipment: 18%
- Lighting: 28%
- Other: 9%

Natural Gas Use for Framingham Mfg & Lab Facility

- Boilers: 63%
- AHUs: 37%
Energy Conservation Measures selected

• ECMs already planned
  – On-site cogeneration (CHP) of electricity and steam for Allston Manufacturing Facility
  – Variable Frequency Drive (VFD) motors
  – Replace old boilers with more efficient boilers in new Central Utility Building serving Genzyme Framingham Campus
  – Replace old chillers, cooling for roof top air handling units with chilled water from new Central Utility Building

• ECMs to be implemented in 2008-2010
  – Lighting Retrofits for both Manufacturing and Office space
    • Replace lamps and ballasts with Super T8, T5 HO, compact fluorescents
    • Install occupancy sensors
Energy Conservation Measures needing further study

- Install dedicated smaller (100 hp) condenser water pump for electric chiller
  - replacing 250 hp pump located 3 floors below and shared with steam absorption chiller

- Install plate & frame heat exchanger for free cooling during winter
  - Eliminate operation of electric chiller when weather conditions allow

- Solar hosting – power purchase contract
  - Eliminates upfront capital cost
Energy conservation measures rejected

• On-site renewable energy
  – Wind power – inadequate wind resource
  – Solar photovoltaics – large capital investment and long pay-back (14 yrs)
  – Geothermal groundsource heat exchange – high installed cost

• Control Clean Room ventilation with particle counter rather than fixed rate of 25 air changes per hour
  – Large potential energy saving
  – Major change to validated manufacturing process
ECMs identified at other Genzyme MA sites – 2009

- Laboratory Fume hoods
  - Replace standard hoods with High Efficiency hoods
  - Recertification and balancing
  - Proximity controls – close sash when not in use

- Vending Machines
  - Lights removed, reducing energy use by 1/3
  - Specify ENERGY STAR
  - Program for night and weekend set-back of refrigeration

- Occupancy control of exhaust fans – toilets, kitchen

- HVAC night set-backs for non-manufacturing space
ECMs identified at other Genzyme MA sites – 2009

- Packaged Combined Heat & Power units
  - Gas-fired engine
  - 75 kW induction generator with 4.84 therms/hr heat recovery
  - supply hot water and generate electricity

- Solar thermal for hot water

- Install Loading Dock door insulation

- Replace older motors with NEMA Premium high efficiency motors
What’s Next?

• Further evaluation of promising ECMs; develop longer range plans and budget

• Targeted energy audits
  – Air Compressors
  – Building Envelope
  – Insulation
  – HVAC
  – Lighting

• On-going Investigation of Appropriate On-site Renewable Energy

• EDF Climate Corps MBA Student Intern

• Partner with “Lean Transformation” program

• Continue to take advantage of Utility Incentives, Economic Stimulus programs
Concluding Thoughts

• Alternative regulatory schemes and voluntary government / industry partnership programs allow companies to deploy limited staff and budget resources to reduce environmental impact
  – MA TURA Alternative Resource Conservation Planning
  – EPA Climate Leaders Program

• Energy Audits help identify and quantify energy conservation and efficiency opportunities

• Most recommendations require further analysis and take time to plan, budget and implement