



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
 - MA DEP / TURI / OTA – “2008 Resource Conservation Planning” – 2 day – Jan '08
 - TURI Cleaner Technologies Demonstration Site Visti – Rohm & Haas Electronic Materials
- Websites – MA DEP, OTA, TURI
- TURA “Resource Conservation Planning Guidance” (working draft, December 2007)
- NAEM conference – Corporate Climate Strategies: Best Practices in GHG Management and Energy Efficiency – June 2008
- 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

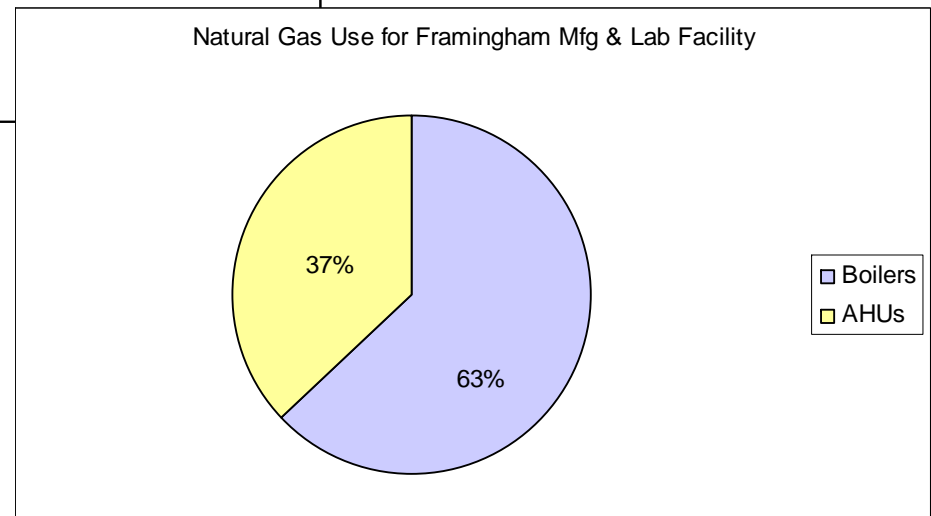
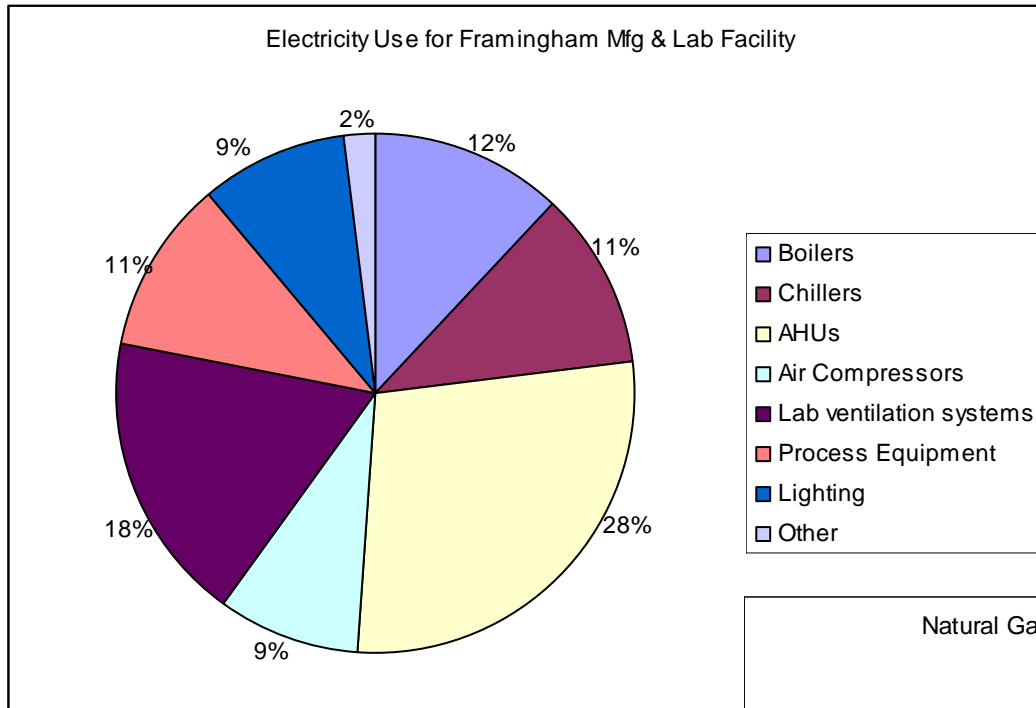
- Lessons learned

- 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



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

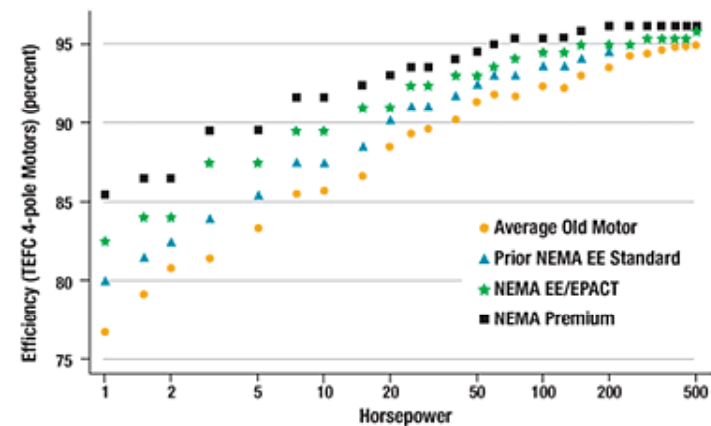


ECMs identified at other Genzyme MA sites – 2009

- Packaged Combined Heat & Power units
 - Gas-fired engine
 - 75 kW induction generator with 4.84 therms/h
 - 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



Replacement Results in Big Savings



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