AEE NEW ENGLAND ENERGY PROJECT AWARDS 2012
2012 AWARDED ENERGY PROJECTS - SAVINGS TOTALS

- 22,647,107 kWh of electricity
- 805,089 therms of natural gas
- 25,000 mlbs of purchased steam
- 31,567 gallons of #2 oil
- $5,205,688 in energy costs
- Significant environmental benefits (emissions)
- Substantial economic impact (energy sector jobs)
2012 AWARD WINNING PROJECTS PROFILES

- Variety of customers – healthcare (S, M, XL), large office, food manufacturing, pharmaceutical R&D, university, large retail, semiconductor
- Variety of business models for project development – performance contract, design build, new construction
2012 AWARD WINNING PROJECTS
COMMON THEMES

- Clear business goals prioritizing energy from the top down
- Creative engineering – will to challenge the design or operating status quo crucial
- Strong vendor partners – solving problems, keeping schedules, fair pricing
- Partnerships with utilities – engineering support helps substantiate projects, incentive support makes projects happen
OUTSTANDING ENERGY PROJECT IN A MANAGED FACILITY

Seaport World Trade Center
East & West Office Buildings
SEAPORT WTC PROJECT
OVERVIEW

- Upgrade 503 Fan-Powered Boxes to ECM Motors (largest ECM motor install in NE)
- Demand Control Ventilation at AHUs
- Static Pressure Reset on AHUs
- RCx of AHU and FPB controls
- Lighting and Lighting Controls

- Over 1 Million kWh of Savings Annually
OUTSTANDING ENERGY PROJECT
INDUSTRIAL PROCESS

Kopin Corporation
KOPIN CORP PROJECT DETAILS

○ Particle-count based control of clean-room recirculation fans, with reduced speed via VFDs
○ Ceiling HEPA Filter Replacement to reduce pressure drop

- 2,288,693 kWh annual savings
- 31,567 gallons of oil annual savings
- 23,440 therms of gas savings per year
- $240,084 annual energy cost savings
OUTSTANDING ENERGY PROJECT PRODUCTION FACILITY

Joseph’s Gourmet Pasta Sauces
Joseph’s Gourmet Pasta

Old world techniques, cutting-edge technology and a burning passion to be the best have made Joseph’s Gourmet Pasta & Sauces the nation’s leading makers of pasta and sauce products. The company’s motto, “It’s What’s Inside that Counts,” refers to its dedication to product quality and superior service. Joseph’s is a culinary solutions company that provides chains, independent restaurants and other foodservice establishments with more than 300 innovative products, new menu concepts and profitable operational ideas.

Energy Efficiency Solutions
- Refrigeration system upgrades
  - Condenser Replacement
  - VSD’s
  - Controls
- Compressed Air System Optimization
  - Leak repairs
  - Fitting replacements
  - Monitor and control
- Steam trap replacements and pipe insulation

Savings Summary
Joseph’s invested $739,405 and National Grid partnered in the project paying $399,932 in incentives. Not only will Joseph’s enjoy a 2 year payback by saving over 1 million kWh and 321 therms annually, they now have a more reliable system and added production capacity to continue consistently delivering quality product to Joseph’s customers.

The result:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Project cost</td>
<td>$739,405</td>
</tr>
<tr>
<td>National Grid incentive</td>
<td>$399,932</td>
</tr>
<tr>
<td>Customer cost</td>
<td>$399,932</td>
</tr>
<tr>
<td>Annual kWh savings</td>
<td>1,160,630</td>
</tr>
<tr>
<td>Annual therm savings</td>
<td>32,008</td>
</tr>
<tr>
<td>Annual cost savings</td>
<td>$157,800</td>
</tr>
</tbody>
</table>

“Working with National Grid and the Merrimack Valley Clean Energy Partnership, we were able to achieve our 3 year energy reduction target in only one year. This enabled us to create a new more aggressive 3 year target and deliver on Nestle’s commitment to Good Food, Good Life.”

— Jeff Shuman, Engineering and Maintenance Manager
Joseph’s Gourmet Pasta

252 Dimmes Street, Haverhill, MA

1-800-787-1705 | efficiency@nationalgrid.com | www.nationalgridus.com/EnergyEfficiencyServices
JOSEPH’S GOURMET
PROJECT DETAILS

- Refrigeration upgrades including new condensers, enhanced controls and VSDs
- Refrigeration pipe insulation
- Compressed air leak repairs, fitting replacements, enhanced monitoring and control
- Steam trap repairs
- 1,160,630 annual kWh savings
- 32,308 annual therm savings
- $157,800 annual cost savings
OUTSTANDING CUSTOMER-DRIVEN ENERGY PROJECT

AstraZeneca
R&D Boston
## AstraZeneca Project Overview

**AstraZeneca R&D Boston - 2012 Energy Efficiency Project Summary**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Realized Electric Energy Savings and NREBs</th>
<th>Total Cost Reduction</th>
<th>Installed Incr. Cost</th>
<th>Simple payback yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electric Energy Savings</td>
<td>Natural Gas Savings</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Main Plant Lighting Upgrade &amp; Controls</td>
<td>318,466 kWh</td>
<td>$44,586</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>GUP and Site Lighting Upgrade</td>
<td>94,531 kWh</td>
<td>$13,234</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>Chilled water pump P-CH-1 &amp; 2 VSDs and variable flow</td>
<td>385,000 kWh</td>
<td>$53,900</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>CHW plant optimization</td>
<td>43,422 kWh</td>
<td>$6,079</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>Exhaust cones</td>
<td>214,000 kWh</td>
<td>$29,960</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>Trane chiller optimization</td>
<td>260,000 kWh</td>
<td>$37,660</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Sum of Electric Only Measures</strong></td>
<td>1,324,421 kWh</td>
<td>$185,419</td>
<td>0</td>
<td>$0</td>
</tr>
</tbody>
</table>

**Electric / Gas Measures**

<table>
<thead>
<tr>
<th></th>
<th>Electric Energy Savings</th>
<th>Natural Gas Savings</th>
<th>Total Cost Reduction</th>
<th>Installed Incr. Cost</th>
<th>Simple payback yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viv. airflow reductions and temp setback</td>
<td>216,000 kWh</td>
<td>$30,240</td>
<td>49,118</td>
<td>$54,560</td>
<td>$84,830</td>
</tr>
<tr>
<td>Autoclave steam switching</td>
<td>35,554 kWh</td>
<td>$4,978</td>
<td>22,000</td>
<td>$24,420</td>
<td>$29,398</td>
</tr>
<tr>
<td><strong>Sum of Electric / Gas Measures</strong></td>
<td>251,554 kWh</td>
<td>$35,218</td>
<td>71,118</td>
<td>$79,010</td>
<td>$114,228</td>
</tr>
</tbody>
</table>

**Combined Savings**

|                                                        | $229,637 | $79,019 | $299,647 | $487,647 |

Substantial support from NSTAR Electric and National Grid brought the final SPB for these projects in aggregate to well under 1 year.
CHILLED WATER PLATE AND FRAME
FREE COOLING
78% KW REDUCTION
CHILLED WATER PLATE AND FRAME FREE COOLING - 78% KW REDUCTION
R&D LIGHTING
JANUARY 2012 VS. JANUARY 2013
30% REDUCTION
SITE TOTAL ELECTRIC KW
JANUARY 2012 VS. JANUARY 2013
11.4% REDUCTION
SITE TOTAL ELECTRIC KW
OCTOBER 2011 VS. JANUARY 2013
22.5% REDUCTION
OUTSTANDING ENERGY PROJECT
HEALTHCARE

Melrose Wakefield Hospital
AS FEATURED IN NGRID CASE STUDY

Large Business Program
Hallmark Health System

Savings Summary
National Grid was able to design custom projects that reduce HHS facilities overall energy consumption. The multiphase projects took place throughout the 2011 fiscal year and were planned in order to minimize the impact of seasonal weather as well as the impact on the hospitals day-to-day operations.

The Solution —
- Boiler Combustion Controls
- Two Variable Speed Drive’s (VSD’s):
  - 600 ton chiller compressor VSD
  - 400 ton chiller pump VSD
- Associated set-points & controls
- Heat Recovery Unit
- High and Low Pressure Steam Traps

Project Summary
Hallmark Health System has consistently made efforts to improve the efficiency of their facilities by working closely with National Grid. By utilizing incentives and rebates offered through National Grid, Hallmark Health Systems was able to improve existing technology, replace out of date equipment with state of the art equipment and effectively reduced operating costs. Their commitment to energy efficiency was recently recognized with Hallmark Health System being awarded the 2012 VHA Sustainability Excellence Award.

Hallmark Health System
Hallmark Health System has a strong commitment to sustainability and energy efficiency improvements. HHS is comprised of two outstanding acute care hospitals, Melrose-Wakefield in Melrose, Massachusetts and Lawrence Memorial Hospital in Medford, Massachusetts and is known for providing some of the highest quality medicine in the State. Hallmark Health System is recognized for its surgical success rate, leading-edge technology and its ability to offer the most advanced clinical therapies.

**Project costs**

- Project Cost: $723,599
- National Grid Incentive: $244,604
- Customer Cost: $478,705
- Annual Kilowatt Savings: 561,546 kWh
- Annual Thomas Savings: 69,206
- Annual Cost Savings: $203,966

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E8821 JFK 6/15  1-800-787-1706  efficiency@nationalgrid.com  www.nationalgrid.com/EnergyEfficiencyServices
MELROSE-WAKEFIELD
PROJECT DETAILS

- Boiler combustion controls
- VSD for 600 ton chiller’s compressor
- VSD for 400 ton chiller’s CHWP
- Chiller plant EMS enhancements
- Heat recovery
- Steam trap repairs
- 561,548 annual kWh savings
- 69,206 annual therm savings
- $203,986 annual cost savings
OUTSTANDING ENERGY PROJECT
NEW CONSTRUCTION

Green Mountain Coffee Roasters
# GMCR – COMPRESSED AIR OVERVIEW

<table>
<thead>
<tr>
<th>Measure</th>
<th>Base</th>
<th>Design</th>
<th>Savings (kWh)</th>
<th>$.13/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Compressor System Design and Sequencing</td>
<td>4,188,682.36</td>
<td>3,724,646.20</td>
<td>464,036.17</td>
<td>$60,324.70</td>
</tr>
<tr>
<td>Cycling Dryer Instead of Non-Cycling</td>
<td>271,191.00</td>
<td>96,474.00</td>
<td>174,717.00</td>
<td>$22,713.21</td>
</tr>
<tr>
<td>Zero Loss Drains In Place of Timer Drains</td>
<td>11 Drains 27CFM</td>
<td>Zero Loss</td>
<td>46,294</td>
<td>$6,018.21</td>
</tr>
<tr>
<td>Optimized Piping</td>
<td>19.94 PSI Drop</td>
<td>3.6 PSI Drop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimized piping kWh Cost</td>
<td>417,612.00</td>
<td>67,043.63</td>
<td>350,568.37</td>
<td>$45,573.89</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,035,615</strong></td>
<td><strong>134,630.01</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Explanation of Measures**

- **Air Compressor Design + Sequencing**
  - The base case is calculated using a CFM/kW of 5.
  - Adjusted for varying load.
- **Cycling dryer vs non cycling**
  - 11 Drains
- **Zero Loss Drains**
  - Minimum elbows, large tanks, upsized pipe, full port valves, mist eliminator, high quality dryer,
GMCR – ADDITIONAL MEASURES

- Cooling tower for water-cooled chiller plant: 130,063 kWh
- ECM motors for boiler pumps: 22,644 kWh
- Direct drives on 10, 15hp air handler fans: 14,325 kWh
- VFD’s on chilled water circ pumps: 121,613 kWh
- Higher DT design across chiller evaporator, VFDs on chiller evaporator pumps: 80,207 kWh
- Relocation of cooling tower, VFDs on tower condenser pumps: 129,579 kWh
- VFD’s on hot water circ pumps: 50,069 kWh
- VFD with interlocked CO sensors on bean degas exhaust/make-up fans: 70,516 kWh
GMRC – ADDITIONAL MEASURES

- VFDs on dust collection blowers - DP across filter control: 19,686 kWh
- High Efficiency water cooled Chillers (3): 160,044 kWh
- Dual enthalpy economizers on 5 air handling units (baseline is dry bulb economizer): 40,937 kWh
- High efficiency lighting, average of 0.68 watts per sf, 59% better than Vermont Code: 1,971,995 kWh
- Total savings: 2,811,678 kWh
- GRAND TOTAL SAVINGS OVER BASE CASE: 3,847,293 kWh
- Total cost for efficiency upgrades: $653,944
- Annual Cost Savings: $500,148
- Simple Payback: 1.31 Years
OUTSTANDING ENERGY PROJECT
LEASED FACILITY

Brigham & Women's Hospital
BWH 41 AVE LOUIS PASTEUR
PROJECT OVERVIEW

- 51,000 GSF former lab building, repurposed as office space with legacy 100% OA HVAC design
- Leased by BWH, managed by CBRE, original short life expectancy let to short term renovation decisions
- Building ran 24 x 7 despite M-F use
- Project ID’d by CBRE, brought to Brigham for conceptual approval, then jointly developed by NSTAR and NGRID
BWH 41 AVE LOUIS PASTEUR
PROJECT OVERVIEW

Measures implemented included:

- Full DDC upgrade of chiller plant, boiler plant, AHUs, terminal units of various kinds, with unoccupied setback and advanced controls strategies
- Pipe insulation
- 3 new dedicated split systems for ULT freezer rooms to permit shutdown of assoc AHU and chiller plant
- 472,030 kWh annual savings (36%)
- 43,262 therms annual gas savings (62%)
- $101,478 annual energy cost savings
OUTSTANDING ENERGY PROJECT
OFFICE BUILDING

BJ’s Wholesale Club

Association of Energy Engineers
Energy Project Award Application
BJ’s Wholesale Club Headquarters
25 Research Drive Westborough, MA

Prepared by
Michael Pace, Horizon Energy Services
Kevin Norum, BJ’s Wholesale Club
1/11/2013
BJ’s PROJECT OVERVIEW

- Recommission Andover BAS and overlay with Tridium Jace controllers
- O2 Trim system for Boiler Plant
- Install DDC controls for perimeter fan coil units in Buildings B&C
- Install dedicated 45-ton chiller for data center, shut down main plant in winter
- VFD on 40HP HW pump for induction units
- 728,124 kWh annual savings
- 12,364 therms annual gas savings
- $124,619 annual energy cost savings
BJ’s BEFORE/AFTER kW

Date Range Profiles

Account: 1479813003 WESTBORO COMPLEX

Available dates Friday, November 08, 2002 Through Wednesday, January 16, 2013

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OUTSTANDING CAMPUS-WIDE ENERGY PROJECT HEALTHCARE

Boston Medical Center
BOSTON MEDICAL PROJECT
OVERVIEW

- New facilities management team started second half of 2011, made energy efficiency a major priority
- Scoping and engineering studies initiated to identify opportunities campus-wide
- 6 major projects implemented in a span of eight months produced:
  - 5,391,111 kWh annual savings
  - 25,000 mlbs of District Steam saved annually
  - $1,191,590 annual energy cost savings
BMC PROJECT OVERVIEW

- DDC conversion of pneumatic controls to implement VAV box-level setback on AHUs operating 24 x 7 (Menino, Newton)
- Reprogramming of existing DDC box controls to implement unoccupied setback on AHUs operating 24 x 7 (Menino, Newton)
- Unoccupied setback for 12 of the campus’ Operating Rooms, using the existing DDC controls to reduce air-change rates on nights and weekends. (Menino, Newton)
- VSDs on 100HP supply fans (Menino AHU-2)
- VSDs for (3) 100HP Cond Water Pumps (Newton Pavilion chiller plant)
BMC PROJECT OVERVIEW

- Re-location of freeze-stats on multiple AHUs, enabling correction of mixed air control and allowing chiller plant shutdown in winter (Newton Pavilion)
- Controls upgrade to implement AHU-level setback of (8) AHUs, each having a total of 200HP supply and return fan motor horsepower (Yawkey). Additional ductwork mods and CV to VAV conversions to follow
BMC PROJECT OVERVIEW

- Cross-connect piping for Power Plant & Shapiro plant, enabling use of Shapiro plant free cool PHE for the Menino Bldg. Process CHW Loop & to allow for Optimization of the CHW Pump Operation.

- 125 HP VFDs and associated controls for three Power Plant Condenser Water Pumps (Power Plant)

- Optimization of Chiller Plant including EMS staging revisions, improved operation of CHW flow through each chiller, recalibration of instrumentation, and rebalancing of the plant (Power Plant)
BMC PROJECT OVERVIEW

- Unoccupied control RCx on 2010 LEED Certified building produced an additional 948,973 kWh and 3,038 mlbs annual savings (not included in prior totals)
- New garage lighting (Doctor’s Office Bldg)
- HPT8 relamp and reballast with reduced wattage lamps (Moakley)
ENERGY PROJECT OF THE YEAR
University of Massachusetts
Dartmouth

[Image: Aerial view of a campus with logos for UMass and Dartmouth]
UMASS DARTMOUTH NET PROJECT SAVINGS

- Campus-wide, two phase guaranteed savings project by NORESCO
- Largest project of its kind ever managed by DCAMM
- Phase 1 (efficiency and infrastructure upgrade) results:
  - 5,611,703 kWh annual savings
  - 553,391 therms annual savings per year
  - $1,797,129 annual cost savings
- Phase 2 (cogen) to be completed in CY2013, an additional 12.75 MWH annual savings expected
UMASS DARTMOUTH
PHASE 1 PROJECT OVERVIEW

- ECM Identification
- ECM-1 Lighting Upgrades
- ECM-2 Lighting Upgrades (Controls)
- ECM-3 Replace Electric Motors
- ECM-4a Re-commission/Expand Existing BMS Controls
- ECM-4b Add Central Building
- ECM-4c HVAC Modifications –
- ECM-4d Base Mechanical Upgrades
- ECM-4e Operational Enhancements
  Behavior modification
- ECM-5a Water Upgrades
- ECM-5b Reduce Ground Water Leakage
UMASS DARTMOUTH
PHASE 1 PROJECT OVERVIEW

- ECM-7 Add Variable Frequency drives
- ECM-11 Install Kitchen Hood Controls
- ECM-15b New Gas Turbine with Heat
- ECM-18 Electric and Steam Submeters
- ECM-22 Maintenance Related Upgrades
  - Insulation of damaged or missing piping insulation
- ECM-23 Weatherization
- ECM-25 New Absorption Chiller
  - New chiller to replace existing failed unit.
- ECM-26 Exterior LED Area Lights
ANY QUESTIONS?

CONGRATULATIONS!

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