Enterprise Energy Management

Schneider Energy Action

Barry Coflan
Barry.Coflan@Schneider-electric.com
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The global specialist in energy management

- Energy Efficiency is in our DNA – 180,000 Employees
- Schneider’s Global Headquarters was first ever ISO 50001 certified EnMS
- Offer many energy efficiency products and services
  - Square D (VFDs and Automated Controls)
  - APC (Data Center Power and Cooling)
  - Energy and Sustainability Services
- Committed to education and outreach
  - http://www.schneideruniversities.com/energy-university/
Key Elements of Schneider Energy Action

- Identify Goals
- Develop a Team
- Create Energy Models
- Track Energy Performance
- Identify Projects
- Share Best Practices
- Track Projects
- Sustain Success
Schneider Electric is committed to continuous improvement in the efficiency with which energy is used and the avoidance of energy waste.

Our objective is to reduce our total energy consumption each year after normalizing for significant changes in levels of activity, weather, and other relevant factors.

We are committed to conserving natural resources so future generations can prosper.

We set annual objectives and targets for energy performance improvement to drive continual improvement. Schneider Electric is committed to providing the necessary resources and information in order to achieve our objectives and targets.

We want to limit our risks related to energy.

We will comply with all legal requirements related to our energy use, consumption, and efficiency. In addition, we will meet all other requirements that we choose to pledge to including ISO 50001 and Superior Energy Performance.

We want to be an example for our customers through Schneider Energy Action.

Schneider Energy Action provides a platform for sharing best practices enabling improved process design for energy efficiency and the purchase of energy-efficient products and services.

March 2015

3.5% Annual Reduction Goal
Schneider Energy Action Team

Corporate Energy Team
- Drive Performance Targets
- Prioritize Projects based on:
  - Payback
  - Schneider Electric Products
- Capital Planning
- Return on Investment

Energy Experts
- Create Energy Models
- Provide technical expertise for quantifying
- Verify Energy Performance

Local Energy Champions
- BOC Green Team
- Propose projects
- Coordinate with others
- Obtain Quotes
- Review Contractors
- Employee Visibility
Modeling Techniques

Remove Bias and aim to Quantify

Use Standard Model
  - Utilize free DOE EnPI tool

Normalize Energy Consumption
  - Weather
  - Production/Occupancy

Regularly Review Model vs. Reality
Energy Performance – North America

> 4.9% reduction in total energy consumption (‘15 vs. ‘14)

- 3.9% savings in electrical energy
- 6.5% savings in natural gas
Global Standard

Schneider Electric uses the ISO 50001 Energy Review Process

Superior Energy Performance Indicator (SEnPI)

Smyrna plant is SEP Platinum certified. The facility determined their SEnPI using the CT EEnPI Tool V3.14. The SEnPI tool converts electricity and natural gas consumptions to source consumptions in MMBtu. Other energy sources are less than 5% and therefore excluded. The tool uses a linear regression model to complete actual energy consumption to baseline.

The input variables analyzed include:
- Making Degree Days
- Cooling Degree Days
- Safety Hours
- Shift Converter Hours
  - Regular
  - Overtime
  - Double Overtime
  - Overtime - Double Overtime

Figure 12 below shows the results of the analysis. The SEnPI for 2017-2018 was 20.5%. The SEnPI will be updated semi-annually.

Table 1: Detailed Summary of Recommendations

<table>
<thead>
<tr>
<th>Project Summary Table</th>
<th>Budgeted Energy Savings</th>
<th>Baseline Energy Consumption</th>
<th>SEnPI Value</th>
<th>DPY (Dollars)</th>
<th>Payback Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32,000</td>
<td>25,000</td>
<td>0.8</td>
<td>10,000</td>
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<td>2</td>
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<td>35,000</td>
<td>0.9</td>
<td>15,000</td>
<td>5</td>
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<td>3</td>
<td>50,000</td>
<td>40,000</td>
<td>0.95</td>
<td>20,000</td>
<td>4</td>
</tr>
</tbody>
</table>

Comprehensive energy assessment of the facility including detailed utility analysis and energy load breakdown

ISO50001 and SEP Certification readiness

Energy conservation measures with cost savings and simple payback analysis
Boston ONE Campus

Green Energy Team

**Team Leader:**
Chris LaFleur – Engineer Building Management Systems Development

**Sponsor:**
Barry Coflan – CTO EcoBuilding

**Frequency of Meetings:**
~ 6 Per Year

**Mission:**
Voluntary initiative to investigate, plan and enable and communicate energy optimization solutions for Boston Campus, in collaboration with BOC site management and in consultation with Schneider Subject Matter Experts.

**2016 Objectives:**
- Support for ISO 50001 Certification
- Support improvements from 2015 energy audit
- Support BOC to DSP (meter data to the cloud)
- Support LED Parking Lights & Micro Grid

**Share Best Practices**
Reconciliation of projected savings versus actual energy reduction (from energy model)

Monthly discussions with all regions/sites

Clear visibility to current performance on regional and site level, by GSC Cluster and Business Unit

Tool to determine significant deviation for ISO 50001 certified sites

- Easily done with conditional formatting
Achieved and exceeded corporate energy goals by reducing the total energy consumption by over 14% from 2011 to 2014 (10% Goal), and by using Schneider Electric products & services.

- Increased scope from 26 facilities to 64 by 2015.
- More than 850 million kWh of cumulative energy (electricity & natural gas) saved through the end of 2015.
- Equivalent cost savings of over $85 million.
- Over 40% reduction in greenhouse gas emissions since 2004.
Why Implement ISO 50001?

> ISO 50001 Builds on Existing Energy Program
  • Schneider North America reduced consumption by 40% over last 10 years
  • Goal is to reduce by another 10% from 2015-2017

> Superior Energy Performance
  • External recognition for energy reduction
  • 3rd party validation of Schneider Energy Action
  • Improves internal recognition of energy performance

> Verify Results with Enterprise-wide Action Plan
  • Consistent method for tracking projects
  • Allows for best practice sharing and ROI lookup for similar projects
Impact of ISO 50001 Implementation

Share Best Practices
Make Better - Products and Services

> Automation and Control
  • Building Management System
  • Industrial Process Control
  • Variable Frequency Drives
  • Power and Energy Monitoring
  • Telemetry and Remote SCADA Systems
> Data Center Cooling Systems
> Solar and Micro Grid
> Energy and Sustainability Services
  • Energy Consulting
  • Strategic Energy Sourcing Services

Share Best Practices
Energy University – MOOC*

200 Free Courses

Share Best Practices

What Makes Energy University An Award Winning Education Program?

- MOOC, never before available in data center automation and efficiency
- Courses available 24 hours a day
- Focused on delivering a broad audience from around the world
- Includes a wide variety of topics
- Designed to train the future workforce
- All courses are vendor neutral

670,000+ courses taken
400,000+ registered users from 180+ countries

Energy University wins 1st place in the Category for the 2014 Sustainable Energy Europe Award

*All Courses are Vendor Neutral
## Energy Efficient Solutions in use at BOC

<table>
<thead>
<tr>
<th>Smart Struxure Cooling/Energy management</th>
<th>Server Room: Eco Aisle - In Row Cooling</th>
<th>EV charge</th>
<th>EcoBreeze</th>
<th>HVAC Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting controls &amp; lighting sensors</td>
<td>StruxureWare for Building Management/Operations (BMS)</td>
<td>StruxureWare Resource Advisor</td>
<td>Altivar 212 variable speed drives for HVAC</td>
<td></td>
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</tbody>
</table>
Energy Efficient Solutions in use at BOC

- Surveillance and Access Control
- LED Lighting
- Racks
- Data Center UPS Symmetra PX - PDUs
- PC and Server UPS
- StruxureWare Data Center Expert

Sustain Success
Power Distribution and Protection in use at BOC

<table>
<thead>
<tr>
<th>Switchgear</th>
<th>Power Meters</th>
<th>Bus Controls</th>
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<tr>
<td><img src="image1" alt="Switchgear Image" /></td>
<td><img src="image2" alt="Power Meters Image" /></td>
<td><img src="image3" alt="Bus Controls Image" /></td>
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<table>
<thead>
<tr>
<th>Building Entrance Surge</th>
<th>StruxureWare Power Monitoring Expert</th>
<th>Panel boards &amp; Breakers</th>
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</thead>
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<tr>
<td><img src="image4" alt="Building Entrance Surge Image" /></td>
<td><img src="image5" alt="StruxureWare Image" /></td>
<td><img src="image6" alt="Panel boards &amp; Breakers Image" /></td>
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</table>
Example of a microgrid at BOC

> **Pilot Project** – Schneider and Duke are partnering for growth and success in the emerging market for microgrids

  - *BOC is an opportunity to “test drive” our approach by working together – reliability, safety, and economics at scale are critical to success.*

> **Solution Showcase** – Schneider and Duke will give customer tours of BOC to showcase the benefits of our microgrid solutions

  - **400 kW of PV utilizing Schneider inverters**
  - *Schneider’s microgrid controller and StruxureWare DSO will optimize use of PV, storage, and BOC’s existing natural gas genset during grid-connected and islanded operation*

> **Innovation** – Schneider engineers will advance the state of the art using BOC as a “living laboratory”

  - *Schneider is incorporating a microgrid innovation “sandbox” that minimizes risk to essential BOC functions during microgrid R&D and customer demonstrations*
Planned BOC PV Locations
BOC - PV Carports at BOC with EV

Design of PV carports enables Schneider to drop in EV charge stations at any point in the future