Emerging Technologies

Applying Strategic Energy Management in Manufacturing Facilities

Warren Fish
Northwest Energy Efficiency Alliance

Todd Amundson
Bonneville Power Administration

Emerging Technologies Showcase
August 1, 2017
GoToWebinar Logistics

- Minimize or maximize control panel
- Phone lines are muted
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NOTE: Today’s presentation is being recorded and will be available at http://e3tnw.org/Webinars
Resources for Strategic Energy Management

Warren Fish, Program Manager
What is SEM?
What is SEM?

“a system of organizational practices, policies, and processes that creates persistent energy savings by integrating energy management into business practices – just like you would with quality assurance, safety, or productivity.

SEM focuses on changes in daily operations that engage staff at all levels of an organization in energy efficiency activities.”
Benefits of SEM

• Increased productivity, operational efficiency, profitability and competitive advantage.

• Helps companies permanently embed long-term energy management practices into the key areas of their operations.

• Significantly reduced energy consumption and associated cost savings.
The Need

• A common language and terminology for SEM in the region.
• Information on SEM best practices available in a centralized, accessible, and trustworthy location.
• Expertly vetted resources for current practitioners and those who are interested in learning more.
NEEA’s role

1) Gather and assess all available SEM best practices, tools and resources and offer them in a single, accessible location

2) Facilitate regional alignment on standard definitions of key SEM terms and concepts

3) Create an active community of energy efficiency professionals interested in and or engaged in SEM practices to share successes and challenges (NW SEM Collaborative)
SEMHub.com

- SEM Hub is a product of collaboration among Northwest utilities and energy efficiency organizations, facilitated by NEEA

- The site offers an online community for contractors, utilities and other energy professionals for the exchange of ideas and information on regional SEM programs.
SEM Hub provides…

- Tools and resources
- Training modules
- Videos
- Guides
- Case studies
- Events calendar

- Support for utilities and other organizations exploring SEM programs
- A place for discussion and knowledge transfer for SEM in the region
A ‘living’ site

Sector
- Industrial
- Commercial
- Small-to-Medium

Most Shared

<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Shares</th>
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<tbody>
<tr>
<td>1</td>
<td>Opportunity Register</td>
<td>4</td>
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<tr>
<td>2</td>
<td>Energy Surveys</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Achieve Immediate and Ongoing Energy Savings</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Animated Overview of SEM</td>
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Highest Rated

<table>
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<th>#</th>
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<th>Rating</th>
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<tbody>
<tr>
<td>1</td>
<td>How to Form an Energy Team</td>
<td>★★★★★</td>
</tr>
<tr>
<td>2</td>
<td>Online Strategic Energy Management</td>
<td>★★★★★</td>
</tr>
<tr>
<td>3</td>
<td>Energy Driver Discovery Worksheet</td>
<td>★★★★★</td>
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<tr>
<td>4</td>
<td>Small to Medium Industrial Energy Savings Validation</td>
<td>★★★★★</td>
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<td>Energy Efficient Purchasing Policy 2</td>
<td>★★★★★</td>
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SEMHub.com
live demonstration
Thank you!
Warren Fish, wfish@neea.org
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BPA Industrial Energy Management

Todd Amundson
Energy Smart Industrial (ESI) Energy Management Engineer
Bonneville Power Administration
BPA Industrial Energy Management

Together We Strive – SEM Mixed Sector Cohorts
Energy Management – Levels of Application

Integrated Energy Management

Level 3 (Integrated Plant Management)
- Adoption of an Energy Management Plan
- Advanced Operations and Maintenance (O&M) approach
- Benchmarking of energy intensity relative to similar systems or operations

Level 2 (Energy Project Management)
- Assigned responsibility for energy (e.g. Energy Engineer)
- Tracking of energy as a controllable expense
- Inclusion of energy projects in capital planning

Level 1 (Plant Energy Management)
- Good Preventative Maintenance Practices
- Consideration of energy in Operations and Maintenance (O&M) activities
- Some application of new technologies

Track and Tune / HPEM

EPM

General Energy Management
Unify T&T and HPEM to SEM.

**Evolution of SEM Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Year Launched</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPEM – High Performance Energy Management</td>
<td>2010</td>
<td>Cohort (primary) and Individual site (secondary – large sites and geographically isolated sites)</td>
</tr>
<tr>
<td>T&amp;T – Track and Tune</td>
<td>2010</td>
<td>Individual site</td>
</tr>
<tr>
<td>EPM – Energy Project Manager</td>
<td>2010</td>
<td>Individual site co-funding support for managing energy efficiency projects at the facility</td>
</tr>
<tr>
<td>ROC (T&amp;T) – Refrigerator Operator Coaching</td>
<td>2013</td>
<td>Cohort (operator training) and Individual site (Tune up)</td>
</tr>
<tr>
<td>SI HPEM – Small Industrial HPEM</td>
<td>2014</td>
<td>Individual training (online), group webinars, loose grouping of “clusters”.</td>
</tr>
</tbody>
</table>

**Program Options**

- **Cohort or Single Site**
  - HPEM: Either
  - T&T: Single Site
  - ROC: Cohort
  - SI HPEM: Mixture

- **PTS (y/n)**
  - HPEM: No
  - T&T: Yes
  - ROC: Yes
  - SI HPEM: Tool Kit

- **Training or Tune Up**
  - HPEM: Training
  - T&T: Tune Up
  - ROC: Both
  - SI HPEM: Training

- **Action Item Payment (y/n)**
  - HPEM: No
  - T&T: Yes
  - ROC: Yes
  - SI HPEM: No
BPA-served Industrial EM Participants

- 79 currently enrolled participants
- >20% of BPA-served industrial load
Three HPEM Success Factors

**Leadership**
Management recognizes energy as a controllable cost, communicates goals and assigns resources.

**Personnel**
Key personnel understand how the process uses energy and develop and test new ideas.

**Technical**
The process has the technical potential to reduce energy consumption.
HPEM Cohorts 1 and 2
HPEM Cohort 2 Total Savings

<table>
<thead>
<tr>
<th>Year</th>
<th>Custom Project Savings</th>
<th>O&amp;M/Behavior-Based Savings</th>
<th>Total Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>344,016</td>
<td>4,646,541</td>
<td>7,990,557</td>
</tr>
<tr>
<td>2</td>
<td>4,279,752</td>
<td>7,345,658</td>
<td>11,625,400</td>
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<tr>
<td>3</td>
<td>9,188,286</td>
<td>11,638,767</td>
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<tr>
<td>4</td>
<td>12,068,642</td>
<td>15,793,426</td>
<td>27,862,068</td>
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<tr>
<td>5</td>
<td>17,925,923</td>
<td>24,192,055</td>
<td>42,117,978</td>
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6.1% Savings
HPEM 5-year Financial Benefit to the Eleven End Users

Total = $8.2 million

- HPEM Incentive: $1,549,093
- Custom Project Incentive: $1,583,617
- Avoided Cost: $5,052,061

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BPA SEM Impact Evaluation Results


Note: MT&R = Monitoring, Targeting & Reporting
Case Study: Site Background
Case Study: Capital Project Implementation

CUSUM = Cumulative Sum of Differences

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Case Study: Energy Management Takes Hold
Performance over 5-years

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom Project Savings</td>
<td>0.0%</td>
<td>0.2%</td>
<td>1.3%</td>
<td>3.3%</td>
<td>4.2%</td>
</tr>
<tr>
<td>O&amp;M/Behavioral Savings</td>
<td>-0.8%</td>
<td>0.2%</td>
<td>0.4%</td>
<td>2.2%</td>
<td>2.9%</td>
</tr>
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Leadership
Management recognizes energy as a controllable cost, **is supportive of energy teams and wants to re-enroll in SEM**.

Personnel
Key personnel understand how the process uses energy **and have identified another 6.5% of energy reduction**.

Technical
Improved sub metering has been identified as necessary to collect real-time information.
Questions?
Contacts

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- High Efficiency Heat Pump Clothes Dryers    Sept 7
- Window Attachments                   Sept 20
- Alternative Refrigerants             Sept 28

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Thank you for attending!