3 keys to unlocking substantial long-term energy savings at large C&I facilities

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Product Portfolio Manager, Xcel Energy

Authors: Lori Nielsen, Chandan Rao, Nikhila Rao, Stuart Moulder and Dominic Kennedy
Customer Quotes

“This report told me things I didn’t already know.

*Engineering firms ask me questions and then regurgitate what I tell them into a report*

Engineering Services Leader for large glass bottle manufacturing company
“[The analysis] was significant in the decision making because it allowed us to verify with upper management the payback associated with investment.”

Anonymous customer – taken from product evaluation report
The 3 keys…

- Senior executive engagement
- Long term performance incentives
- Energy data mining
Leveraging…

1. Senior executive engagement
2. Long term performance incentives and
3. Energy data mining

To Achieve
1. Significant savings and
2. Sustainable energy management practices

For large customers
Traditional approach

- Technical audits
- Technology incentives
- Outcomes

What’s missing
- Executive engagement
- In-depth data
- Utility focused vs customer focused
Sustainable Energy Management Practices

Phase 1: Identification
Phase 2: Scoping
Phase 3: Implementation
Phase 1. Identification / Executive engagement

- Memorandum of Understanding
- Executive workshop
  - Who participates
  - Value of key stakeholder participation
  - Outcomes/output
  - Checkpoint
Engagement – EnVinta One2Five

**Achievement**
- 10.1 Energy cost performance in the past 12 months
- 10.2 Auditing progress

**Plant & Equipment**
- 8.1 Procedures for new facilities design
- 8.2 Procedures for equipment selection
- 8.3 Innovation & new technology

**Monitoring & Reporting**
- 9.1 Metering & monitoring
- 9.2 Reporting, feedback & control systems
- 9.3 Documentation & records

**Financial Management**
- 5.1 Criteria/budgets for capital expenditure (CAPEX)
- 5.2 Energy operating budgets

**Supply Management**
- 6.1 Purchasing procedures & alternative energy options
- 6.2 Quality & reliability of supply
- 6.3 Optimizing purchasing within supply agreement

**Operations & Maintenance**
- 7.1 Operating procedures
- 7.2 Maintenance procedures

**Leadership**
- 1.1 Demonstrated corporate commitment

**Understanding**
- 2.1 Understanding of performance & opportunities

**Planning**
- 3.1 Targets, performance indicators (KPI) & motivation
- 3.2 Plans

**People**
- 4.1 Accountabilities
- 4.2 Awareness & training
- 4.3 Resourcing
# Sample Report

## Diagnostic Results

<table>
<thead>
<tr>
<th>Element</th>
<th>Level of Development</th>
<th>User Priority</th>
<th>Critical Action Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Demonstrated corporate commitment</td>
<td>Medium</td>
<td>L.000</td>
<td>Critical</td>
</tr>
<tr>
<td>2.1 Understanding of performance and opportunities</td>
<td>Medium</td>
<td>L.000</td>
<td>Critical</td>
</tr>
<tr>
<td>3.1 Targets, performance indicators (KPI) and motivation</td>
<td>Medium</td>
<td>L.000</td>
<td>Critical</td>
</tr>
<tr>
<td>3.2 Plans</td>
<td>Medium</td>
<td>L.000</td>
<td>-</td>
</tr>
<tr>
<td>4.1 Accountability</td>
<td>Medium</td>
<td>L.000</td>
<td>Critical</td>
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<td>4.2 Awareness and training</td>
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<tr>
<td>7.1 Operating procedures</td>
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<tr>
<td>7.2 Maintenance procedures</td>
<td>Medium</td>
<td>L.000</td>
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</tr>
<tr>
<td>8.1 Efficiency of existing plant design</td>
<td>Medium</td>
<td>L.000</td>
<td>-</td>
</tr>
<tr>
<td>8.2 Procedures - plant design/retrofit, purchasing/replacement</td>
<td>Medium</td>
<td>L.000</td>
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<td>8.3 Innovation and new technology</td>
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**Overall Ranking:** 2 Stars  
**% Achievement:** 23  
**% Achievement to reach next level:** 22
Phase 2. Scoping - Data mining

- Definition... *Transforming energy data through analytics and visualization to present useful insights to drive change*

- Establishes:
  - Common language and understanding for sustainable results
  - Support needed to present the “story” effectively
  - Credibility for solutions proposed
Data Driven versus Anecdotal

Posted on September 15, 2011 by Peter Ellerton
Chiller Plant – 3D plot
Chiller Plant - Histogram

Summer -320 / 4988 / 8192-kw
Trans. -288 / 2530 / 6816-kw
Winter -416 / 1624 / 6208-kw

% of time

kw

All Data
Summer
Winter
Transition
Cumulative
Chiller Plant – Scatter Plot
Phase 3. Implementation

- Preapproval for projects
- Bundling of projects
- Vendor proposal support
- Pre and post-monitoring
- Xcel Energy rebates & bonuses
- Repeat One-2-Five diagnostic
## Phase 3. Implement – Case study

<table>
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<th>Practices</th>
<th>Major Research Campus</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Improve Management Effectiveness</td>
<td>Complex and interconnected energy systems Engaged all (16) stakeholders in decision making</td>
<td></td>
</tr>
<tr>
<td>Achieve Sustainable Energy Conservation</td>
<td>Implemented savings of 12.5% (6.8 GWh) of the annual electric energy consumption (implemented a further 4.6 GWh since paper was written)</td>
<td></td>
</tr>
<tr>
<td>Review Energy Performance</td>
<td>Increased focus and momentum with enhanced monitoring resources for review of performance and rebate incentives for implementing additional measures</td>
<td></td>
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Achieve Significant Energy Savings
Cost Effectiveness

Expected range for levelized cost of energy saved $0.016 to $0.033 per kWh (Ref: ACEEE TAP An Assessment of Utility Program Portfolios, Sept 2011)

Levelized cost of saved energy, $/kwh

 Shows an average increase of 10% per year
Conclusion

- Adjustable offering
- Executive level engagement
- Energy team
- Data Driven analysis
- Cost = 0.5 - 0.7 cents per life-time kWh saved (2012)