EnMS (energy management systems) Package for Small Commercial Buildings

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Problem Statement:
Small commercial buildings present two challenges for implementing energy efficiency strategies
1) high transaction cost relative to total savings
2) lack of personnel time or skill available for energy management

Objective: Develop packaged, highly ‘commoditized’ energy management systems (EnMS) for small commercial buildings that can be delivered with sufficiently low transaction costs, for 5-10% site energy savings
Impact of Project:
• Based on CBECS data, small buildings targeted (office, retail, food) comprise 24% of commercial energy use representing 1570 TBtu
• Assuming just 5% market penetration within several years of the first pilot, and 5-10% site savings, 4-8 TBtu savings could be generated

Project Focus:
• Supports midterm BTO goal of 40% savings in energy to operate existing commercial buildings, at less than the cost of energy saved
• Aligns with CBI strategies: accelerate advanced solutions into existing buildings, energy mgt and continuous improvement
• Aligns with CBI program role/priority: voluntary activities for increased efficiency, emphasizing market-viable yet under-utilized resources
Approach: Combine existing approaches, e.g., meter data analysis, incentive matching, into a single low-cost solution delivered by HVAC contractors

Key Issues: Very low level of effort (~4 hours); business model development; identification of deployment channels for scaled dissemination; demonstration design to generate necessary ‘proof points’ for adoption

Distinctive Characteristics: Utilizes contractors who already serve small commercial market; creates new business value proposition for contractors and owners
Approach

- Existing benchmarking tools (free)
Approach

• Existing utility and interval data analysis tools (low/no cost)
Approach

- Existing walk-through checklists and guides

**SURE ENERGY SAVERS**

**Energy Efficient checklist for small businesses**

**Quick and Easy Energy Saving Checklist for Small Businesses**

Use this checklist to identify no-cost or low-cost measures you can take to save your business 10 to 50% on your energy bills.

1. **Fluorescent Lighting**

   Does your business have outdated and inefficient fluorescent lighting and magnetic ballasts?  
   - No: Congratulations! You have made the energy efficient choice.
   - Yes: An energy efficient T8 fluorescent lamp utilizes rare earth phosphorus and a special electronic ballast. Though considerably thinner (one inch in diameter rather than one and one-half inches), the T8 provides equivalent light, higher quality color rendition and consumes up to 40% less energy than outdated fluorescent lighting systems which use T12 lamps and magnetic ballasts.
Accomplishments: Concept vetting and confirmation of intended approach with ~20 stakeholders—contractors, tools vendors, utility reps w/ small commercial focus

Partner commitments for pilot demonstration- 2 contractors and 4 buildings

Progress on Goals: Project is progressing relative to goals, as planned– draft package by May, demos in May/June

Awards/Recognition: n/a
**Task Overview**

Task 1 Analyze market need and potential - completed

Task 2 Develop technical and business approach, obtain pilot partner commitments - completed

Task 3 Develop EnMS package and business model - in progress

Task 4 Demonstrate in pilot, track impacts, disseminate results to seed deployment – future task
Project Plan & Schedule

Project initiated October 2012

Planned completion September 2013

2 go/no-go decision points, both have occurred

Q1: Evidence of necessity and value of DOE investment in proposed EnMS (scoping study, stakeholder feedback)

Q2: Commitment from providers and owners to participate in pilot demonstration

On schedule, no slips
## EnMS Package Description

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<thead>
<tr>
<th>EnMS Activity</th>
<th>EnMS Package Contents</th>
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<tbody>
<tr>
<td>Peer benchmarking, monthly bill analysis</td>
<td>Template and instructions for collecting data; Instructions on how to use existing tools, interpret and record results</td>
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<tr>
<td>Electric interval meter data analysis</td>
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<tr>
<td>Walkthrough to identify operational or modest capital improvements</td>
<td>Audit checklists and guidelines; tracking sheet, and instructions on how to resolve issues</td>
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<tr>
<td>Identify incentives to support capital improvements</td>
<td>Pointers to online tools and how to find local small commercial utility programs</td>
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<tr>
<td>Savings assessment and continuous tracking</td>
<td>Instructions on how to use existing tools; what to quantify</td>
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<tr>
<td>Communication of results</td>
<td>Guidelines on goal setting; template to compile results</td>
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EnMS Package Description

- Analyze monthly data & benchmark
- Analyze interval data
- Walkthrough
- Identify incentives
- Assess savings
- Communicate results
EnMS Activity Example: Interval meter data analysis

Analysis of Interval Data

Plan to spend about 20-30 minutes reviewing a building’s interval energy use data.

When you see this icon, make sure to record the requested information in the ‘Analysis of Interval Data Worksheet’

When you see this icon, look for tips for actions to reduce energy consumption.

Step 1 Upload data

Load interval data into the program. You need at least one month (as much as 6-13 months for some tools) of electricity use data reported every hour (or every 30, 20, 15 minutes). See ‘Obtaining Interval Data’.

Step 2 Daily and weekly load schedule

Display electricity use data vs. time for a few weeks of interval energy use data.

![Graph showing electricity use data for October 2006](image)

Energy use for each day in the month of October 2006 using ECAM (from ECAM Instruction manual). Note weekday vs. weekend schedule is typical, with abnormal activity on Saturday October 21.

Does the daily load profile have the same shape as you would expect? Specifically:

- Peak
- Startup begins
- Shutdown

Interval Data Analysis Worksheet

| Building: ______________ |
| Date: ____________ |

Step 0: Obtain interval energy use data

Either:
- Get file from owner. File name: ______________
- Download file from utility website. Utility: __________ Username: __________ Password: __________

Building floor area: __________ Building type: __________

Step 1: Tool used to display interval data: __________

Step 2 Daily and Weekly Scheduling:

[paste an image of a week or several weeks of daily loads here]

- Weekly pattern (circle):
  - all days similar
  - weekday/weekend
  - weekday/Sat/Sun irregular/other: __________
- Weekend load compared w/ typical: __________
  - As owner expected? yes / no
- Holiday load compared w/ typical: __________
  - Which holidays (circle): __________
  - As owner expected? yes / no
- Holiday loads compared w/ typical: __________
  - Which holidays (circle): __________
  - As owner expected? yes / no

- Typical day scheduling:
  - Startup begins: __________
  - Startup ends: __________
  - Shutdown begins: __________
  - Shutdown ends: __________
  - As owner expected? yes / no

Notes on irregular activity:

- Include times where equipment may be running unnecessarily.

Step 3 Base Load:

- Base load level: __________
- Typical daily maximum level: __________

- Base load to daily maximum ratio: __________
- Divide base load by typical daily max

- If ratio above is greater than 0.50, look for opportunities to deepen setbacks.
Project Budget

Project Budget: $250K

Variances: None expected

Cost to Date: $70K, expected increase in spend rate to support pilot demonstration

Additional Funding: n/a

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<td></td>
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<tr>
<td>FY2013</td>
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<tr>
<td>DOE</td>
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<td>$250K</td>
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<tr>
<td>Cost-share</td>
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TBD: To Be Determined
Partners, Subcontractors, and Collaborators: Demonstration partners Marina Mechanical and RRR Heating and Air Conditioning

Technology Transfer, Deployment, Market Impact: 6 potential deployment pathways have been identified

1. Contractor training venues
2. Contractor professional orgs
3. Cities and states with energy use reporting requirements
4. Utility programs targeting small commercial
5. Building Owners and Managers Association (BOMA)
6. Environmental business certification bodies, e.g. Green Seal

Communications: n/a
Next Steps and Future Plans: Following FY13 development and demonstration, potential next steps concern dissemination of pilot results, engagement of deployment partners via high-priority pathways, and scaling/testing in diverse US markets.