

Michigan Statewide Building Energy Management Systems Study

EO Collaborative

PRESENTATION

September 20, 2016

AGENDA

- Overview
- Key Findings
- Methodology
- Findings
 - What are "Building Energy Management Systems" (BEMS)?
 - Technology and Market Trends
 - BEMS Supply And Opportunity in Michigan
- Recommendations

STUDY MOTIVATION

- Rapid evolution of “smart” system automation technology
- New products entering building market
- Limited knowledge of technologies & market potential in Michigan



OBJECTIVES

1. Understand **technology trends** in commercial (non-residential) building automation
2. Develop robust **supply chain** analysis and technical evaluation for building automation markets.
3. Identify **key areas of strength in Michigan** supply chain and potential for growth of the industry overall.
4. Identify **key industry sectors** where BEMS could have clear and well-defined impacts to support the development of MEMD values that are likely to have positive potential economic impact on utility programs.
5. Identify **potential opportunities for Michigan**
6. Develop **case studies of successful BEMS projects** to understand the relevant skillsets

KEY FINDINGS

- New BEMS represent a leap forward from traditional EMS.
- New and growing opportunity in:
 - Restaurants
 - Warehouse Facilities
 - Lodging Facilities
 - Large energy use facilities that update to BEMS
- Savvy facility managers looking for advanced BEMS will not support the growth of the market alone.
- Opportunities exist for utility programs to engage with BEMS integrators, energy management consultants, and other BEMS contractors as trade allies for promoting BEMS programs.

METHODOLOGY

Objective	Approach and Data Sources
Identify technology trends	Literature Review, Review of Industry Reports, Manufacturer Interviews, ESource
Develop robust supply chain analysis and technical evaluation for building automation markets	Review of Industry Reports, Manufacturer Interviews
Identify key areas of strength in Michigan supply chain and potential for growth of the industry	Interviews with Experts, Interviews with Manufacturers and Vendors Operating in Michigan, Review of Industry Reports
Identify key industry targets for MEMD values to have positive potential economic impact on utility programs	Economic Analysis, Scenario Analysis, Review Activities by Other Utilities
Identify potential opportunities for Michigan entities	Synthesis of findings, existing utility data and evaluation reports
Develop case studies	Conduct on-site interviews with four facilities that have recently implemented BEMS projects to identify success and lessons learned

WHAT ARE BEMS?

BEMS are **centralized, computer-based controls systems** that, at a **minimum, control HVAC equipment** and may include advanced data analytics and visualization capabilities.

BEMS are most often deployed in large commercial (100,000+ square feet) and industrial facilities, but increasingly are also suitable for smaller buildings.

Increasingly sector specific & additional capabilities



General						Hospitality					
Disitech	●	●	●			Johnson Controls			●		
Grid Navigator	●	●	●			Evolve	●				
Gridpoint		●				Honeywell	●				
Phoenix Energy			●			Pacific Controls					
Delta Controls						Schneider	●	●			
IBM						Siemens					
Rockwell Automation						Telkonet	●				
Trend						Verdant	●				
Enlightened		●	●			Energex					
Pace Controls				●	●	INNCOM					
Pelican Wireless	●				●	Onity					
Cortex			●			Healthcare					
Cree		●				Johnson Controls			●		
Daiken				●		Blue Pillar					
DreamWatts	●					Building IQ				●	
Ecova			●			Optimum Energy				●	
Ecovox				●		Pacific Controls					
EFT Energy			●			Schneider	●	●			
Energy CAP			●			Siemens					
Enerit			●			Automated Logic					
Enernoc			●			Eaton					
eSight Energy			●			JLL					
NorthWrite			●			Trane					
Panoramic Power			●			Food					
Perillon			●			Novar					
Proliphix	●					Powerhouse Dynamics					
Pulse Energy			●			Critical					
RCS Technology	●					Blue Pillar					
Verisae			●								



HOW BEMS SAVE ENERGY

- Typical “range of savings” is 5-20%
- BEMS functions that lead to savings:
 - Tailoring equipment use to occupancy
 - Tailoring equipment use to overall load
 - Coordinating various items of equipment
 - Enabling facility managers to focus on the right equipment at the right time.



BEMS TRENDS

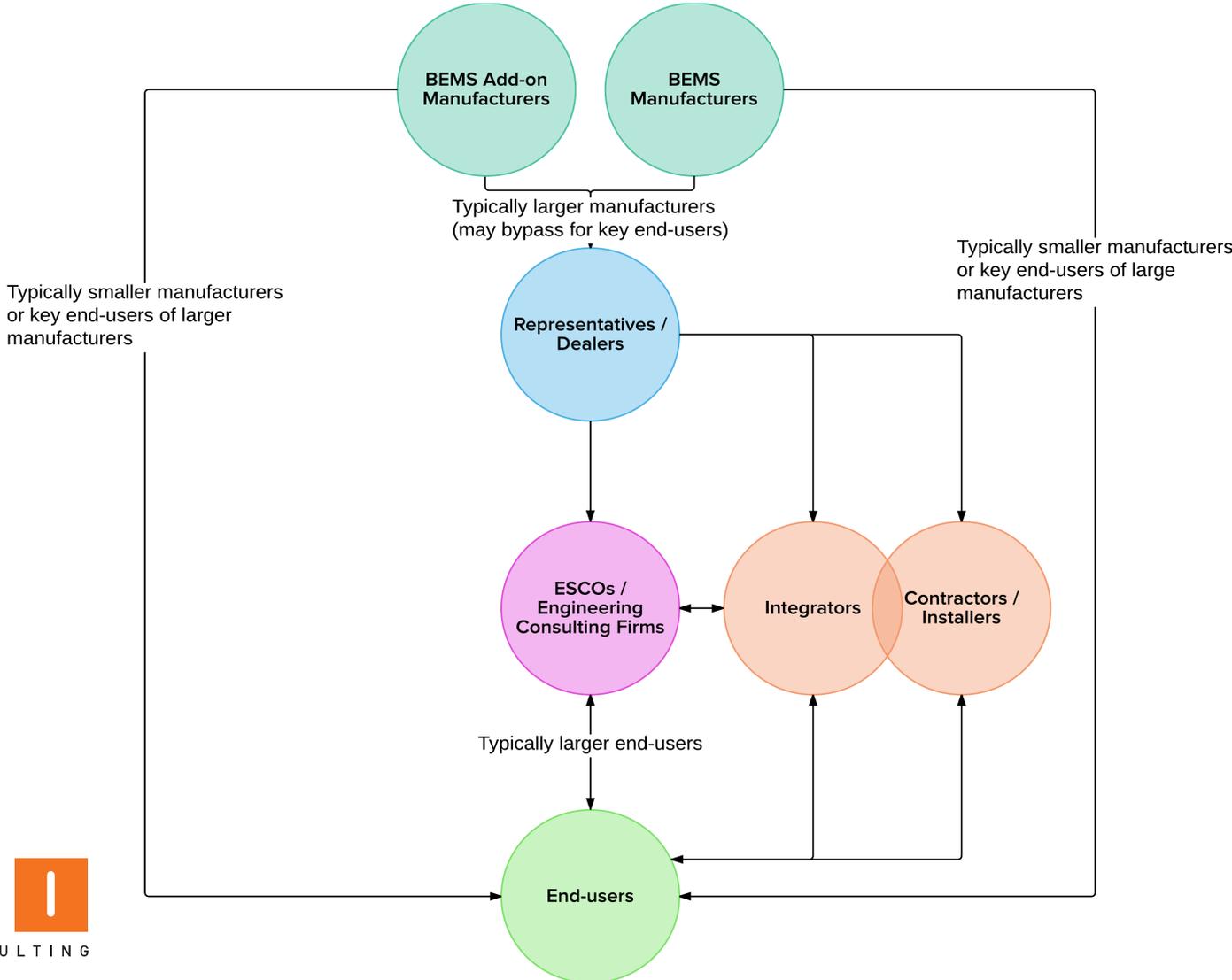
- Open protocol systems reducing costs
- Internet of Things (IoT) driving interoperability
- Big data and software advances creating vibrant supplier competition
- Modular systems creating an entry point for smaller businesses to take advantage of BEMS

“In the past it was proprietary controls that dominated, and now that it’s open protocol... As long as you can get it on the internet, you don’t need the single source provider... In the past, with a proprietary system it was around \$25,000 to install a system. Now it’s cheap with an open system, anywhere from \$7,000 to 10,000.”

BEMS IN UTILITY PROGRAMS

- We identified 70 utilities with BEMS programs through ESource's DSM DAT
- Incentives for existing programs vary:
 - \$7 to \$350 per 1,000 square foot conditioned space
 - \$225 to \$300 per system point
 - \$70 to \$100 per ton of controlled heating and cooling equipment
 - \$80 to \$280 per MWh saved with the system
 - 150% of annual dollar value of energy savings
- Biggest challenge for utilities: assigning energy savings values

BEMS SUPPLY



MICHIGAN BEMS SUPPLY THEMES

1. The Michigan BEMS market is similar to the national BEMS market.
2. Qualified and invested BEMS champions within organizations are critical to the health of the supply chain.
3. BEMS services are in limited demand for many commercial sectors, despite high potential energy savings and non-energy benefits.
4. The Michigan market already has some incentives for BEMS components, but could grow.

SUCCESSFUL CASE STUDIES

4 case studies (all successful) varied in scale and complexity



Key Skills for Success:

- Desire to improve facility operations
- Research the available technological options or trust a knowledgeable contractor/integrator
- Learn to work with the BEMS displays
- Transfer BEMS information to action

EXISTING BEMS PENETRATION

Penetration varies, and most BEMS are in large facilities

Business Type	High Use Customers (>=100 MWh annually)	Low Use Customers (<100 MWh annually)	Weighted Mean
Education	High	Low	Low
Grocery	Low	Low	Low
Health	Medium	Low	Medium
Lodging	Medium	Low	Medium
Office	Medium	Low	Medium
Other	Low	Low	Low
Restaurant	Low	Low	Low
Retail	Medium	Low	Low
Warehouse	Low	Low	Low
Overall	Medium	Low	Low

High - 51 % or greater penetration, Medium - 21 to 50% penetration, Low 20% or less penetration

BEMS OPPORTUNITY

We project technical savings potential to be in the range of 3%-5% of state energy use.

- Based on current penetration, typical installations, and MEMD values:
 - Office buildings remain an important candidate for BEMS, as there appears to be remaining potential in these facilities
 - Potential in several types of non-office business types, including health, retail, and warehouse facilities
- Based on interviews and current penetration:
 - Business types without historic BEMS installations (restaurants and smaller lodging facilities) may now have cost-effective options

BEMS MARKET DRIVERS

The market appears open to shifts expected to expand the market.

Variables	Current Picture	Market Expansion	Market Stagnation
Intuitive Systems	No	Yes	No
Trusted Vendors	No	Yes	No
Distributed Energy Resources	No	Growing	No
Time Variant Pricing	Varied	Yes	Varied
Market Size	Growing	Growing or Large	Shrinking
System Accessibility	Proprietary/Open Mix	Proprietary/Open Mix	Proprietary

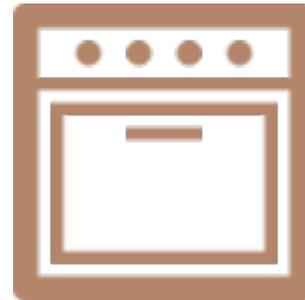
RECOMMENDATIONS

1. Utilities may be able to encourage broader adoption of BEMS, increasing energy awareness, energy savings, and customer satisfaction for the majority of customers who do not realize that BEMS technology is available to them.



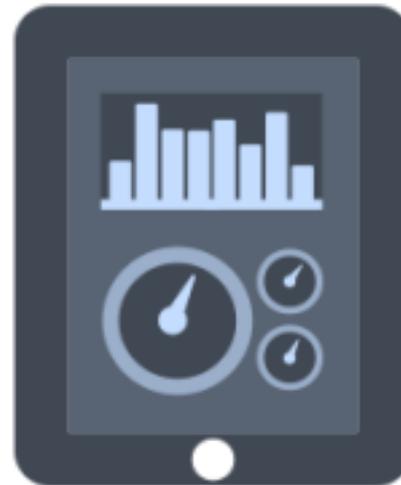
RECOMMENDATIONS

2. We recommend developing BEMS savings values in a similar modular fashion as the existing EMS approach, but also with sector-specific values for the integrated system.



RECOMMENDATIONS

3. It may be valuable to determine the incremental savings from upgrading existing systems to BEMS for large facilities: market actors and users suggested that improved usability changes the nature of the facility management, but quantifying savings associated with this shift is beyond the scope of this study as the baseline will vary in each facility.



RECOMMENDATIONS

4. Utilities may want to engage BEMS integrators, energy management consultants, and other BEMS contractors as trade allies for promoting BEMS programs. Michigan contractor associations, such as (MEECA) and (MIACCA), may simplify the task of connecting with these potential BEMS trade allies.



THANK YOU

Questions or Follow up?

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