ComEd®
Energy Efficiency Program

ENERGY MANAGEMENT SYSTEMS MARKET ASSESSMENT FOR SMALL AND MIDSIZE BUSINESS CUSTOMERS EXECUTIVE SUMMARY

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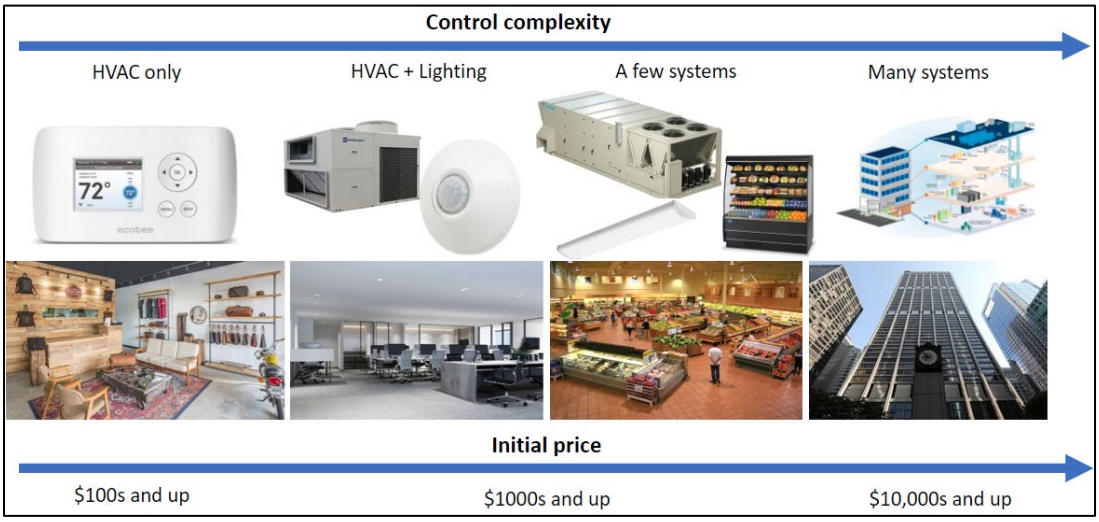
EXECUTIVE SUMMARY

Energy management systems (EMSs) are used to control HVAC, lighting, refrigeration, process loads, and plug loads in commercial buildings. The key function of an EMS is to operate these systems as efficiently as possible while still providing a specified level of occupant comfort or desired indoor environmental conditions. Full-building energy savings are typically 5% to 20% in most applications. A simple EMS in a small building can cost as little as a few thousand dollars (or sometimes even less), while a sophisticated system in a large facility can exceed $250,000 with thousands more per year in operational costs.

EMSs have traditionally only been cost-effective in large buildings—typically over 100,000 square feet (ft^2). However, this is changing as the cost of sensors, computing power, and controls goes down. In the past decade, small and midsize businesses (SMBs) have become increasingly suitable candidates for EMSs. **We estimate that there is approximately 108 gigawatt-hours (GWh) of potential savings in buildings under 100,000 ft^2 through 2025 in ComEd's territory.** And because many of the measures with greater potential already exist in ComEd's energy-efficiency portfolio, **EMSs in SMBs represent one of the single largest untapped savings opportunities for ComEd.**

There is no uniform definition of an EMS. But at a minimum, in the SMB context, such systems consist of at least one communicating thermostat that can be controlled remotely via the internet. Note that this minimum product definition is significantly simpler and cheaper than what would typically be considered an EMS for larger buildings, where the most basic system would typically involve a network of communicating HVAC control devices coupled with an online energy management dashboard. But by using such a basic definition of an EMS, ComEd should theoretically be able to offer a program to even the smallest commercial customers—even a corner store of under 1,000 ft^2 will typically have a thermostat that, if replaced with a communicating model, could potentially participate.



While writing this report, we analyzed 150 EMS products. They ranged in complexity from standalone smart, connected thermostats most appropriate in very small offices or shops to large multisystem controls that can manage a building of tens of thousands of square feet or manage operations at scores of sites. Of those 150 products, we determined that only 28 met the basic qualifications of providing control to HVAC and were appropriate in smaller business environments. Of these 28, **we narrowed the focus to 4 potential products for a pilot: Ecobee smart thermostats for the smallest customers and Johnson Controls devices for midsize businesses, plus Budderfly and Phoenix Energy Technologies as possible alternatives to Johnson Controls.**

Actions taken	Number of products
Total products analyzed	150
Met basic definition of EMS	78
Good match for SMB settings	28
Recommended for pilot	4

We found that developing an EMS pilot is not without its challenges. In extensive interviews with ComEd SMB customers, trade allies, utility program managers, product vendors, and other experts, we learned that the following **barriers** exist:

- Initial expense and access to capital
- Lack of understanding of energy issues
- EMS complexity
- Low cost-effectiveness
- Uncertain system persistence
- Absence of relationship between business owners and their utility

At the same time, EMSs offers several critical benefits to customers, including lowering operating costs, enhancing occupant comfort, improving productivity, identifying failing systems early, and increasing sales.

Because the benefits and potential downsides are both significant and compelling, it is likely that a pilot placement (or placements) is necessary to better understand all the factors at play and determine whether a full-scale incentive program is right for ComEd's energy-efficiency portfolio. To that end, we make several key recommendations for developing a pilot or eventual incentive program.

1. Design the pilot to answer key program questions. For example: Will the program generate cumulative persisting annual savings worth pursuing over the next best future program option? And is a program going to be cost-effective in ComEd's operating environment?

2. Conduct rigorous evaluation using such tools as the Lawrence Berkeley National Lab (LBNL) Energy Management and Information System Field

Evaluation Protocol, which enables consistent evaluation of EMS projects by providing an evaluation plan and key baseline data and energy-use metrics required to estimate savings.

3. Target a narrow subset of customers and technologies with an initial pilot to keep the pilot simple and maximize the probability of success. We recommend sectors that have significant EMS savings potential, high energy-use intensity, and diverse characteristics that would allow for a robust pilot.

4. Supplement outreach with simple, payback-based analysis. SMB owners and industry experts alike told us that customers need quality cost-benefit analyses to inform their decisions around energy. In addition, we found that customers are wary of projects that have complex participation processes or interrupt business operations. On the flip side, customers often see the non-energy benefits (NEBs) of an EMS quite appealing, particularly retail businesses, which see improved lighting controls as an opportunity to better display and sell products. In the end, we discovered that a two-year payback seems to be the "sweet spot" for the simple payback period for SMB customers to justify the cost of an EMS.

5. Design incentives for simplicity and payback in a way that avoids a pay-for-performance incentive model, as small businesses often will not be able to access the sophisticated energy modeling, nor will they always be able to cover 100% of the cost of installation with the promise of a future payback. Instead, we recommend incentives based on facility square footage, a percentage of the total project cost, or number of control points installed. We also recommend a two-tier approach to best serve smaller and midsize customers alike. Tier 1 offerings would be limited to cloud-connected thermostats, while Tier 2 would integrate additional functionality, such as lighting, more-sophisticated HVAC controls, refrigeration, plug load, and/or process load controls in a more complex and expensive package that can also deliver more benefits.

To gauge the state of the industry for EMS offerings among small business customers, we also looked into the details of 20 active incentive programs in the industry. This is helpful for ComEd, as it allows the utility to evaluate the strengths and weaknesses of numerous approaches. That said, we judge many program structures to be a less-than-ideal match for ComEd because they have what we view as a burdensome application process; mismatched goals that favor gas savings or demand reduction over electrical efficiency; or are offered by a utility with a significantly different climate, customer base, or size than ComEd. However, at least two programs—at National Grid in New York and Consumers Energy—provide interesting models that ComEd could base an eventual offering on. Several other programs provide interesting insights.

After analyzing other programs and conducting interviews with more than a dozen subject-matter experts (SMEs) and program managers, we found that cost-effectiveness is likely to be the biggest hurdle that ComEd would face in any future offering. For this reason, a pilot is an excellent approach to determine what environments or customer segments may be the best fit for EMSs. Specifically, we recommend a pilot that focuses on healthcare and retail with refrigeration because these sectors have significant savings potential, high energy use, and diverse characteristics that would allow for a robust pilot to flesh out what sizes and types of operations would benefit the most. Additionally, ComEd's recent potential study and previous E Source market research indicate that these sectors are among those with the greatest opportunity for savings and very high interest in implementing EMSs, relative to many other sectors. These factors offer ComEd an opportunity to launch a robust pilot that tests the cost-effectiveness potential, as well as operational parameters and customer characteristics, to gauge whether a full-scale incentive program is warranted at this time.