



# Optimize Your Building Performance

How to choose the right energy management information system for your portfolio

# Which Energy Management Information System (EMIS) is Right for You?

Energy Management Information Systems (EMIS) consist of a broad set of tools and services that give building owners, facility managers, energy managers, and commercial property management companies the information required to measure, manage, and enhance building performance. EMIS can cut energy use by up to 20 percent,<sup>1</sup> when used in alignment with other energy management best practices, yielding quick payback, smart operations, and better buildings.

EMIS are software and hardware components that work together to provide building stakeholders powerful insights that allow them to target low- and no-cost improvements, as well as strengthen the business case for investing in energy upgrades that will significantly lower utility costs, improve tenant satisfaction, and increase property value.

All buildings will benefit from having an EMIS installed, and the tools vary in application, frequency of data, and overall functionality, providing the flexibility that best suits your capabilities, needs, and goals.

To understand which EMIS is right for your portfolio or individual building, take the below questionnaire and select the options that most accurately address your needs.



<sup>1</sup> Source: <http://eis.lbl.gov/pubs/lbnl-6476e.pdf>

## Summary of EMIS Types

Before getting started, it is helpful to understand the different EMIS available to the market. Use the table below as a reference.

EMIS Type	Description	Benefits	Typical Energy Savings	Needed Infrastructure	Cost <sup>1</sup> (\$ less, \$\$\$ more)	Case Studies
<b>Energy Benchmarking Tools</b>	Helps track monthly to interval whole-building energy data	<ul style="list-style-type: none"> <li>Helps users set energy goals, identifies whole-scale needs for improvement, streamlines benchmarking ordinance compliance</li> </ul>	2.4% annually	<ul style="list-style-type: none"> <li>Whole-building data</li> </ul>	Free or \$	Discover how the team at <a href="#">One Franklin Square</a> in the District benchmarked energy in their building.
<b>Utility Bill Analysis</b>	Optimizes the utility bill-pay process	<ul style="list-style-type: none"> <li>Automates bill-pay and energy reporting</li> <li>Identifies billing errors, which save customers money</li> <li>Identifies utility meters that are not working properly</li> </ul>	2.4% annually	<ul style="list-style-type: none"> <li>Whole-building data</li> <li>Utility cost data</li> </ul>	Free or \$	<a href="#">Loudoun County Public Schools</a> in Virginia used utility bill analysis to save on energy.
<b>Energy Information Systems (EIS)</b>	Track, weather-normalized energy data on an interval basis (hourly or less)	<ul style="list-style-type: none"> <li>Visualizes granular energy consumption data, may contain demand response capabilities, and alarm-setting capabilities</li> </ul>	8% annual median savings, ranges from 0–33%	<ul style="list-style-type: none"> <li>Whole-building data</li> <li>Possible submeter and sensor compatibility</li> </ul>	\$\$–\$\$\$	Learn how the <a href="#">City of Orlando, FL</a> uses EIS to visualize its energy spend.
<b>Advanced EIS</b>	More advanced EIS with a higher degree of automated analytics, which may integrate with the Building Automation System (BAS).	<ul style="list-style-type: none"> <li>Has the ability to incorporate information from other platforms, such as a BAS, to provide additional analytics</li> </ul>	8% annual median savings, ranges from 0–33%	<ul style="list-style-type: none"> <li>Whole-building data, possible submeter capability, BAS</li> </ul>	\$\$–\$\$\$	Read how <a href="#">Carr Properties</a> used Advanced EIS to analyze energy trends in its portfolio.
<b>Building Automation System (BAS)</b>	Controls HVAC and sometimes lighting and security by user programmed set parameters.	<ul style="list-style-type: none"> <li>Control indoor temperature, humidity, lighting based on operator input</li> <li>Alarm and anomaly detection for programmed set-points</li> </ul>	10–15% when installing new BAS	<ul style="list-style-type: none"> <li>Sensors</li> <li>Potential compatibility with submeters</li> <li>Additional server or cloud storage</li> </ul>	\$\$\$\$	Learn how <a href="#">Golden 1 Center</a> in Sacramento, CA uses BAS at its sports arena.
<b>Fault Detection and Diagnostics (FDD)</b>	Identifies HVAC system or equipment-level performance abnormalities and in some instances can isolate the root cause of anomalies. These tools rely on data from the BAS, sub-meters and other whole-building energy data. These tools are also useful for measurement and verification (M&V) procedures.	<ul style="list-style-type: none"> <li>Automatically detects problems</li> <li>Identifies solutions</li> </ul>	2–11% whole-building potential	<ul style="list-style-type: none"> <li>BAS</li> <li>Sensors</li> <li>Possible submeter</li> </ul>	\$\$\$	Read how a <a href="#">multi-tenant office building</a> in Massachusetts uses FDD.
<b>Automated System Optimization (ASO)</b>	Two-way communication with BAS, whereby set-points are re-adjusted to optimize building-level services.	<ul style="list-style-type: none"> <li>Automatically re-writes set-point to maintain occupant comfort</li> <li>Evaluates optimization settings based on indoor and outdoor conditions and energy prices</li> </ul>	Unknown	<ul style="list-style-type: none"> <li>BAS</li> <li>Sensors</li> <li>Possible submeter</li> </ul>	\$\$\$	Discover how <a href="#">Waterfront Station</a> in the District used ASO to improve tenant comfort, space-conditioning operations, and energy management.

<sup>2</sup> The median cost for EMIS is \$23,000 in upfront costs. Lawrence-Berkeley National Lab. EIS Technology Costs, Benefits and Best Practice Uses. 2013. <http://eis.lbl.gov/pubs/lbnl-6476e.pdf>

## WHAT TYPE OF EMIS DO YOU NEED?

### A Three-Step Questionnaire to Help Narrow Your Choices

→ **Step 1:** Assessing the information you have about your building.

Your responses will help guide you toward better understanding the characteristics and energy performance of your building.

**Question 1:** What situation below best reflects your circumstances?

SITUATION	NEXT STEPS
I know very little about the characteristics of my building.	<ul style="list-style-type: none"> <li>Investigate property records, public information about building(s), and consider an energy audit.</li> <li>The Building Owners and Managers Association International (<b>BOMA</b>) provides many guides classified by building type to help owners measure the square footage of their building.</li> <li>Contact the <b>District of Columbia</b> for information on public real estate records.</li> </ul>
I have basic building characteristics (age, square footage, basic HVAC systems, etc.).	<ul style="list-style-type: none"> <li>Consider an energy audit.</li> <li><b>Learn</b> how performing an audit of your building can be good for your bottom line.</li> </ul>
I have detailed information about the characteristics of my building (ASHRAE Level II audit).	<ul style="list-style-type: none"> <li>Investigate options for energy savings identified in the energy audit findings.</li> <li>Implement <b>low- and no-cost energy-efficiency measures</b>.</li> <li>Contact the DC Sustainable Energy Utility (<b>DCSEU</b>) to get rebates for larger efficiency measures.</li> </ul>

**Question 2:** What type of access do you have to your building energy data?

SITUATION	NEXT STEPS
I do not have any information on monthly/annual energy or water-consumption data for my building(s).	<ul style="list-style-type: none"> <li>Investigate utility billing information.</li> <li>Pepco has a <b>step-by-step guide</b> to obtaining whole-building energy data.</li> </ul>
I have monthly utility bills from common areas in my building(s). My tenants are individually metered and pay the utility directly for their energy consumption.	<ul style="list-style-type: none"> <li>Investigate potential for obtaining whole-building data from your utility, or for having tenants provide you energy and water consumption data directly.</li> <li>U.S. Environmental Protection Agency (EPA) ENERGY STAR has developed a <b>checklist</b> based on property type for common metrics needed for energy tracking.</li> <li>Learn how <b>Prologis</b> accessed its tenant utility data for its triple-net leased buildings.</li> </ul>
I have aggregated monthly utility bills for my entire building.	<ul style="list-style-type: none"> <li>Investigate trends in data over time, or, if needed, consider obtaining more granular data, such as 15-minute interval data.</li> <li>Turn data into action. Execute <b>these steps</b> into your data analysis.</li> </ul>
I have 15-minute interval data for my whole building.	
I have sub-metered 15-minute interval (or more frequent interval) data for large systems, ex. HVAC.	
I have sub-metered 15-minute interval data (or more granular) for large systems and tenant spaces.	

**Question 3:** Do you have a building automation system (BAS)?

	SITUATION	NEXT STEPS
	I do not have a BAS and am not interested in installing one.	<ul style="list-style-type: none"> <li>If you do not have a BAS, ensure that your building has a <a href="#">strong preventative maintenance plan</a> for HVAC, lighting and other energy-consuming equipment in the building.</li> </ul>
	I do not have a BAS and I am interested in installing one.	<ul style="list-style-type: none"> <li>Investigate the potential options to incorporate a BAS into your building, and investigate the below step 2 options related to BAS.</li> <li>Need help selecting the appropriate BAS for your building? <a href="#">Read more</a> about how to achieve your energy goals with the correct platform.</li> </ul>
	I have a BAS that is optimized and used for the operation of my building.	<ul style="list-style-type: none"> <li>Get the most out of your BAS with <a href="#">these steps</a>.</li> </ul>
	I have a BAS, but it is old/not fully functional/our facility manager isn't trained on how to use it.	<ul style="list-style-type: none"> <li>Consider BAS calibration, also investigate Step 2 options related to BAS.</li> <li>Implement these <a href="#">strategies</a> when optimizing your existing BAS.</li> </ul>

→ **Step 2:** Determining what to do with your energy information.

Your responses to Question 2 on the previous page should help guide you toward possible next steps in investigating an EMIS.

	SITUATION	NEXT STEPS
	I want to comply with the District of Columbia's Clean and Affordable Energy Act ( <a href="#">CAEA</a> ).	<p>The CAEA requires building owners over 50,000 sq. ft. to track their building's energy use annually and report usage to the District.</p> <p>Research automated benchmarking tools, which can simplify this process for building owners. These tools track monthly whole-building energy data and benchmark energy performance.</p>
	I want to simplify my utility billing and analyze my energy spend.	Consider a <a href="#">utility billing tool</a> . These types of tools allow users to benchmark and reconcile and manage utility bill-pay.
	I want to monitor energy consumption in real-time without tying to a BAS.	Consider utilizing an <a href="#">Energy Information Systems (EIS)</a> , which is a building-level EMIS that pulls in hourly or more frequent data. This will provide you with in-depth, often real-time visibility into how energy is being consumed in a building.
	I want to monitor energy consumption real-time and tie it into my BAS, and:	
	I am not concerned with system-level faults and inefficiencies being brought to my attention.	If you're looking to move beyond an EIS into more advanced controls, consider an <a href="#">Advanced EIS</a> , which includes EIS capabilities and controls with detailed baseline models to identify unusual energy trends, verify ECM success, and connect to the BAS.
	I want system-level faults and inefficiencies brought to my attention so I can alert my engineers.	Research <a href="#">Fault Detection and Diagnostics Tools (FDDs)</a> . FDDs are EMIS tools that identify faults at the system level via BAS data. These tools not only identify systemic issues in the building, but also offer solutions to fix the identified problems. This saves building teams time on troubleshooting.
	I want system-level faults and inefficiencies brought to my attention and corrected automatically by the system.	Consider <a href="#">Automated System Optimization (ASO)</a> . By connecting the ASO to the BAS, this can re-adjust set-points to optimize building-level systems.

→ **Step 3: Consider your organizational needs.**

**Question 4:** How often do you anticipate your team will use an EMIS?

SITUATION	NEXT STEPS
Daily	Many complex system-based EMIS options such as BAS, EIS, and Advanced EIS need frequent monitoring in order to achieve maximum energy savings. Identify team members who will manage the EMIS. Consider annual training and calibration from the system vendor to stay up-to-date with EMIS management.
Weekly	Some EIS options can be analyzed on a weekly basis, generating automated reports that can be studied on a weekly basis. Identify team members that will respond to action items.
Monthly	Low-touch tools such as EIS, Advanced EIS, utility bill pay, and benchmarking tools can be accessed on a monthly basis, using automated tools such as FDDs and ASOs need monthly monitoring for set-point recalibrations.
Annually	To maximize energy savings, teams should interact with their EMIS solution on at least a monthly basis.

**Question 5:** How do you want to receive data?

SITUATION	NEXT STEPS
I want notifications that system errors have been automatically resolved.	Explore ASOs with notification settings that fit your organization's needs. Determine who should receive notifications.
I want alerts that diagnosis system faults pushed to my phone.	Investigate FDDs. Ensure that notifications are reaching the correct team members. Develop a process for tracking and responding to alerts.
I want to access to a real-time energy dashboard.	EIS and advanced EIS platforms often have accessible dashboards with real-time data functionality. Assign staff members to analyze data trends on a regular basis.
I want to set parameters for my major building systems with anomaly email notifications.	Consider a BAS. Identify which building staff need access to the system. Develop a process for tracking and responding to alerts. Schedule annual trainings to keep staff up-to-date on best practices.
I want to log into an interface, whereby, my monthly energy data is tracked against other similar buildings.	Investigate benchmarking tools. Review data quarterly for quality control. Set energy reduction goals. If you own or manage multiple buildings, consider adding all of the buildings to the benchmarking tools. Develop a tailored energy reduction plan for energy intensive buildings in your real estate portfolio.
I want to receive email notifications that my utility bills have been paid.	Utility bill analysis tools provide peace of mind that your utility bills have been paid. Use the tool to monitor expenses and set energy and utility bill reduction goals. If you own or manage multiple buildings, consider adding all of the buildings to the utility bill tool.

**Question 6:** How concerned are you about cost?

SITUATION	NEXT STEPS
I am very cost sensitive, yet want to achieve energy savings.	Consider a benchmarking or, a utility bill analysis tools. Many of these tools, especially benchmarking tools, are free.
Cost is a moderate concern. A decent return on investment is important.	Investigate an EIS or advanced EIS. These platforms have moderate costs associated with them and can achieve annual energy savings of 8 percent.
I want to achieve the greatest energy savings. Cost is a little factor.	Consider a good BAS system layered with a FDD or ASO to achieve savings of 15 percent. BAS is the most commonly used system and averages \$23,000 in upfront costs. <sup>3</sup>

<sup>3</sup> Lawrence-Berkeley National Lab. EIS Technology Costs, Benefits and Best Practice Uses. 2013. <http://eis.lbl.gov/pubs/lbnl-6476e.pdf>

## Next Steps: Integrating EMIS into Your Core Operations

Using an EMIS is a key component of a strong energy management plan, which is a programmatic approach to optimizing building energy performance and reducing waste. The following section includes strategies to further help select an EMIS that will suit the needs of your organization.

### 1. Set Goals

Building teams that are comprised of owners alongside facility and maintenance personnel are more likely to succeed in identifying the best EMIS solution to achieve desired outcomes. It is recommended that the building teams identify whether they want to save on utility expenses, reduce greenhouse emissions, comply with local regulations, streamline utility billing, get better insight into building performance, or some combination of these goals. Once underlying motivations are identified, focus on developing specific, measureable, achievable, realistic, and timely (SMART) goals for implementation.

### 2. Evaluate Current Building Infrastructure and Operations

Once an end goal is identified, examine the current infrastructure in the building. Some questions to answer may include:

- Does the building have a building automation system (BAS)? Is it accessible remotely?
- Does the building team have access to whole-building data?
- Do tenants directly pay their own utility costs to the utility company?
- How will an EMIS benefit tenants and other occupants?
- What is the current metering infrastructure in the building? Do the current whole-building meters and submeters give insight in the major energy end uses in the building?
- What is the historical utility spend for the building?

### 3. Develop a Business Case

To develop the business case for investing in an EMIS, investigate the total cost of a desired tool by conducting a [sensitivity analysis](#) that runs best-case, likely-case, and worst-case performance scenarios. This process identifies the installation and management fees, payback period, energy savings, and return on investment (ROI) to confirm that EMIS implementation will align with organizational priorities.

### 4. Get Buy-In From Key Stakeholders

Present the business case to key stakeholders, which may include asset managers, building engineers, tenants, occupants, executives, and finance teams. When getting buy-in from stakeholders, stress the financial benefits, while also highlighting non-energy benefits such as improved occupant comfort, productivity gains, enhanced sustainability profile, and other benefits subject to organizational priorities.

### 5. Ensure Adequate Capacity of Relevant Staff

Once an EMIS solution has been selected, consider allocating additional training time through service providers. Evaluate the building engineers' familiarity with the chosen EMIS solution and define roles and responsibilities for building engineers, property managers, energy managers, asset managers, and finance teams.

### 6. Explore Opportunities for Improvement

For decisions on renewing subscriptions or changing service providers, consider continually exploring and analyzing efficiency performance. To do this, it is necessary to revisit goals and stakeholder feedback periodically. Schedule recurring meetings with key stakeholders to present and receive feedback on progress towards energy- and cost-saving goals, ROI, and feedback relayed by building occupants regarding improvements in comfort or productivity. Use this information and the feedback of stakeholders to fine-tune EMIS tasks with vendors. Check with your vendor annually for any changes to the platform and additional service options; evaluate changes and new options with stakeholder input.

### 7. Recognize and Reward Success

It is likely that an EMIS will enable better results when operated by a professional who is actively using the system and the tools it offers. Use gatherings as an opportunity to recognize building operators or managers who have achieved goals. Find ways to facilitate the mentoring of building managers and operators who are receiving sub-optimal results by those who have had more success.

## Resources

Use these resources below to learn more about EMIS technologies and market adoption:

Learn how the District of Columbia used EMIS to get a snapshot of its portfolio's energy usage.

"City of DC Publicizes Real-Time Energy Consumption with Aquicore," Aquicore, 2014, available at <https://resources.aquicore.com/city-of-dc-publicizes-real-time-energy-consumption-with-aquicore>

This slide deck gives a high-level overview of the state of the EMIS market and how to choose an appropriate EMIS.

*EMIS Crash Course*, Jessica Granderson et al., Lawrence Berkeley National Laboratory, 2013, available at <http://eis.lbl.gov/pubs/emis-crash-course.pdf>.

This toolkit includes information for all business sectors to take advantage of EMIS technology.

"Toolkit: Implement Energy Management Information Systems (EMIS) in your Building Portfolio," Better Buildings, available at <https://betterbuildingssolutioncenter.energy.gov/toolkits/implement-energy-management-information-systems-emis-your-building-portfolio>

The resource gives a highly detailed overview of the different types of EMIS systems.

*A Primer on Organizational Use of Energy Management and Information Systems (EMIS)*, Lawrence Berkeley National Laboratory, 2015, available at [http://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/A\\_Primer\\_on\\_Organizational\\_Use\\_of\\_EMIS\\_V1.1.1.pdf](http://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/A_Primer_on_Organizational_Use_of_EMIS_V1.1.1.pdf)

Local District of Columbia landlord, the Tower Companies, implemented EMIS at three of its properties and achieved an average 13.2 percent reduction in electricity.

*Real-Time Energy Management: A Case Study of Three Large Commercial Buildings in Washington, DC*, Philip Henderson and Meg Waltner, National Resources Defense Council (NRDC), 2013, available at <https://www.nrdc.org/sites/default/files/tower-companies-case-study.pdf>

This DC office building achieved 47% in energy savings with a EMIS and new chiller plant.

"Showcase Project: 1800 K Street, Better Buildings," available at <https://betterbuildingssolutioncenter.energy.gov/showcase-projects/1800-k-street>

This report analyzes current national trends, while offering solutions for how commercial real estate professionals, EMIS vendors, utilities, and local government actors can spread the usage of EMIS.

*Transforming the Market Through Energy Management Information System*, Alexandra Harry and Erin Beddingfield, Institute for Market Transformation, 2016, available at [http://www.imt.org/uploads/resources/files/Transforming\\_the\\_Market\\_Through\\_Energy\\_Management\\_Information\\_Systems.pdf](http://www.imt.org/uploads/resources/files/Transforming_the_Market_Through_Energy_Management_Information_Systems.pdf)