

Selecting an Energy Management Information System Guide for an Industrial Customer

EXECUTIVE SUMMARY

An Energy Management Information System (EMIS) is a software tool that stores, analyzes, and displays energy consumption data. The challenge for potential users of EMIS is that the number of commercially-available EMIS tools has increased dramatically over the past ten years, as have the analytical and reporting capabilities of the tools. Picking your way through the options is complex, especially when the software may need to be accompanied by hardware updates for data gathering. Organizations need to determine how to prepare themselves to make best use of the EMIS tool they select.

This guide is designed to be used at the point when EMIS is first raised as a possibility for your organization, through to the point of selecting and purchasing your EMIS. This guide will help you determine if EMIS is a good fit for your organization and how to go about selecting the right vendor. The accompanying guide, "Using an Energy Management Information System," will help you deploy EMIS and make best use of the system.

This guide is intended for:

- Energy managers, champions and/or teams who are considering EMIS for their organizations
- Executives, typically either operations executives or general managers, who set the vision for their organization's energy program
- Managers who deploy EMIS related programs or services on behalf of Energy Efficiency Program Administrators, such as from programs run by utilities, agencies, or non-governmental organizations

The general flow of the guide is as follows:



There is also a final section that explains how your Energy Efficiency Program Administrator can help you with all of these steps.

CONFIRMING ORGANIZATIONAL FIT WITH EMIS



Value of EMIS

The primary value of EMIS is to reduce energy costs through better visibility of how energy is consumed, which drives better decisions within and across facilities. The following table covers the different types of visibility that EMIS provides, along with the decisions that EMIS supports.

EMIS supports decisions at multiple levels in an organization

	Visibility	Decision
Management	Benchmarking of consumption within a portfolio and in comparison with other firms	Prioritize resources to meet energy goals
	Actual energy consumption at multiple facilities (“single version of the truth”)	Prioritize resources to reduce waste and meet energy or sustainability goals; understand and potentially optimize distributed generation resources
	Performance tracking against energy or sustainability goals	Maintain course or adjust resources
	Financial reporting	Prioritize resources across all operations; assign energy costs accurately to product lines; determine options for energy supply
Supervisory	Monitoring and verification (M&V) of energy projects, including both capital and operational projects	Justify past investments; build business case for future investment
	Understanding of energy drivers and/or mass-energy balance	Determine options to reduce waste and increase efficiency
	Load profiles over time	Reduce demand charges; determine options for demand response participation

	Visibility	Decision
Control	Current energy use (i.e. over the past few seconds or minutes) at the system or equipment level, often within a control chart	Change operations to control energy consumption
	Alerting when certain conditions occur	Change operations to control energy consumption and/or demand

Organizations have also noticed that EMIS has benefits that go beyond energy reduction, including the following:

- Save time
 - Manage the increasing quantity of energy data coming from sensors and meters
 - Reduce the time to create sustainability reports
 - Eliminate problems in locating information when staff leave
- Manage energy projects
 - Plan future projects
 - Coordinate efforts between teams
 - Allocate energy costs more accurately
 - Determine the impact of energy projects on total site energy
 - Help make the transition to more sustainable energy solutions
- Simplify compliance
 - Support certification compliance (e.g. ISO 50001, LEED, etc.)
 - Comply with regulatory requirements
- Improve plant efficiency
 - Improve reliability through increased monitoring of plant operations
 - Conduct fault detection, fault isolation and root cause analysis
 - Reduce waste of other utilities such as water

If some or most of these concerns are relevant in your organization, then there is strong potential for EMIS to be a valuable management tool for you.

Fit with your organization

The most important initial questions for EMIS are:

1. How does EMIS help us meet our energy/sustainability goals?
2. Is my organization aligned around energy so that we can make the best use of the software?

3. What actions will people take with the software? Whose job will be affected by the software?

Software implementations fail when organizations do not think through the answers to these questions in advance.

Meeting Goals

The table above highlighted a number of value points for EMIS. Consider your goals and whether EMIS' value fits with those goals. The table has some examples to help you think through this fit.

EMIS helps you meet specific goals

Example Goal	How EMIS helps
Reduce energy consumption by, say, 5%	EMIS gathers your energy data in one place so you can reliably assess if you are meeting your goals. EMIS also creates a baseline for measurement. Different EMIS vendors offer different baseline options.
Ensure projects deliver on their estimated savings	EMIS can be connected to equipment- or system-specific meters so you can perform M&V of (CapEx or operational) projects on your equipment.
Increase employee engagement	EMIS can be configured to provide the relevant information for staff at multiple levels in the organization. But not every system offers the same amount of configuration and flexibility.
Improve overall operating efficiency	EMIS can gather all energy sources in one place (electricity, gas, steam, etc.) so you can see detailed performance. EMIS implementation gets more expensive as you add more sources and as you require data closer to real time.
Reduce energy costs	Costs are driven by how you buy energy, how you use it, and when you use it. If you have variable pricing or demand charges, EMIS shows the detailed connection between your energy cost and your energy use. Each system has a different way of displaying this connection.

Note that if your immediate needs are around process control, process modeling, production design, waste management, or water management, EMIS may be tangentially useful but it will not address these needs directly.

Organizational Alignment

Many organizations have found that combining EMIS with Strategic Energy Management (SEM) is very effective. SEM is a systematic approach to delivering persistent energy savings by integrating energy management into your regular business practices. SEM applies the Plan-Do-Check-Act, continuous improvement approach to energy management.

Typical SEM components include:

- executive commitment
- an energy policy or mandate with goals
- a dedicated energy manager
- an energy management team
- performance indicators with targets
- energy monitoring
- carefully organized implementation of an action plan

If your organization has started down the path (or is well on its way) with some or all of these components, then you'll notice how EMIS fits well into your energy program by:

- measuring performance against indicators
- providing comprehensive energy monitoring
- tracking the implementation of your plan
- providing a "single version of the truth for your executives, managers, and staff

If your organization does not have any of the SEM components in place, then you will benefit most by getting some help with SEM before you start with EMIS. At the end of this guide, we discuss how your utility or program administrator can assist you.

Actions and Job Impact

The accompanying guide, "Using an EMIS," lays out the different potential users for EMIS. For example, you should consider the production team, the maintenance team, the finance and accounting group, department leads, and the executive team. If your expectation is that all of these people will gain insight from EMIS, consider the implications for your organization. What would they each have to do to see what they need to see? How likely is that to happen? We discuss this in more detail in the Scope section below, but it's important to understand if any organizational culture or rules stand in the way of EMIS success.

Technical prerequisites for success

Aside from organizational preparedness, you should also consider a few technical aspects of your operations. EMIS requires good data for success so if there is a significant shortfall in energy or production data, or you have concerns about data accuracy, then you will have to invest in better metering and measurement to ensure EMIS provides value.

EMIS is delivered as a web application. If you expect users to use EMIS to make decisions, make sure that their workstations have access to a secure Internet connection.

PREPARING THE ORGANIZATION



Defining the scope

The previous section looked at the big picture. However, it's inevitable that the potential scope of EMIS in your organization is more than you can take on, due to budgets and available resources.

Before you present EMIS to senior management think carefully about how to scope the solution so that you get early wins without spending too much time and money. The table below describes the different aspects of implementation that you should consider when creating your project phases.

Different attributes to consider in defining the scope and phases

Phasing Option	What to think about
Production lines/systems and supporting on-site utilities	<ul style="list-style-type: none"> Lines/systems with largest use are the most obvious place to start. If your largest uses have been tuned over several years, consider other plant locations that may offer big savings from closer attention. These locations include on-site utilities such as steam or compressed air.

Phasing Option	What to think about
Metering	<ul style="list-style-type: none"> • EMIS requires electricity or gas data. • If your plant does not have widespread metering, look at the option of a whole-plant implementation to start with. • Consider the scope of your production data. You will want to match the metering to your available production data to better correlate energy to production. • If your plant does not have good metering of equipment, you will want to include new metering in your initial implementation, • Granular metering of natural gas may be very expensive and disruptive if not already in place.
Other data sources	<ul style="list-style-type: none"> • Production data is critical. Your EMIS solution should match the scope and timing of production data and energy data. • If there are multiple sources of production data, determine which has the easiest export capabilities through database queries or data exchange. • If EMIS is a window into your mass-energy balance, consider if other data are critical, such as raw material flows, steam production, heat losses, etc.
Users and reporting	<ul style="list-style-type: none"> • Different types of people may have an interest in the data: <ul style="list-style-type: none"> ○ You ○ Engineers ○ Maintenance staff ○ Production operations ○ Production managers ○ Plant executives ○ Financial staff and managers • Your implementation phases will affect each of these groups. Consider which ones will be early users and advocates. Also consider who needs regular reports (which can be automated) versus access to the EMIS screens.

Phasing Option	What to think about
Time granularity	<ul style="list-style-type: none"> • It is tempting to go for the most granular data you can get. Consider which of your users will actually make use of that detail in early phases. For example, who will look at daily load shapes and spot anomalies? • Many EMIS users are interested in matching energy to production. If production data is delivered on a daily basis, determine how to aggregate hourly or sub-hourly energy data.
Project tracking	<ul style="list-style-type: none"> • EMIS tools may offer project tracking in three ways: project timing and resourcing, document management, and project impact on energy savings. • Document management can be very helpful in dispersed organizations. Other options are useful as EMIS becomes central to your energy management program. • If you have strong project management tools in widespread use, this feature may be of less interest to you.
Alerting	<ul style="list-style-type: none"> • Alerting is a useful feature of EMIS. Determine (a) if your colleagues are ready to take action on alerts and (b) if your data is accurate enough to minimize false alarms. You may wish to delay alerting to a later phase.
Demand management	<ul style="list-style-type: none"> • If it is critical for you to manage your demand / load, then granular time data is vital. Consider the accuracy of your meters at the granular level. If not accurate, then metering will be an additional upfront cost.

Example of a phased rollout:

- Phase 1.
 - Production lines/systems – whole facility
 - Metering – existing utility meter with pulse output
 - Data sources – aggregate production uploaded from weekly spreadsheet report from historian
 - Users and reporting – energy manager and plant executives

- Time granularity – daily
- Alerting – not included
- Demand management – not included
- Phase 2. Additional to phase 1
 - Production lines/systems – production line 1
 - Metering – three additional meters at selected points in line 1
 - Data sources – line 1 production volume from database query of historian
 - Users and reporting – production operations, production managers, accounting, and engineers
 - Time granularity – hourly
 - Alerting – line 1 aggregate load exceeds defined limit
 - Demand management – not included
- Phase 3. Additional to phases 1 and 2
 - Production lines/systems – production lines 1 and 2, plant utilities
 - Metering – four additional meters at selected points in line 2, three additional meters for compressed air and gas boiler
 - Data sources – line 2 production from database query of historian, compressed air and steam flows from control systems
 - Users and reporting – maintenance staff
 - Time granularity – 15-minutes for all meters
 - Alerting – lines 1 and 2 aggregate load exceeds their defined limits
 - Demand management – plant-level demand management with options to investigate causes of demand spikes.

It's important to recognize that your scoping and phasing plan may change over time as you learn more about the different EMIS tools on offer. Be prepared to be flexible.

Creating the Business Case

The main challenge with preparing the business case is the uncertainty of energy savings since EMIS does not generate savings on its own. Research has shown that organizations see around 8% savings¹ on average when EMIS is deployed with the organizational changes discussed above. Previous sections have also included the various ways that EMIS can deliver value in your organization – bring the relevant ones to the fore in your business case since saving time and pain will add to the persuasiveness of your argument.

A secondary challenge is determining a range of costs for EMIS implementations. Your energy efficiency program manager should be able to help you, based on their market experience.

Your business case could include the following sections to provide a complete picture of the impact of EMIS on your organization:

¹ See Section 6.4 of *Energy Management Information Systems: A handbook for managers, engineers, and operational staff*, available from Natural Resources Canada at http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/oeel/pdf/publications/industrial/EMIS/EMIS_eng.pdf

- Foundation
 - Known facts. Undisputed attributes of your facility and its operations over the life of the business case (e.g. 3 years)
 - Assumptions. Expectations of change and stability
 - Constraints. Limits on resources such as money, time, focus
 - Strengths. Relevant aspects of your firm that contribute to EMIS success
- Business Analysis
 - Benefits. Advantages from EMIS, expressed quantitatively and qualitatively.
 - Costs. Outlays that you will have to make, including time.
 - Risks and mitigation.
- Financial analysis
 - Expected dollars savings
 - Expected dollar costs
 - Funding, including incentives
 - Cash flow over 3-5 years

While your business case is intended to be persuasive, it will be more effective if it includes an honest assessment of risks.

Your savings are likely to develop over time as you and your colleagues become more adept at using the information and as the software gains more features.

Your costs will typically come in three buckets:

- Capital costs for metering and data integration tools
- Upfront operational costs for deployment
- Ongoing operational costs for software subscription over the life of the contract

Getting executive support

EMIS has been successful in many organizations but executives have all seen failed software deployments. By following this guide, you'll be prepared to answer their detailed questions.

Managers with great EMIS deployments under their belts have the following advice:

- Meet with a wide group of colleagues
- Listen to their concerns
- Be succinct when presenting
- Think of what your audience cares about
- Be persistent!

Your energy efficiency program manager may be able to provide incentives for EMIS, for EMIS-related consulting, and for SEM. Bring these incentives to the fore when advocating for EMIS, since they indicate widespread support for the technology.

SELECTING THE RIGHT SYSTEM



Once you've received approval to go ahead, best practice is to follow a standard process that has proved successful in the past, as laid out in the table below.

Steps	Actions
<p>1. Build a set of requirements</p>	<ul style="list-style-type: none"> • Talk to possible users of the software to understand their problems. If they can express their needs clearly, so much the better. Many people, however, have a hard time understanding how software can help if they haven't seen it before. You may have to translate their problems into software requirements. • Think through some uses of EMIS in detail from the moment you or your colleague logs in to the moment you have the information you need. What are your expectations of what EMIS will deliver? • Use this analysis to develop a grid of requirements with at least these sections: <ul style="list-style-type: none"> ○ Data sources ○ Baseline modeling ○ Reporting and dashboards ○ Alerts ○ Types of users ○ Access control to screens and data ○ Mobile access ○ Compatibility with software in use at your firm ○ Energy cost management (if desired) ○ Energy project tracking (if desired) ○ Vendor Support (including training) • One key question is the flexibility in baseline modeling. An accurate model is critical for calculating energy savings. If your operations change, the model may need to be reassessed and modified over time. Check to see if the software you select has this capability.
<p>2. Bring the right people into the selection</p>	<ul style="list-style-type: none"> • Consider who are the prime users of EMIS and engage them in selection.

<p>process</p>	<ul style="list-style-type: none"> • Determine if IT staff should participate since you may need their help in data integration • Ask for your colleagues' help in weighting your requirements so you can assess vendors fairly
<p>3. Contact vendors</p>	<ul style="list-style-type: none"> • Engage more than one vendor <ul style="list-style-type: none"> ○ Assume that you will learn from each vendor. They may suggest features that you hadn't considered. If you like their ideas, add them to your list of requirements for all vendors. • Ask for the following items from vendors before you get a proposal: <ul style="list-style-type: none"> ○ Demo ○ Detailed discussion of your requirements ○ References • Ask vendors lots of open questions, such as: <ul style="list-style-type: none"> ○ What are other customers doing with your software? ○ What user roles do you recommend so we get the most from the software? ○ How do customers start using the software if they don't have enough data? ○ What options do you recommend for baselines in industrial facilities? ○ How would you recommend phasing in our deployment? ○ How is your software different from other EMIS on the market? ○ What kinds of consulting do you offer and why do you think it is valuable? • Make sure that vendors include the following items in their proposals: <ul style="list-style-type: none"> ○ Initial costs and annual costs ○ Hardware requirements ○ Additional costs for data integration ○ Training costs ○ Support costs
<p>4. Score vendors against your weighted requirements</p>	<ul style="list-style-type: none"> • Score each vendor against your weighted requirements with a 0,1,2 score where 0 means "does not meet" and 2 means "meets fully" • Bring your colleagues into the discussion to make sure

their perspectives are heard

- Determine which software scored highest compared to the proposed costs
- Expect to have negotiations with your colleagues and vendors as you finalize the decision.
- While this may seem like a cumbersome step, you'll be grateful later when you want to review the performance of the EMIS against your expectations

FINALIZING THE DETAILS



As you negotiate the final details of your EMIS agreement, make sure that you have included all of the items that will be important for EMIS success. It might be difficult for you to get additional budget for these items in the future. Also, vendors will tend to be more aggressive on pricing during the initial sale as opposed to later.

Some items to consider at this point include:

- Implementation support
 - Configuration and user setup
 - Energy metering
 - Energy data integration
 - Production data integration
 - Best practices consulting
- Training
 - Administrators
 - Initial Users
 - Options for subsequent users after initial training
- Post-purchase support
 - Customer service hours
 - Service levels
 - Escalation procedure
 - Services which can only be provided by vendor (e.g. certain kinds of configuration or data integration)
 - Regular check-ins with vendor engineers

THE ROLE OF YOUR PROGRAM ADMINISTRATOR

Your local Energy Efficiency Program Administrator may be able to provide numerous types of support for your organization to deploy EMIS. This support can include:

- **Funding.** Programs can provide partial or complete funding of the initial purchase cost for EMIS, as well as some of the capital and services costs for deployment.
- **Business case support.** Program managers often have extensive experience of how EMIS has been successfully deployed in organizations like yours. This experience will help you determine likely costs, benefits, and risks.
- **Technical support.** The program's engineers have seen the way different kinds of organizations use EMIS. They can help you figure out your list of requirements, and provide some objective advice on how the features of different systems might meet those requirements.
- **SEM establishment.** Successful EMIS implementations are accompanied by organizational changes. Look for SEM programs to support effective organizational change using proven approaches.