

Best Practice O&M Program

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Introduction

Creating a best-practice operation-and-maintenance (O&M) program increases the efficiency of facility staff, improves building operational practices, and reduces utility costs. The O&M process helps sustain a building's profitability by reducing costly equipment failure and maintaining tenant comfort and indoor air quality. Establishing an O&M program is generally straightforward and does not significantly affect budget. It primarily reorganizes and reallocates existing resources to be more efficient and productive. Implementing a best-practice O&M program can reduce facility energy use by 5–20% without significant capital investment. This document discusses the elements essential to creating a best-practice O&M program.

Create the Leadership Team

Convene an O&M leadership team

Members of the leadership team should include representatives from the executive, finance, and engineering branches of the organization. Participation of an upper-level manager is key to sending the message that the program is supported from the top of the organization. Appoint an O&M project manager as the project leader and focal point for accountability. Early participation of line-level engineering staff is essential to the long-term success of the O&M program. As with any initiative, be sure to establish roles, responsibilities, and communication channels.

Assign someone to coordinate with the utilities. Your local utility may be the most important source of outside assistance. They may help fund or provide technical support for establishing an O&M program or a building tune-up.

Maintain the momentum

With the O&M Program up and running, the challenge is to maintain the momentum. Hold quarterly meetings (more frequently at the beginning) of the O&M team to review building energy use and progress toward meeting the goals. It may also be appropriate, in the context of O&M activities, to review building operation protocols, complaints from occupants about comfort, the performance of service contractors, and staff training plans.

Recognize success

Employee recognition will help sustain enthusiasm and interest for achieving energy-use goals. Use recognition, awards, and meaningful incentives to encourage the entire staff to develop ideas for improving building performance. Ultimately, the success or failure of the new O&M Program lies with the

line-level staff. Meeting or exceeding building-energy-performance goals should be an occasion for sharing a sense of a job well done by all.

Appoint a Building or System Champion

Many organizations spend tens of thousands of dollars on electricity, but assign no responsibility for managing energy usage. Properly managing any system requires a champion.

What is a champion?

The champion is someone who is responsible for the overall management of a building or system. The champion is knowledgeable of, and an advocate for, the proper design, use, operation, and maintenance of the building or system. The champion understands the details and knows how to meet management's goals and objectives in the safest, and most cost-effective way possible.

What do champions do?

- Educate themselves and others on the proper design, use, operation, and maintenance of the system to minimize the life-cycle cost, and maximize the performance of the system.
- Participate in all decisions regarding the design, use, operation, and maintenance of the system.
- Work with management to establish and track key performance indicators for the system.
- Recommend operational or maintenance changes to improve system performance.

What does a system champion need to succeed?

To succeed, a champion must have management support. Management support includes technical training for the champion and others, establishing and managing key performance indicators, and commitment to implementing change to increase performance.

Establish an Energy Accounting System

The information provided by an energy-accounting system provides insight into the O&M fitness of the building. Create a best-practice system for tracking utility information and communicate the results both vertically and laterally in the organization. Evaluate and select an energy-accounting software tool to track energy use and monitor performance goals. Some utilities offer their customers excellent free or low-cost programs with automatic data uploading. Programs are also available from private vendors. With your permission, some private vendors can work directly with your utility to collect consumption data periodically. Energy-accounting programs have a wide variety of features and user interfaces. For instance, the ability to update utility data in a web-based program may be a desirable feature. Carefully evaluate several programs before selecting one. If you buy from a vendor, request a trial period to thoroughly evaluate the product.

When you select a system, establish responsibilities for implementation and maintenance. Broad employee access to energy-consumption data promotes awareness of energy use throughout the organization and collective ownership in reducing energy use. Providing read-only access on your organization's intranet is highly recommended.

Establish Performance Goals and Follow-up Activities

With the energy-accounting system providing a clear picture of building-energy use, establish performance goals. Goals should be realistic and achievable based on established benchmarks.

Establish benchmarks

Benchmarks create a standard for measuring building-energy performance. Energy performance benchmarks may be based on similar buildings in a portfolio or campus, or other standards such as the Environmental Protection Agency's (EPA) Energy Star Portfolio Manager. This web-based program has a benchmarking feature that ranks the energy use of a building among a large database of similar buildings. When comparing buildings in your campus or portfolio, be sure to use a common metric such as energy use per square foot of conditioned space, to create an "apples-to-apples" comparison.

Track performance

The O&M project manager and the leadership team should review and adjust energy-use goals as necessary. The perpetual question should be, “How can we be more energy efficient?” When operational changes (in equipment scheduling or space use, for example) are made, or equipment is added or replaced, it is appropriate to adjust the goals accordingly. Provide monthly feedback to building-operation staff on building-energy use relative to goals and benchmarks. Building-energy-performance data should be easily accessible to all employees.

Identify tune-up candidates

Benchmarking will identify buildings with higher than normal energy use. These are the best targets for a building tune-up. If your organization has more than one building, a strategic approach is to identify one building that most needs improving, conduct the building tune-up at that building, then expand the program to build on that initial success.

The building-tune-up process includes reviewing operating procedures and existing O&M practices, as well as the physical inspection of equipment. The outcome will include a list of low-cost modifications and the follow-up improvements and modifications. A well-executed tune-up will noticeably reduce energy consumption.

Integrate O&M into related activities

Identify organizational activities that affect O&M and building-energy use, and incorporate a long-range perspective into these related activities. For example, the decision to purchase replacement equipment should consider long-term or life-cycle operating costs. A low-first-cost option may have costly long-term effects. Many utilities offer rebate programs to help offset the higher first cost of high-efficiency equipment. Service contracts are another area where a lowest-first-cost option may have adverse long-term effects.

Apply for a nationally recognized award

Consider applying for a building award or certification that signifies achieving a recognized standard of energy and environmental excellence. These certifications are attractive to building occupants and tenants as well as the building operations’ team, and will have positive effects on marketing and staff morale. Two high-profile awards for green buildings are the EPA’s Energy Star Labeled Buildings program and the U.S. Green Building Council’s Leadership in Energy and Environmental Design – Existing Buildings (LEED-EB) award.

Define a Maintenance Strategy

There are three general approaches to maintenance management: reactive, preventive, and predictive. Evaluate the current approach and adopt a maintenance strategy that best supports the long-term O&M plan.

- **Reactive:** This is the “run it until it breaks” approach. In the short run, this saves staff time and expense but over time it is costly in terms of unplanned equipment downtime, repairs, and shorter equipment life.
- **Preventive:** Preventive maintenance (PM) occurs at time intervals or at run-hour milestones. Because HVAC equipment is capital intensive, this is more cost-effective than reactive maintenance.
- **Predictive:** This approach uses periodic measurements to detect evidence that machinery is deteriorating, with the aim of extending service life by avoiding impending problems. Special diagnostic equipment, which requires additional staff training, is needed, but it will maximize equipment life and efficiency.

Most organizations use a combination of reactive and preventive maintenance with or without maintenance-service contractors. Generally, the most cost-effective solution is a combination of preventive and predictive maintenance that appropriately balances prevention and repair.

Computerized maintenance-management systems

Computerized maintenance-management systems (CMMS) automate and streamline the logistical tasks associated with maintenance programs. CMMS capabilities include generating work orders, tracking work

orders, tracking equipment performance, tracking periodic or run-hour-based preventive maintenance, and tracking outside service calls and dispatches, plus many other functions which may be desirable for a particular organization. Overall, a CMMS will eliminate tedious paperwork, increase staff productivity, and streamline maintenance monitoring for management.

While these systems go a long way toward improving the efficiency of maintenance, there are some common pitfalls in adopting them. Chief among these is inadequate training of administrative and maintenance staff, which leads to lack of commitment and integration into existing practices.

A CMMS integrated into daily operation with well-trained personnel and persistent management support will yield considerable benefits in the form of improved maintenance, more efficient use of staff resources, better inventory control, better maintenance of equipment performance, reduced downtime, and extended equipment life.

Maintaining the maintenance program

The long-term success of a best-practice O&M program requires proper documentation and periodic review of the total cost of the maintenance program. For instance, while it may be difficult to show that the new maintenance program was responsible for saving money in the third quarter because the chiller didn't breakdown, there should be a long-term parity or reduction in maintenance costs compared with the previous, less-rigorous program. Some non-monetary benefits, such as reduced comfort complaints and better air quality, can be tracked and factored into the evaluation.

Assess Staff and Training

Define the skills required

Large facilities have a variety of types and complexity of HVAC and process systems. While maintenance can be performed entirely in-house or entirely outsourced, most organizations use a mix of in-house operating engineers and outside service contractors. Typically, specialized and complex equipment such as building-automation systems (BAS) or chillers are serviced by outside contractors, but a well-trained staff may be capable of many specialized maintenance tasks that are typically outsourced. Emergency repair work is often handled by mechanical or service contractors. Each building or organization will have a somewhat unique balance of in-house and outsourced tasks.

Inventorizing the skills and licenses of in-house engineering staff will reveal if their skills are being used effectively. Likewise, gaps in training may become apparent. Evaluate how well the employee skills match the complexity of the installed systems and local, state and federal licensing requirements. Assess the level of management and supervisory experience required to provide the leadership needed to execute a best-practice O&M program.

Conducting a building tune-up can provide a snapshot of the level of O&M practiced in the facility. This will inform the future staffing and training needs.

Create and implement individual and group training plans

Developing staff training plans should combine supervisory input and individual interest. Large buildings with modern systems are sufficiently complex to encourage individual staff members to become in-house experts in different areas. A staff with good basic skills and diverse advanced technical skills is invaluable in maintaining and operating a complex building, and will reduce reliance on outside contractors. Regularly update individual and group training plans.

Take advantage of resources such as the Building Owners and Managers Association (BOMA), the Refrigeration Service Engineers Society and the Air Conditioning Contractors Association. These organizations provide or sponsor classroom training, on-line training, and training manuals. Additionally, they can provide industry guidelines for staff training and qualifications for maintenance tasks.

Ongoing staff training

Conduct annual training reviews, possibly as part of annual performance reviews. The O&M leadership team should provide input to the supervisory staff on training needs and goals.

Execute Service Contracts

Define the scope

All large facilities use a mixture of maintenance, mechanical, electrical, and lighting service contractors to help perform the many tasks that keep complex building systems operating smoothly. The range of outsourced tasks will vary from building to building. This section offers suggestions for managing contractors with ongoing service contracts:

Within your organization, there should already be a solid understanding of your maintenance strategy and a plan for optimally balancing in-house and outsourced maintenance. Now the challenge is to translate this into a scope of services for a service contract.

Most of the suggestions below apply equally to a building tune-up and to ongoing enhanced O&M.

- ▶ For information on types of service contracts, see *Contract Provisions for Enhanced Operations and Maintenance*.
- ▶ For information on the scope of tune-ups, see *Energy Tune-Up Process Scope*.

Evaluate providers

There are many types of service contractors. With your maintenance strategy, outsourcing needs, and scope of work in mind, select an appropriate type of service provider.

- ▶ For information on types of maintenance-service providers, see *Contract Provisions for Enhanced Operations and Maintenance*.

When you have identified the appropriate type(s) of service providers to bid on the work, consider the selection criteria in the reference below. For a complex building, a pre-bid contractor meeting including a building walkthrough is highly recommended. This will help communicate the organization's requirements and should elicit similarly scoped bids.

- ▶ For information on screening contractors, see *Contract Provisions for Enhanced Operations and Maintenance*.

Structure and implement the contract

There are many factors to consider in describing the scope of services in a service contract. The reference below describes contractual details that will serve the owner best over the term of the contract.

- ▶ For information on structuring service contracts, see *Contract Provisions for Enhanced Operations and Maintenance*.

Manage a service contract

The reference below provides insight into effectively managing a service contractor.

- ▶ For information on managing service contracts, see *Contract Provisions for Enhanced Operations and Maintenance*.

When the contract is executed, establish clear lines of communication and set specific protocols to follow. Set up a feedback system for monitoring contractor performance. Periodically review measurable objectives with the contractor. Use a quarterly report card as part of the feedback system and let them know when they're doing a good job.

References

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