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Bottom line thinking on energy.

THE HIGH PERFORMANCE PORTFOLIO:

# ENHANCED OPERATIONS & MAINTENANCE

## SUMMARY:

A successful operations and maintenance (O&M) program consists of routine, ongoing activities to prevent equipment failure or decline. Enhanced O&M goes beyond the basics, by anticipating problems and proactively addressing equipment issues before they affect performance. A well defined and executed O&M plan will improve and sustain energy efficiency, equipment reliability, and safety of building systems.

## IN DEPTH:

The complexity of today's building systems and equipment challenges even the most experienced staff. Often, engineers and property managers find themselves constantly responding to tenant complaints, repairing infrastructure, or rigging temporary "workarounds" that solve an immediate concern.

To create a high performance portfolio, building staff need to shift from a reactive to a proactive mode, move from solely treating and fixing problems to preventing them. Managing buildings becomes not just an issue of keeping equipment working, but one of considering when, how, and why it is operating. Enhanced O&M helps make this transition by focusing on improving performance with specific operational changes and robust management practices.

Enhanced operations and maintenance consists of daily, ongoing practices by building engineers, outside service firms, and key individuals to sustain performance levels over time. In a sense, a robust O&M program "locks-in" energy performance obtained through such activities as building tune-ups or equipment replacements.

The following are some **key components** of a successful, sustainable, enhanced O&M program:

- **Perform ongoing basic maintenance:** Basic maintenance is the starting point in ensuring high performance levels. Cleaning or replacing filters, checking fan belts, removing obstructions from

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vents, etc. address smaller problems before they grow into larger ones. Develop a maintenance plan by inventorying equipment, outlining specific tasks associated with each system, and creating a schedule with accountability for each item.

- **Regularly track and report building energy use:** Monitoring monthly energy consumption and benchmarking against other properties gives you an informative picture of whole-building energy performance. Ensure that building operators have and understand utility bills and consumption data, and can translate that data into operational decisions. Involve them in developing a reporting system for energy performance data, and be sure to factor in relevant changes in building characteristics (such as occupancy levels or space use) that may affect performance.
- **Review and improve system documentation:** Existing system documentation (such as drawings, control sequences, repair histories, test and balance reports, and O&M manuals) – may not reflect actual conditions. Inventory current system materials and assess their comprehensiveness, accessibility, and usefulness. Some editing may be required. Select the most relevant information from a pile of documents, verify that it's easily accessible and up to date, and archive the rest. Some organizations are moving towards computer-based documentation, however, it's important to keep paper copies of system documentation in case of a power failure – with copies stored both on- and off-site.
- **Monitor performance indicators for equipment and systems:** Identify key performance indicators that can be monitored to provide regular feedback on your building operations and important systems. This could include broader metrics such as energy use per square foot or number of tenant complaints, or more specific items like tons of chiller cooling produced, boiler combustion efficiency, or equipment run hours. Much of this information can be collected from your direct digital controls (DDC) control system. When performance fails to meet expectations, it signals a need to improve maintenance procedures or operating parameters.

Are tenants really using the overtime air they requested? Can the air be shut off earlier and turned down in areas of vacant space? Can you power down 45 minutes earlier and “coast” for the rest of the day?

- **Regularly review O&M activities and management routines:** An enhanced O&M plan should include procedures for periodically reviewing operating sequences, strategies, and schedules – and making revisions as necessary. As O&M improvement opportunities are identified, update practices to capture potential savings.

- **Develop expertise:** Build staff capabilities with training and professional development. Ideally, building operators should be able to proactively target improvements and take action based on observations made during day-to-day activities. (For example, noticing when vents have been closed or blocked, or observing tenants' habits that could impede efficient operations). Training can include individualized instruction based on staff members' specific skill sets, and/or group seminars on energy-efficient operations. Pay specific attention to educating staff on using new technologies (such as advanced Energy Management Systems (EMS)).

While building operators have many responsibilities competing for their attention, consultants and service providers can focus exclusively on O&M best practices.

Detailed O&M guides and experienced service providers are available to help you identify energy-saving operational changes. Here are some **low-cost opportunities** to look for:

- **Adjust temperature settings.** Walk through the building and talk with your tenants – are they actually comfortable with the temperature? You may determine that you can adjust the thermostat by a few degrees and still maintain comfort. Also explore whether you can adjust the temperature on evenings, weekends, and holidays, reducing/increasing the temperature during different seasons. Program these adjustments into your EMS, and check that the new settings are having the desired impact.
- **Turn systems and equipment on only when necessary.** Periodically review schedules to ensure equipment runs only when needed. Are tenants really using the overtime air they requested? Can the air be shut off or turned down in areas of vacant space? Can you start your systems 15 minutes later and still achieve the desired temperature upon tenant arrival? Can you power down 45 minutes earlier and “coast” for the rest of the day? Explore ways to cut back run-times for office equipment – computers, printers, fax machines – and ensure that lights are off when space isn't in use. When you determine an optimum start/stop schedule, program the control systems to implement this so you do not rely on manual adjustments.
- **Assess janitorial practices.** Consider team cleaning or day cleaning to reduce the number of hours per day that lights are on. Periodically visit the building at night, looking at it from different vantage points to see what lights are on – and to see whether the cleaning staff is actually using all lighted portions of the building. Additionally, coordinate janitors and security staff to turn off unused equipment and lights as they pass through the building after hours.

- **Utilize automatic controls.** Automatic controls are often incorrectly programmed or ignored. Program these systems to accomplish energy-efficient control strategies, making building operators' jobs easier. Use controls to activate equipment and systems in the most energy-efficient manner possible, while maintaining tenant comfort. Note that automatic controls are not always fail-safe. Periodically collect data throughout the building to ensure controls are giving accurate readings.
- **Achieve efficiencies with HVAC equipment operations.** Routinely examine HVAC equipment. Fix broken, leaky, or malfunctioning dampers and valves, and verify that outside air dampers are closed during unoccupied hours. Investigate and modify equipment staging, sequencing, and cycling to maximize efficiencies. Identify and correct any fans and pumps that are operating at higher capacities than necessary. Confirm that motors and drives are operating properly, and check insulation and sealing on all equipment.
- **Optimize sensors.** Review sensor setpoints and locations and determine what changes might be necessary. For example, thermostats may have started out in optimal locations, but as the building's occupancy and use changed over time, potential new locations may merit consideration. Periodically recalibrate sensors to ensure their readings match actual building conditions.
- **Use efficient lighting operations and maintenance strategies.** Assess the suitability of current lighting levels throughout the building; identify ways you can be more efficient in the distribution of light and reduce excess wherever possible. Consider group re-lamping and fixture cleaning strategies. If your building uses occupancy sensors or photocells, identify ways to use these systems to save additional energy – for example, setting occupancy sensors to shut lights off after 10 minutes instead of 15.

Skilled in-house staff may be qualified to implement an enhanced O&M program, and should be involved in any case. However, outside expertise always brings valuable perspective and experience. While building operators have many responsibilities competing for their attention, consultants and service providers can focus exclusively on O&M best practices.

To augment existing staff with service providers, coordinate a review of current O&M practices with all parties, and ensure that service providers are closely communicating and collaborating with building operators. In many cases, front-line engineers and facility managers have already identified problems and issues that merit further study:

- Whether existing O&M procedures are followed
- Current staff responsibilities and capabilities





- How outside vendors are utilized
- What system documentation is available
- Occupant behavior that affects O&M
- Any known problems with systems or equipment

When developing your enhanced O&M plan, be sure to examine the results from scoping studies and building tune-ups. In some cases, another physical inspection of the property may identify other opportunities for energy savings or better management practices.

#### THE BOTTOM LINE:

- Enhanced O&M shifts the focus from “crisis” mode to prevention, focusing on small but critical tasks that, when ignored, can evolve into major issues.
- Compared to other means of improving performance (building-tune ups, equipment replacements, etc.) daily O&M activities are virtually free – yet form the backbone of overall energy performance.
- Without a well defined and ongoing O&M plan, hard-won gains in efficiency may be lost.
- Building staff fluency in issue identification, diagnosis, and problem-solving can minimize disruptions and the need to “put out fires”.
- Outside expertise teamed with in-house staff can provide valuable insight into operational improvements.

#### USEFUL LINKS:

The High Performance Portfolio Framework  
[www.betterbricks.com/office/framework](http://www.betterbricks.com/office/framework)

Enhanced Operations and Maintenance  
[www.betterbricks.com/office/briefs](http://www.betterbricks.com/office/briefs)

BetterBricks Better Building  
Operating Performance Resources  
[www.betterbricks.com/operations](http://www.betterbricks.com/operations)



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