

Realizing Savings: The Importance of Operator Training

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Problem Statement

Forward-thinking building owners, managers, and developers invest considerable funds into their assets to reduce utility costs. These investments are often targeted towards innovative technologies which promise energy savings and greenhouse gas emission reductions. No matter how well-intentioned or designed, these systems will fall short of meeting projected savings if not correctly operated. Although often overlooked, operator training is a critical component of any building improvement or new construction project.

Background

Working as a commissioning engineer provides exposure to a wide variety of projects. From testing state-of-the-art equipment in new Class-A office buildings to recommending energy conservation measures in historic 150-year old hotels, each venture presents its own unique challenges. The one constant is the final transition: at the end of every project the designers, consultants, and contractors move on to the next job, and the building is left in the hands of the engineering team. Unfortunately, this handoff is often rushed and mishandled as each organization tries to meet deadlines, wrap-up loose ends, and stay within budget.



New Construction

New buildings are especially prone to the pitfalls of substandard training since the building operators are pressured to learn the intricacies of multiple systems simultaneously. Additionally, new construction ventures often feature cutting-edge,

new technologies that may be unfamiliar to the staff. The project has not been successful when brand-new equipment is visibly mishandled or underutilized at the end of the commissioning process.

From the field: I recently commissioned a higher education building, which featured a complex rainwater catchment system. The captured greywater would be filtered then used in the building's lavatories and irrigation system. When the building team received complaints about discoloration of water in the urinals, the entire system was abandoned. Instead, the filtration system could have been tweaked, informational signage could have been installed in the bathrooms, or the water could have been re-routed for irrigation. The owner paid for an expensive system which went unused and resulted in higher monthly water bills.

Building Retrofits

Building improvement or retrofit projects are also vulnerable to problems associated with lack of training. New equipment often includes more sophisticated controls which create opportunity for energy-saving strategies. However, if these strategies are not effectively communicated to the operators they may revert back to 'the old way of doing things' and negate any potential savings.



The commissioning process often extends after the systems have been turned over to the operators. When testing in these scenarios, the installing contractors will often blame the operators

for overriding or disabling a previously working component. Conversely, the building operators blame the installers for providing a non-working product. The truth is usually somewhere in the middle and the real failure comes from a lack of communication between the two parties.

From the field: I

recently saw this scenario play out at a facility undergoing a heating water



system replacement project. The system featured secondary piping loops with a pump to provide hot water to different areas of the building. Each secondary loop had a bypass valve to protect the pump from the high-water pressure in the primary loop, which was designed to stay open during normal operation. The operators were unaware of the valve function and overrode them closed to increase the hot water flow through the loops. Multiple failed pump motors needed replacement under warranty before the cause of the issue was finally identified.

Normal Building Operation

Normal building operation is another equally important area of building management in which training is often dismissed. Inadequate training can lead to the negligence of preventative maintenance procedures, causing efficiency losses or premature equipment failure. Additionally, employee turnover may cause extensive knowledge of building systems to be lost in transition.

From the field: When performing energy audits or retro-commissioning it is common to see the effects of neglected preventative maintenance such as compromised filters, frozen dampers or valves, or water/air leaks. These issues often lead to occupant discomfort and inefficient energy use; without proper knowledge the underlying issues may go undetected for an extended time. Temporary “Band-aid solutions” such as manually closing valves or disabling sensors are often left permanent, leading to further efficiency losses and compounding issues down the road. All of this

could be avoided with proper staff training.

Solution

Just as the costs of poor operator training can be extensive, the benefits of a comprehensive training program can be valuable. Not only do knowledgeable operators allow efficiency goals to be realized and prolong equipment life, they can also serve as a great resource to identify opportunities for future improvements. Use the following tips in your next project to ensure success.

1. *Involve the operating team early on in the construction process.* Inviting members of the future operating team to attend design reviews, coordination meetings, and commissioning activities will have many benefits. The operators will become more familiar with the systems, provide valuable perspective on coordination decisions, and feel more invested in the success of the project.

2. *Prioritize training as milestone rather than a requirement.* Schedule training sessions well in advance to ensure optimal attendance. Generate agendas or reference materials to effectively communicate high-level goals and objectives. Rather than being a box to check, training sessions should be the end goal to work

towards for the contractors where responsibility for each system is passed to the operators.



3. *Hold follow-up training sessions for complex systems.* BAS, central plant, or other complex system trainings can quickly turn into information overload. After the first training session, schedule a second session to allow operators

time to work with the systems and determine what questions still need to be answered.

4. *Provide reference materials and training resources.* Carefully record a video of each training

session to make it usable for future viewings. Provide organized reference materials (O&M manuals, equipment submittals, commissioning documentation, etc.) to the team for future reference. This will benefit both the operators and contractors, since accessible answers will reduce service and warranty calls.



5. *Encourage ongoing training and education.* After projects are completed, building owners and managers should invest in continuing education for the operating staff. This may take the form of classes, webinars, or in-person product demonstrations.
6. *Reward operators in meeting efficiency goals.* The operators are perhaps the most critical element of a building's energy and water efficiency. Just as design and construction teams are rewarded for successfully meeting project goals, so, too, should the operating team for meeting the efficiency objectives.

Conclusion

Professionals in the green building sector are often enthralled with chasing the next innovative technology to enhance facility performance. With the rise in popularity of Net Zero objectives from developers, owners, and municipalities this trend is likely to continue. However, even as the systems in our buildings become more evolved and complex, it is the investment in people which will have the biggest positive impact of all.