Chapter 10: **Education, Training, and Operation**

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LANL

Chapter 10

Education, Training, and Operation

Building Occupant and Operator Roles

The success of a high-performance building depends how it is designed, built, and managed. Many of the most important sustainable design goals relate to resource use and pollution from building operations. If the facility managers are not well-informed and actively supporting these goals, they may inadvertently undermine them. Depending on how the building systems are designed, cooperation from building occupants may also be essential to success.

Communicating the building's sustainability vision and features can imbue its managers and users with a sense of pride that can reinforce the commitment to low-impact, high-performance operations. The hand-off from the building delivery team to the ones who will run and use it is a critical point at which much can be gained or lost, depending on the effectiveness of the communication.

David Parsons

Information for Facilities Managers and Maintenance Staff

Unless they are told otherwise, the people who will manage and maintain a new high-performance building are likely to expect this building to work like any other building. Anything out-of-the-ordinary or unusual in the new building must be identified and explained if it is to be operated and maintained properly. Hopefully, key facility managers will have participated in the design process, and had an opportunity to gain some comfort with the systems that are being used, and warn against the use of systems that might be problematic.

If high-tech mechanical systems and building controls are used in a setting where they are not yet standard, special training may be needed. Such training might be available, either on- or off-site, from the manufacturers of the systems or from third party trainers.

Often the commissioning process is an ideal opportunity for building staff to learn about the systems they are inheriting. A commissioning agent must be well-versed in the systems and controls. As he or she takes the building through its paces, others can follow along, ask questions, and assist in the process, thereby learning both how the systems were designed to work and how they are performing as installed. It is even advisable to video this process. Personnel who cannot participate or who join the staff later can learn by watching video.

Warren Gretz

Kenneth Shipp

User Manual for Building Operation

At a minimum, the commissioning report can become the basis for a "user manual," as it explains the design intent and the documented performance of the various systems. This information can be supplemented with protocols and resources for dealing with regular maintenance and unexpected events.

It is common practice for the design team and/or construction contractor to supply a binder full of user guides for all equipment in the building. It is not standard practice for this binder to include big picture information about the design intent and guidance about how the building should be operated as a whole system. Yet that additional information is essential for a building to achieve a high level of performance in operation.

More specifically, include information about any systems that required research on the part of the design team in the user manual – it is fair to assume that if the designers were not experienced with those systems, the building operators will not be either. Also, review the "Criteria for Sustainable Success" tables throughout this guide and include documentation for the facility managers from the areas with "Better" or "High" performance.

Information for Building Users

There are two distinct design philosophies regarding the relationship between a high-performance building and its occupants. The first is that the users want to actively participate in controlling their environment. This design philosophy tends to result in buildings that depend on this occupant participation for optimal performance. Occupants may be empowered, for example, to open windows when conditions permit, to manually control blinds and louvers, and to learn something about their building and how it differs from a typical building.

Well-labeled mechanical system components greatly improve the building operators ability to manage and maintain all systems as the sustainable design intended.

The second design approach argues that most users would rather not be bothered with learning about the building in which they work, and any non-standard systems should be automated and managed in a way that makes them transparent. This approach places the optimal performance of the building before the education of occupants in terms of priorities, and tends to depend heavily on automated control systems rather than human intervention.

Either philosophy may be appropriate as an underlying strategy for designing a high-performance building. They differ greatly, however, in terms of the information that must be communicated to the occupants. If the occupants are to be engaged and participate in running the building properly, it is up to the designers to create the systems that teach the occupants what they must do. These systems might include strategically placed informational signs and placards, brochures, even interactive kiosks displaying the building's performance in real time. If the building is to perform independently of the occupants, the designers must focus on robust control systems and a well-trained building staff to keep things working well.

Warren Gretz

Features that May Benefit from Interpretive Signage

Light switches – Placards encouraging users to turn off unneeded lights OR explaining the principles of automated controls so users understand when and how it is appropriate to override those controls.

Window blinds – Placards explaining how the blinds are best used to control glare while introducing daylight.

Task lights – Information at workstations explaining the benefits of lighting based on indirect ambient light combined with direct task lighting, and suggestions for adjusting the task lighting for various activities.

Building energy performance (especially if renewable energy systems are included) – Informational kiosk displaying and interpreting energy performance in real time. Ideally this information would also be available at workstations via the Internet.

Operable windows – Placards describing when it is appropriate to open them (ideally based on real-time guidance from building management) or why they are locked at certain times to maintain air-flow integrity for the mechanical system.

Underfloor air distribution – Information at workstations explaining how users can adjust the airflow in their vicinity using the round diffusers.

Warren Gretz

Entryway track-off system – Sign explaining the benefits of trapping dirt to improve building maintenance and indoor air quality.

Dual-flush toilets – Placards explaining the two levels of flushing action and when each is appropriate.

No-flush urinals – Placards explaining how they work.

Foot-pedal faucet controls – Placards explaining how they work.

Robb Williamson

The design response may be to engage the occupants and educate them about the effect of daylighting and the energy savings in order to discourage them from manually overriding the lighting controls and turning on the lights. Or, it can involve the installation of fully dimmable ballasts and calibrated controls that keep the lights on at very low levels, even when the daylight is sufficient. These controls can even be set to allow users to turn the lights up, while limiting their range of control to a reasonable level.

Regardless of the design philosophy, it is important to provide general information on the benefits of the high-performance building so that building occupants and LANL administrators can take pride in what they have. This information may be in the form of attractive brochures illustrating the building's features, and can be made available to visitors as well as staff. These brochures can be published both on paper and electronically via the Internet, and should focus on how these features contribute to a more comfortable and productive workplace and how they protect and enhance the global environment.

Post-Occupancy Evaluation

Once the building is occupied, it becomes a valuable source of information to be mined and analyzed when planning maintenance, modifications, and future projects. Information extracted through periodic or ongoing commissioning provide critical information about how building systems perform over time. Survey the building users for information on how they feel about the building in terms of thermal, visual, and acoustical comfort, indoor environmental quality, and responsiveness to problems.

	Standard Practice/	*Better*	*High Performance*
Information transfer to building staff	◯ Binder with manuals for installed equipment	◯ As-built drawings, notes about the design intent, and guidance on operating the building as a whole system	*PLUS:* ◯ Hands-on training, including performance targets, (may be linked to the commissioning process) documented on video
Information transfer to building users	◯ Emergency response and evacuation procedures	◯ Brochures or signage explaining the building's benefits to users and the environment	◯ Interpretive signs, literature, and other materials explaining the building's high-performance features and how users can maximize the benefits of those features
Post-occupancy evaluation	◯ Not done	◯ Occasional, limited-scope investigations in reaction to problems	◯ Comprehensive plan for periodic commissioning of building systems and surveying of occupants, with the results used to identify modifications and other projects.

Additional Resources

Vital Signs, ***http://arch.ced.berkeley.edu/research/***

Building Use Studies, ***www.usablebuildings.co.uk***

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