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TAKING CONTROL OF ELECTRIC LOADS

By shifting, reducing or turning off loads, many facilities can both reduce costs and improve operations

By Paul T. Graves

With the increasing concern about energy shortages and steadily rising utility costs, facility executives are finding that some of the best ways to tackle those challenges involve research into the basics of operations. One of the areas most likely to yield immediate benefits is load management.

Load management is a systematic approach to control the operation of electrical equipment. It entails the ability to adjust operations to reduce utility and production costs, increase profits, control electrical demand and deal with power problems.

The scope of work for load management studies usually deals with the fundamental issues of how, what, when, where and why a facility utilizes energy. The analysis includes:

- analyzing rate schedules and procurement contracts;
- reviewing utility rates and incentives;
- understanding utility bill costs, trends and load factor;
- analyzing productivity in relation to energy use and costs;
- determining costs of energy on a time-of-day or annual basis; and
- developing the draft of opportunities to manage load to obtain defined results.

Weighing the Benefits

Since load management requires a broad commitment of

time and effort, it is prudent to weigh the benefits of such a program. The place to begin is a review of existing electric rate structures to determine if optional rates or riders provide more incentive to control loads. Facility executives might find it helpful to meet with the utilities to learn about any special programs, for example, voluntary or contracted load management programs.

If the investigation indicates that such a program will be beneficial, a thorough evaluation of load management may be necessary. As a first step, a brief review of facility operations can determine which loads could be shifted, reduced or turned off completely. For instance, lighting that might be left on but is not necessarily needed on bright, sunny days may be turned off. This is especially true of lighting in lobbies or locations next to windows such as halls and offices.

Other load management measures could include efforts to use less energy by cutting back on what normally is considered full operations. For example, using only one or two lamps in a dual-switched three- or four-lamp fixture might provide sufficient light while cutting by half the amount of energy used. Similar results can be achieved by reducing fan speeds, raising chilled water temperatures, and turning off monitors and office equipment that are not in use.

Also, the operation of certain electrical loads can sometimes be delayed until off-peak hours. Such operations might include battery-charging stations, maintenance projects and water heating. Of course all conservation measures should take into consideration the health, safety and productivity of employees. Public information programs can help gain the support of employees and other occupants of the facilities.

If the potential exists to control electrical loads in a facility, the development of a management program should include a thorough analysis of existing resources, utility and other costs, potential savings, management concerns and opportunities, and implementation methods. One company changed its scheduling to allow some operations to be conducted during off-peak hours and to use alternative fuels during peak periods of use.

The notion of instituting a load management program often meets with initial resistance, and a number of hurdles must be overcome. The first is attitude. Many managers believe there are no loads within any operation that can be managed. A recent study indicated that nearly 70 percent of all businesses believed that they had no ability to shed loads. Of that 70 percent, 30 percent were found to have only a minimal ability to shed loads and still maintain operations; the rest could benefit measurably from load management.

The next most restrictive hurdle is the amount of time available to gather, review, and analyze data, interview personnel and develop a proposed plan of action for management's consideration. After the energy crisis of the '70s subsided, energy efficiency became a low priority for most businesses. Now, energy is again at the top of the list, but facility executives may find that insufficient resources are available to complete an analysis in a timely manner. Solutions include temporarily reshuffling staff or utilizing consultants or other outside resources.

The third hurdle is lack of experience within a company. Specific training sessions can usually be devised to remedy that situation quickly. Many businesses find that the development of a load management program brings both management and operations together so that each understands the needs of the other.

Assessing the Results

The benefits that result from a load management program depend on the final scope of work approved for implementation. Almost all programs, however, can receive positive results in three areas.

Utility cost savings. This is usually the main reason for developing a program. Overall, typical savings could range from a few percent to 15 percent or more compared to the annual utility budget. The biggest savings generally result from improved utilization of the existing utility rate structure and more prudent use of energy.

Operation savings. Operations and maintenance savings can result from improved performance of systems, reduced run-time and decreased maintenance costs.


Improved performance and operations. If the scope of a program can reduce the impacts of blackouts, power quality problems and process scheduling difficulties, the bottom line can be improved.

The latter benefits are sometimes overlooked, but they can be important to a corporation. Consider power quality. The quality of power utilized in a facility depends in part on how well equipment operates and when it is used. For instance, an electrical load that results in a low power factor can lead to increased charges from the utility.

Preventing Problems

Power quality can be severely impaired if there are no operating controls to sequence or stage equipment operation to prevent voltage sags or spikes, which can be dramatic enough to cause equipment with sophisticated power-monitoring devices to shut down the unit. This is most likely to occur with chillers, rooftop equipment, computer-room air conditioning units, and computer equipment and systems. Load management programs, if well-developed, will monitor power quality and ensure equipment and system operations are employed in the most efficient manner.

Most businesses have about an 80 percent chance of gaining from load management. For businesses with limited time and resources, programs can be developed in phases over several months. The results in each instance should be bottom-line improvement to operations. Efforts in this regard are likely to be paid within the first year of implementation. Furthermore, beginning or expanding an energy management program with a load management program can provide a solid foundation on which to build a system that can return even greater benefits.

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