

## **Common Energy Management Themes**

### **Consider energy cost to be a controllable cost and not overhead.**

Customers have control of a portion of their bill. It should be obvious that a big building will take more to heat than a small one, but there are ways to manage costs. An enabler for energy management is being aware of the linkages between equipment and operating choices and the bill. There are many ways to influence this cost in existing facilities (operating and maintaining smarter), as well as strategic things to include with equipment replacement, renovation projects, and new construction.

Related is self-monitoring your usage. Energy use can be tracked by month, by year, per SF, per meal, per manufactured item, compared to this time last year, etc. For electric demand there are more 'things' to watch like on-peak/off-peak times, power factor, load factor, and the specifics of your rate that associate dollars to those things. And there are some variables for even-comparison to fine tune the view, such as weather changes, production changes, occupancy changes, rate changes...things change, but don't let that stop you from keeping an eye on your utility usage patterns and expense. For many meters, the granular 'interval' data is available to customers – if you see that, look at it; if you don't, ask about options.

**Use less to begin with and optimize what you already have.** Savings from more efficient equipment, less expensive fuel, and alternative energy are increased when combined with conservation measures. For example, a more efficient heating unit might save 20% of heating cost but so might insulating pipes or a building; combined, the savings would be higher and the new equipment can often be smaller.

There are many low cost conservation items that are low cost:

- **General:**
  - Accountability, and feedback are embedded in management practices which includes energy management. These are discussed in separate paragraphs.
  - Behavior includes choices and habits, including voluntarily turning things off when not in use.
  - Operations and maintenance activities, choices, habits, training and management support. Acknowledge maintenance staff for their contribution – they are in an excellent position to influence energy cost.
  - Create awareness and incentive to care about utility cost. This can take many forms including periodic metrics to see trends, spot checking daily/hourly use especially at peak times and 'middle of the night', and a management structure that provides feedback for employee and O/M behavior.
  
- **Use energy only when it has value.** Energy is a very good tool for business. However, when there is a utility expense without a corresponding value, challenge it and see if there is a way for it to go away. For example, turn off lights, computers when not using them. Anything that runs 'all the time' is usually a waste item that can be curbed. This also includes conditioning only those areas that are needed – for example, conditioning an attic or the great outdoors. Another example of this is residual usage in unoccupied times and at night; sometimes called 'ghost loads'. By viewing your daily or hourly use you can detect things left on over the weekend or overnight and then ask why. Some of it will need to be there and some of it can go away. The granular utility data is very helpful in keeping this waste in check.
  
- **Provide space conditioning only when occupied.** Heating, ventilating, and air conditioning in most buildings is about people; in unoccupied times, set the equipment for temperatures that protect equipment from freezing but don't cool and don't ventilate. This includes fans, outside air dampers, and exhaust fans operating in sync with occupancy.

- **Compress schedules.** Operating services for “all” people rather than the bulk of the occupancy in a building increases run time of energy using equipment. A very effective strategy is to provide HVAC and lighting service to the bulk of the occupants and provide convenient temporary override control (i.e. a 2-hour override button) for occupants that come in early or stay late.
- **Leverage automatic controls.** In most facilities, the automatic controls are under-utilized and represent an excellent tool to generate savings. Where these controls do not exist, they represent a good investment. There are a variety of optimizing control strategies available that go beyond the basics of temperature control and a time switch function. Systems with multiple components can be optimized so they operate as a coordinated system, reset routines can monitor actual load and adjust equipment to provide ‘enough, but just enough’ temperature, pressure, flow, schedules can be compressed and adjusted to actual use, energy meters can be monitored, and systems that ‘fight’ can be controlled in smarter ways, and things like simultaneous heating and cooling and false loading should be prevented.
- **Adopt maintenance practices that have energy benefit.** Targeted maintenance can be very beneficial at controlling energy, when paired with proper education and management support, including having enough people, ensuring they are trained, and acknowledging the value – too often the O/M staff are seen as a necessary evil and exist only to repair things that break. Some tasks with tangible dollar saving benefit include cleaning heat exchangers, equipment monitoring and checkups rather than ignoring as long as it is working, verifying air economizers work, verifying controls are logical and not overridden, and verifying equipment in general is as efficient as it can be for what it is. A side benefit to this technical shepherding is extending the equipment life (delaying the cost of replacement) and increased comfort level and indoor environment quality that polishes the company image and impression on others.
- **Provide accountability and feedback for energy use.** This is about behavior. View energy use as a controllable cost rather than an overhead cost. Avoid anything that gives the impression of ‘free energy’ or entitlement. Build in management and employee incentives for energy savings by making energy cost a metric by making energy use and cost visible and preferably attached to merit pay. This requires sharing the responsibility of paying the bill, funding proper training and maintenance activities, and measuring results. Any kind of accountability requires feedback which means tracking and reports and trends and goals and results. A very useful tool for feedback is daily or hourly energy use tracking; for example, ‘what is this large usage in the middle of the night’? Visual cues creates awareness and may discover/correct an item that would have otherwise gone unnoticed for years.

**Avoid conditions where the ‘tail wags the dog’.** When one particular area has special needs different than the bulk of the area, it can require large systems to run just for it, including time when the system would otherwise be off. A common example is turning on a very large unit to serve just one space. When this is identified, it can make sense to have a small independent system (heater or cooler, etc.) for the special area, allowing the larger system to be turned off.

**Energy use should follow load.** As load goes up and down during a day or as process needs change, the equipment serving it should modulate so that energy used is proportional to the load and tracks it. Many modulating methods are able to throttle the delivery of the service (heating, cooling, water pressure, air pressure, etc.) but do so with ‘false loading’ that does not reduce energy use proportionally. If you find that energy use is steady when load is going up and down, there is opportunity for savings. This also applies to automatic control – settings that are constant can usually be adjusted according to load or seasonally.

**Avoid electric resistance heating where possible.** This form of heat is convenient because it is cheap to install, but creates high operating costs. Fuel switching from electric to gas will cut the operating cost of the

heating tasks by half or more at current rates. This applies to space heating, water heating, cooking equipment, clothes driers, and manufacturing processes; whatever is using electricity for the basic task of heating something.

**Time of use considerations.** Some utility rates charge more/less depending on 'when' energy is used, such as electric demand rates. If there are ways to coordinate operations to use the energy in ways that are friendly to rates, there can be good dollar savings. Not all utility rates have time of use provisions (usually smaller services do not), but when they do, adding certain terms to your energy cost control vocabulary will help, such as on-peak, off-peak, kW vs. kWh (power vs. energy), load factor (average/max power), power factor (real power/apparent power), minimum demand charge, and others. These terms are important to your bill and can influence a lot of the cost; in many cases, operating choices and equipment choices you make can influence the bills. Become familiar with the terms or contact the utility so you can make good choices.

