Managing The Energy Department

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ABSTRACT

During a recent interview with several energy managers for large public institutions in our state, the question was asked: "Can you define your job in twenty-five words or less?" One energy manager said, "I only need two words… herding cats!" As we discussed this comment, it became abundantly clear that the energy manager's job description has changed over the years. In the beginning, when energy management was a relatively new profession, the task was simple: cut the utility bill! Today the job has expanded to look much the same as everyone else's in the organization: energy management is a department with the task of operating as efficiently and as cost effectively as possible within the constraints of company goals, company organization, and company policy.

The energy manager's responsibility is to make "energy" an issue within the organization. How is it used? When is it used? *Why* is it used when it's used? Is there a technical problem that needs to be resolved? A maintenance problem? An operations problem? Do you simply need to head off a problem?

More and more, we are finding that the source of the problem is not technically oriented. Today we find that both management and communication skills are needed to get the job done.

As a result, the energy manager now has to ask which set of tools is needed for correction of the problem—the screwdriver, the checkbook, or the coffee cup?

Professional skills now required to carry out the task include a knowledge of some rather sophisticated control systems, negotiation skills for the purchase of fuel and electricity, people management skills for enforcement of energy policies (without producing riots and public

scenes), insertion of energy efficiency into construction documents, and integration of those efficient concepts with today's design standards for higher ventilation rates, stricter humidity requirements, and longer operating hours.

Add all that to the financial wizardry required to get it all done within ever-tightening budgets, and you create the picture of the job of today's new energy manager!

This article will discuss the job of the energy manager as it exists today. We will discuss:

- The job description
- The key decisions within the job
- Coordination with other departments
- Ways to fund the energy department

Let's begin at the beginning.

Energy management initiatives develop in different ways within different organizations.

MOST COMMON SCENARIOS

A. Fresh from attending an energy efficiency session at a professional conference, a top executive or a board member assumes the role of energy champion, convincing fellow administrators that the efficient use of energy can play a significant role in cutting operational costs.

B. An enterprising energy consultant, equipment vendor, or energy service company makes a presentation to the board or to an influential administrator, extolling the fiscal rewards of energy management and mapping out a painless way to get there.

C. An employee with a zeal for efficiency, an eye for spotting waste, and access to top-level administration makes a compelling case that energy efficiency can provide a positive cash flow.

The source of the energy management initiative is significant, not only because it affects the terms, expectations, and level of support for

the program, but because it usually influences the type of program established. If an energy equipment vendor or an energy service company is the driving force behind the initiative, the administration may be inclined to place all energy management responsibilities completely in the hands of a contractor, stating that "this is what we are paying them for." This externally driven program is normally focused on short-term equipment replacement and operation, e.g., controls, lighting, etc. On the other hand, if the idea comes from an administrator or employee, the tendency is to lean toward setting up a departmentalized program, designating an energy manager to be in charge of all energy management phases and tapping energy consultants and vendors as needed. Internally driven programs are normally more broad-ranging, establishing a phased implementation with long-range goals and objectives.

The type of program chosen depends on the specific circumstances.

The decision revolves around:

1. Perception of cost of a turnkey program versus the cost of setting up and maintaining a locally controlled program.

2. Confidence in your own resources, particularly your operational staff, and in other resources available to help you establish a local program.

3. Perception of your own level of discipline; i.e., many need to commit themselves to a major dollar investment with guaranteed savings provisions to be convinced that the job will be done properly.

If an entity makes the decision to control its own energy destiny through hiring an energy manager, making energy management an ongoing, integral component of facility operation, and setting up realistic cost-saving goals, it can find ample models around the country. In these entities, the initial step is top-level administration delivering a clear and forceful message of commitment to the energy program, and then broad-based support for the program is solicited and provided from all sectors of the organization. Realistic energy saving goals are established based upon initial data gathering, and procedures are set in place to reach the desired (and stated) goals. At the center of the process is an energy manager responsible for making the system work and generat-

ing the expected results.

The most successful of these programs reflects a number of common denominators which can guide the novice in setting up a locally controlled energy management program.

ENERGY MANAGEMENT IS A TOP-LEVEL ADMINISTRATIVE PRIORITY

Commitment from the top. Hopefully, you have it. If you don't, get it—*and fast*. If you can't get administrative support, brush up your resumé—you'll either quit in a fit of frustration, or your department will become "expendable." Without top-level support, energy management either won't get off the ground or may be swept away at the first sign that someone is unhappy with the program, or it will become a budget fatality… a short-term cost cut with a long-term negative impact.

The road to a successful energy management program begins with a strong signal from the administration that energy efficiency is a **priority**.

This commitment is formalized in a written policy statement which can cover a number of points:

- Rising utility costs and the necessity for energy cost control.
- Designation of a representative to work with utility suppliers. This representative should understand utility billing procedures and have basic knowledge of the electric deregulation process.
- Authorization of an energy manager position and a realistic energy management budget. The energy manager will answer directly to the top executive and the board.
- An energy management goal.
- Preparation of an energy management plan for board or council approval.
- Incentive programs for energy efficiency.

The length and level of detail of the policy statement will vary, depending on the size and organizational complexity of the entity.

Establishment of a realistic energy saving goal is critical. To pursue this goal and produce energy saving results, an energy manager is hired. This person should be capable of understanding the basic concepts of energy-using systems and energy accounting, but-—perhaps even more importantly—he/she must be a strong communicator with excellent organizational skills. The energy manager usually reports to the administrator and organizationally is on equal footing with the departmental heads.

THE ENERGY MANAGER'S RESPONSIBILITIES

1. Establishment and implementation of a district-wide energy management plan.

2. Establishment and implementation of individual facility or campus goals for energy savings based upon past utility billings and the condition of the building's equipment, and revision of these goals annually based upon projects implemented and estimated savings potential.

3. Develop a method to determine actual annual savings adjusted for occupancy totals, hours of operation, severe weather variances, and other factors which may have an effect on the savings for each facility.

4. Establish and maintain a system for recording and reporting energy consumption, power demands, and costs for the district as a whole, and for each individual campus, on a monthly and annual basis.

5. Serve as the company/district coordinator with utility suppliers.

6. Serve as the coordinator for negotiation with utility suppliers, and be a member of the committee formed to evaluate various utility offers for future service.

7. Provide continuous assessment of energy consuming equipment.

8. Oversee outside consultants retained to provide energy-related audits for the district.

9. Work with the director of maintenance for the district to implement and insure the continued success of a preventive maintenance program for each major category of energy consuming equipment within the district.

10. Implement the initial **Master Plan for Energy Consuming Equipment**, and prepare (or have prepared) an annual update and revision to the plan to provide a revolving, prioritized, five-year equipment replacement recommendation for incorporation into the annual budget planning process for the district.

11. Assist the construction department in development and updating of specifications for standardized future purchases of energy efficient equipment.

12. Assist the construction and maintenance departments to determine the optimal balance between efficiency and safety/health related issues.

13. Serve as chairman of the board-appointed energy committee.

14. Prepare an annual budget for the continued operation of the energy management program.

15. Provide energy-related communications and information to district staff and students, and develop reward program(s) for campuses making significant contributions to the district's energy conservation effort.

16. Identify technical and financial assistance available from outside sources.

17. Communicate with facility administrators, office personnel, and staff to determine the impact of conservation efforts on occupant comfort and working environment.

Some issues that will need to be addressed by the energy committee (item #13, above) are:

- Temperatures and humidity allowances for various areas of the building.
- Who has authority to revise scheduled hours of operation and under what conditions?
- Domestic hot water temperatures.
- Operation of: kitchen equipment, ancillary equipment, computers, and kilns (when and by whom).
- Allowable time of day to turn on exterior lights, including activity fields.
- Vending machine policy.
- Portable heater and fan policy.
- Value of ceiling fans.
- Value of ceiling insulation. Problems with "conditioned" attic space, using ceiling plenums for return air passage, and the need for increased roof insulation levels.
- Community usage of facilities: areas and times allowed; cost and rental rates for specific areas.
- Control of portable buildings' HVAC systems.
- *Accountability and Corrective Action*: How and to whom will violations of the rules be reported? What will be the procedure when violations of the program are discovered?
- *Incentive Program*: Do you pass savings on to campuses? How much? What effort or results merit a reward? Buildings with lower EUI than last year? Largest rewards to be given to the facility with the greatest improvement?

ENERGY MANAGEMENT INVESTS IN HARDWARE AND PEOPLE

The entity understands the importance of installing and maintaining energy-efficient equipment, such as high efficiency lamps and electronic ballasts, energy-efficient heating and air conditioning equipment, and energy management control devices. But it also understands the fundamental importance of changing the behavior of those who both use energy and control its usage. Behavior and hardware are complementary, integrated components of the program.

KEY PERSONNEL PLAY PIVOTAL ROLES IN THE ENERGY MANAGEMENT PROGRAM

To do your job correctly, you must have input into construction, purchasing, and operations (custodial, maintenance) departments *and* you must have the authority to speak with administrative backing.

No one should be expected to carry out an assigned responsibility without having been provided the associated authority to do the job!

Support from the director of maintenance, custodial director, business manager, purchasing department, and the facility's occupants is critical to program success. Strategies are in place to convince these players that they have a vested interest in the success of the energy program. An energy committee composed of representatives of these groups is frequently set up to guide the decision-making process and to enlist broad-based support for the program. The successful energy manager understands who can make the program hum and who can stop it dead in its tracks. Frequently, this is the same person.

BUILDING ENERGY PERFORMANCES ARE IDENTIFIED EARLY IN THE PROCESS AND ENERGY ACCOUNTING SYSTEMS ESTABLISHED TO MONITOR USAGE AND TRACK PROGRESS

The entity knows how it is being billed for energy, how much energy (per square foot) is being used by each building, and how much it costs (per square foot). It understands that these data enable them to compare their usage and cost with local and state data and to flag energy hogs. If one elementary campus is costing $0.84 per square foot

to operate and another of comparable size, in the same climatic zone and the same general orientation, costs $1.04/sf, they know it, and they find out why.

LOW COST/NO COST PROJECTS ARE THE INITIAL TARGETS FOR ENERGY SAVINGS AND ARE IMPLEMENTED BEFORE CAPITAL INVESTMENTS ARE MADE IN ENERGY RETROFITS

Sound maintenance and operations procedures are in place to recoup the easy and cheap savings associated with turning off lights in unoccupied areas, sensibly reducing equipment run times during the unoccupied months, enforcing standard operation and maintenance practices for air conditioning equipment, and attending to caulking and weather-stripping problems to lower infiltration (but not at the expense of air quality). Savings generated from these actions may offset the cost of more expensive retrofits. Good O&M practices pave the way for effective energy management. Let's state that another way: good O&M is absolutely essential for a consistently successful energy management program! The entity also realizes that it does little good to design or retrofit a building for energy efficiency if the building and its energy systems are not properly operated and maintained.

ENERGY RETROFITS ARE IDENTIFIED, PRIORITIZED, AND FUNDED

After an effective maintenance and operation program is in place, the entity turns to more capital intensive retrofit projects. Heating and air conditioning systems may not only be inefficient, but may also be at the end of their useful lives. Incandescent lighting may need to be replaced with high-efficiency fluorescent or metal halide lighting systems. Mechanical or computerized energy management controls may yield excellent paybacks.

The entity uses a master planning approach to establish priorities, consider project dependencies, and set up the most appropriate sequence for completing the retrofits.

In moving to the financing area, the entity carefully identifies and evaluates all available funding options: local maintenance money, bond

money, grants, loans, and alternative funding methods (lease-purchase, performance contract, etc.). In making the final decision, it may well combine several methods to get the best overall "bang for the buck."

THE ENERGY MANAGEMENT PROGRAM IS VISIBLE, RELEVANT, AND RESPONSIVE

The community not only knows about the energy program, but applauds it as a revenue generator. Dollar savings are converted into meaningful terms such as comparing energy dollars saved to dollars generated by each cent of local tax increase. The public relations officer knows that energy management is the "good news" department and does not hesitate to showcase it.

These entities successfully fight off "consumption creep," which occurs when the newness of a program wears off or the incentives for continuing the program dim. Energy consumption and savings reports are routed to principals or facility managers on a regular basis. Energy efficiency is integrated into environmental concerns, new construction, and other areas of operation.

The program remains meaningful to those it serves. The energy manager continually asks "Why should I be concerned with energy efficiency" from the perspective of the maintenance staff, custodial staff, and occupants. Friendly energy-saving competitions between facilities/campuses and incentive programs for maintenance and custodial workers may be used to invigorate the program as well as maintain program visibility.

PROGRAM GOAL SETTING

To implement the energy efficiency program, proper planning is essential so that decisions can be made early on in the process by the energy management committee regarding program goals and how those goals will be achieved. Goals and objectives must be established early in the implementation phase. A good overall plan is really a process of thinking through the desired goals and the measurement technique used to see if those goals were accomplished.

Realizing that everything that will eventually be utilized to save

energy within the economic criteria cannot possibly be concluded at one time, the areas with the greatest opportunities must be identified in order of priority. The goals that are established should be realistic and attainable within a measurable and predetermined amount of time. The most desirable results that have the greatest probability of being achieved should be defined.

Listed below are suggestions for goals and objectives for an energy efficiency program. Each should be reviewed and analyzed for approval, and a time frame should be established to achieve these goals.

Goal: Formulation of the support services energy management committees and facility sub-committees.

Objective: To provide leadership, show visible upper-level support, and develop a commitment towards energy efficiency.

Objective: To develop various energy programs that will stimulate interest through awareness, recognition, and incentives.

Objective: To design, develop, implement, and coordinate energy efficient activities related to the organization's "reason for existence"; forgetting that energy is a tool to provide an end result has killed more than one energy program.

Objective: To develop a comprehensive end-use energy program for each facility based on building requirements and educational needs.

Goal: Develop and establish guidelines, regulations, and procedures that will assure the use of facilities and equipment only when and to the degree necessary. Authority to implement guidelines and procedures is given to the energy management committee.

Objective: To ensure all personnel and patrons are aware of the energy efficiency program and its ramifications.

Goal: A fiscal management plan will be developed reflecting cost factors for proposed energy efficiency measures.

Objective: The plan will reflect costs and dates for activities and all other considerations normally involved in good project planning procedures.

Objective: Budgets developed annually will reflect, as budget line items, all costs associated with development and implementation of the energy program.

Goal: A detailed written energy management plan shall be developed and submitted to the board. The plan shall include desired program results as well as specific projects and plans developed by the management committees and facility sub-committees. The plan will be updated on an annual basis.

Goal: To reduce energy consumption (measured in Btus/sq.ft.) at each facility to a level below the applicable state average for that region.

Goal: Identify and utilize available financial resources that are offered by local utility companies and state agencies.

Goal: Maintain an energy accounting and tracking system.

Objective: To determine how well each building saves energy as compared to a fixed baseline. This provides feedback to building administrators.

Objective: To check for obvious meter malfunctions or meter reading errors before being certified for payment and to determine the least efficient buildings.

Goal: Conduct an annual energy audit at every facility.

Objective: To ensure that guidelines and procedures as well as individual facility programs are being implemented and continually developed in an effective manner.

Objective: To determine if building applications have been modified that may result in program adjustments.

Goal: All new construction and retrofit work shall be evaluated for energy efficiency, and guidelines will be developed and implemented during the architectural and engineering design phase.

Objective: To ensure that new equipment purchased for use in the facility is energy efficient in design and is cost effective in its operation.

Objective: To ensure that the ANSI/ASHRAE/IESNA Standard 90.1-2001 is incorporated into all new projects. This standard is now required for state-funded projects in public institutions, institutions of higher learning, and political subdivisions as defined by Senate Bill 5. [See page 9].

Goal: Standardize around energy efficient replacement equipment.

Objective: To ensure that replacement equipment installed by the maintenance department or by outside contractors meets energy efficiency guidelines.

Objective: To minimize inventory by standardizing around particular equipment types.

Goal: To select and install a computerized energy management system for all facilities that will allow for all energy-using equipment to be monitored and controlled from a remote, central location.

Objective: To ensure that all buildings are operated in a comparable manner, and only used to the degree necessary.

Objective: To provide automatic control maintaining code/standard required minimum/maximum operation, reducing the potential for violations created by overzealous efficiency programming.

Goal: To initiate an effective preventive and predictive maintenance program designed to increase equipment efficiency and prolong the effective life of the equipment.

Objective: To develop and implement a program of periodic maintenance for the building envelope and mechanical/electrical equipment following manufacturer recommendations.

Objective: To assure that existing facilities and equipment are put into the best state of repair and maintained at a level that will provide for maximum efficiency.

PUBLICITY AND PROMOTION OF THE DISTRICT ENERGY PROGRAM

Publicity and promotion are essential ingredients of a successful energy management program. They are an important arm of motivating employees to save energy. It is difficult to separate publicity and promotion from motivation because the primary purpose of both is to make people want to accept and encourage energy conservation. It is a form of advertising, getting the employees to buy the product of energy efficiency. Somehow the relationship between the evaluation of their job and reducing energy consumption must also be correlated.

Listed below are some suggestions for publicizing and promoting the energy efficiency and management program.

1.) One article per month in a newsletter. This could include a personal profile on people performing energy management activities and/or one good energy efficiency idea that was implemented at a particular facility.

2.) Use the information from (1) to obtain local city newspaper interest and coverage.

3.) Designate one day per year as energy awareness day. This could be during National Energy Week or Earth Day. Develop buttons or stickers with appropriate energy efficiency advertisement that can be worn by employees. Also, set up staff meetings/school assemblies and utilize guest speakers from the state energy conservation office, utility companies, and employees.

4.) Develop posters and pamphlets on energy efficiency. For school districts, this could be integrated into the curriculum by establishing contests for the students.

5.) Develop a contest for the design of light switch stickers to be utilized at all facilities.

6.) Develop decals publicizing energy conserving efforts that can be used for high visibility vehicles or equipment.

7.) Develop and adopt an energy management logo. This could be done through a contest.

8.) Produce a videotape to be distributed to each facility outlining the purpose of the energy program.

9.) Allow the energy manager opportunities to discuss savings results and opportunities for improvement at teacher/staff meetings at least once each year.

GENERAL OPERATING PROCEDURES & GUIDELINES FOR CUSTODIAL PERSONNEL

The custodial staff is an integral part of an effective energy efficiency program. Depending on experience, they are usually the most knowledgeable personnel within a building in terms of equipment operation and building characteristics. The success of this program will largely be a direct result of custodial and administrative cooperation. So, with this in mind, it is very important that the custodial staff not only adheres to the following recommendations and suggestions, but is encouraged and expected to do so by the administrator-in-charge. Even though all of these guidelines will not apply to every facility, the administrator-in-charge and head custodian/building engineer should determine the guidelines which directly relate to their facility.

CLEANING & CONTINUAL UPKEEP OF MECHANICAL ROOMS

It is very important that mechanical rooms (rooms which contain air-handling units, chillers, boilers, hot water heaters, transformers, etc.) be kept clean at all times. Just as much effort should be given to cleaning these rooms as to any other part of the building. All items (mops, brooms, buckets, stored material, etc.) should be kept off and away from mechanical and electrical equipment. This will help insure that the equipment is free of obstruction for proper operation, as well as allow the needed accessibility for maintenance personnel to perform corrective and preventive maintenance procedures.

LIGHT FIXTURE INSPECTION & CLEANING PROGRAM

Establish a regular inspection and cleaning schedule for the interior and exterior surface of all fixtures and lens covers. All light covers (lenses) should be cleaned per manufacturer recommendation every time a bulb is replaced. This allows for the removal of the yellowish, hazy film that accumulates on the surface. Merely wiping the lens with a damp cloth will not remove this residual. The inside of the fixture (not lens) can be cleaned with a damp cloth, which will allow for maximum reflectance of the luminaries.

A fluorescent light will accumulate enough dust/dirt in 6 months to reduce the efficiency by as much as 20 percent; therefore, a regular semi-annual fixture-cleaning program should be implemented at every facility. If lenses are beyond proper cleaning, the energy audit will identify the need for new acrylic lenses which do not discolor.

REPLACEMENT OF FLUORESCENT LIGHTS

Replace fluorescent lights on a regular basis after 80 percent of lamp life used. Develop a program that will provide replacement of all bulbs within a fixture. When one bulb burns out, replace all bulbs. A bulb with approximately 20 percent remaining life will consume more energy and produce less light.

SUPPLY & RETURN AIR VENT CLEANING PROGRAM

A regular inspection and cleaning schedule for all supply and return air grilles will be established. A regular semi-annual cleaning program should be implemented to remove dust/dirt build-up on all grilles so that complete air circulation is possible. Make sure that all vents are free from partial or complete obstruction.

NIGHT SETBACK DURING HEATING SEASON

During the heating season (winter), all thermostats shall be set at 55 degrees at the end of the day. Even though most facilities utilize an energy management system that shuts down the units at night, there

are internal programs that allow the energy management system to turn on the units if the outside air temperature drops below freezing. By decreasing the thermostat setting, the individual room units will now only come on if the temperature in the room drops below 55 degrees.

Responsibility for this procedure would involve the person directly associated with this area; however, the night lead custodian and other staff should make it a part of their procedure to check all thermostat settings and make the necessary adjustments. The building engineer or associated person will be responsible for adjusting the thermostats to a normal setting upon arrival the following morning.

If this results in levels of discomfort, then the administrator-in-charge shall work with the building engineer to determine an adequate night setback temperature that will accommodate personnel needs.

STARTUP PROCEDURE FOR CONDITIONING EQUIPMENT

At the very earliest, all air-conditioning and heating equipment will be started (or adjusted to normal standardized settings) one hour prior to arrival of staff.

If this procedure results in levels of discomfort by the beginning of regular business hours, the administrator-in-charge shall work with the building engineer or head custodian to determine the time the heating or cooling units will be turned on or returned to normal settings, preceding the beginning of business activates. In the fall or spring, the heating units may be turned off as soon as the temperature outside reaches a comfortable level.

If it is felt that particular air-conditioning units must be left on all night to accommodate the needs of the building on the following day, contact the maintenance department to discuss alternative means of providing comfort to the building without operating the units on a continual basis.

SHUTDOWN PROCEDURE FOR CONDITIONING EQUIPMENT

All air-conditioning units and individual heating units (where applicable) will be shut off or turned down approximately 15 minutes before the regular personnel typically leave.

This procedure can be modified for school districts' instructional areas (where applicable); the air-conditioning units and individual heating units should be shut off or turned down approximately 15 minutes after class dismissal.

If possible, all staff is urged to make an energy-conscious effort to minimize the daily operation of heating/cooling units for their particular area.

If individual heating/cooling units are manually controlled by building personnel, try turning the units off or down during last hour of occupancy to allow the room to "coast." The room can hold its temperature up to one hour after the unit has been adjusted.

OPERATION OR SPECIFIC-USE AREAS

Areas of occasional use or heavy use during specific periods of the day shall maintain standard temperature settings only during that period.

Heating and cooling for kitchens is only needed when the food service employees are present. When they are finished at the end of a normal day, the heating and cooling units should be turned off.

Heating and cooling for the cafeteria is usually needed during specific periods of each day. If there are no special events occurring between and/or after these activities, then the heating or cooling units can be turned off or adjusted for night setback.

OPERATION OF EQUIPMENT DURING HOLIDAY PERIODS

Limited air-conditioning and/or heat will be provided for administrative staff during regular holidays and summer break. This will be determined by the facility administrator, or in some instances, the director of maintenance and operations. Conditioning of interior spaces will be provided on a limited basis during the days and hours of the days in which the administrative staff is required to be there unless a specific after-hour event has been scheduled.

During the summer months, air conditioning will be provided for the administrative offices during the period in which the employees are required to be present. During this period, custodial personnel are

encouraged to use exterior doors and windows for ventilation purposes, and also request large box fans to provide additional ventilation for occupancy comfort and assistance in performing custodial services. If health considerations need to be discussed, contact the maintenance office and develop a limited air-conditioning schedule during the summer months.

SCHEDULE AND OPERATION OF AFTER-HOUR EVENTS

When activities are scheduled in a building before or after the regular workday, proper planning should be made to ensure that lights and heating or cooling units are turned off.

When determining the areas within a facility available for after-hour events, first consideration should be given to the size of the area to adequately accommodate the function. If several areas comply, then an energy-conscious effort should be made to utilize the area that will consume the least amount of energy for heating/cooling and lighting. Many activities may be held at a place that is already heated or cooled. This would eliminate the need for these services in the buildings.

OPERATION OF WINDOWS AND DOORS

Maximum use of door/window openings for ventilation is encouraged only if the air-conditioning and/or heating system is not in operation.

If the ventilation units are operating in particular areas, check with the head custodian/building engineer to ensure that heating and/or cooling is not being provided.

All windows and doors (including rooms which open to hallways as well as to outside) shall be kept closed during periods of the day in which the air-conditioning and/or heating systems are in operation.

Once the central air-conditioning system has been activated, it will be the direct responsibility of the administrator-in-charge, or the people he has designated, to ensure that all windows and doors to all conditioned spaces are closed.

If classrooms are not comfortable when heating or cooling is being provided, contact the maintenance department so that trained personnel

can examine the components of the mechanical equipment to resolve the problem. At no time during the conditioned-air process should a door or window be opened to "adjust" the environment to a comfortable level.

WINDOW SHADING DEVICES

If the sun provides direct sunlight to particular areas, then utilize natural light and radiation heat from windows by leaving shades open on sunny days in winter.

Close shading devices at the end of each day and during unoccupied periods. This will aid in reducing night heat loss in the winter and solar heat gain in the summer.

OPERATION OF INTERIOR LIGHTS

When rooms or other areas are unoccupied, all lights will be turned off. Just as everyone has been conditioned to turn on lights when entering a darkened area, the same type of conditioning must be applied when leaving a space. Devise a means to incorporate this conditioning into the educational process, such as having the last person leaving the area be responsible for turning out the lights.

If a particular area is lighted by fluorescent fixtures, it is recommended that if the room is unoccupied for more than 5 minutes, the lights should be turned off.

In areas where incandescent fixtures are used (such as bathrooms), all lights should be turned off whenever they are not occupied, regardless of the time interval.

Lighting for areas of occasional use or heavy use during specific periods of the day (such as kitchens and cafeterias) should only operate during these periods. If there are no special activities occurring between and/or after routine activities, then all lights should remain off.

All hallway lighting should be turned off when everyone is scheduled to leave for the day, unless a special after-hour activity has been scheduled. The emergency lighting for the hallways should be enough light to move from room to room for cleaning purposes. When cleaning the hallways, lighting should be used only during this period.

AREA LIGHTING CONTROLLED BY MULTIPLE SWITCHING

In areas where multiple light switching is available, try utilizing natural light from windows in place of overhead lighting. If particular rooms have multiple switches for lighting, try to conserve energy while cleaning the room by turning off half the lights.

If applicable, turn off hallway lights during class periods. Hallways of minimal use may be able to operate without any lighting depending on the situation. This may also aid in keeping hallways clear of unwanted traffic.

DAILY GUIDELINES AND RECOMMENDATIONS FOR BUILDING ENGINEERS

As custodians have normal responsibilities at the end of a class day (cleaning rooms, etc.), the following additional guidelines and recommendations should be incorporated into their normal, daily work schedule.

1) All lighting and other energy-using systems will be checked and turned off at the end of every day.

Check to make sure that all lighting that is not required to be left on is turned off. This includes interior and exterior lighting that may be the responsibility of other building personnel. If this situation does occur, turn off the lights and notify the administrator-in-charge.

Security personnel will check for excess lighting left on after departure of custodial personnel and instruct them to turn off those lights discovered. The security personnel will include this information in the security report.

2) Turn off all lights that are left on in classroom areas. Make note of which areas are leaving lights on when rooms are not occupied and report to the administrator-in-charge.

3) When cleaning rooms, minimize use of overhead lights. Take advantage of natural light provided by windows. If this is not possible, and multiple light switching is available, only use one row of lights to clean areas.

4) Maintenance and custodial employees are instructed to light only the room or area that they are cleaning. Turn off all other lights not being used for a specific purpose.

5) Turn off lights in areas of moderate or specific use when the normal activities have ended. Areas such as kitchens and cafeterias can be turned off after lunch.

6) Make an energy-conscious effort to turn off any piece of equipment that is not being used by someone. Regardless of how trivial and burdensome it may seem, this could result in significant savings.

7) If applicable, be sure that time controls for lights, cooling, and heating equipment are properly set to effect greatest energy savings possible.

8) Check thermostats to insure that settings are within recommended standards. If not, set to within limits and notify the administrator-in-charge.

9) Once the air-conditioning or heating system has been turned on, walk through the facility to insure that all windows and doors are closed. Remind supervisors that the system has been turned on and to close all outside openings. If problems persist, contact the administrator-in-charge and describe the problem.

10) Inspect rooms during extreme heating and cooling seasons to insure that no drafts are present. If substantial leakage is evident around windows and doors, report this information to the administrator-in-charge or the maintenance department.

11) Make sure that all devices (door closures) used to close doors are functioning properly. The device should close the doors completely and at a relatively quick rate.

12) If applicable, minimize use of exhaust fans. In certain instances, no difference is noticeable when exhaust fans are not running. If the fans need to run, make sure they are turned off as soon as the area is not required for use.

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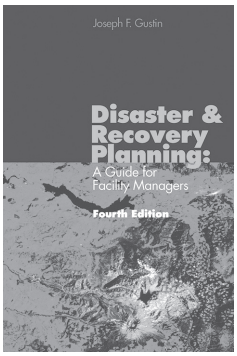

FOURTH EDITION

By Joseph F. Gustin

The key to understanding the complexities of disaster preparedness and business continuity lies in focusing upon the issue of prevention, or mitigation. The newly revised fourth edition of this best-selling reference speaks to the issues of prevention, as well as "controlling" the effects of a disaster on a company's operations. A new chapter has been added on bioterrorism that addresses assessing and managing bioterrorism-related risk. In addition, statistics have been updated with various disaster/emergency declarations including those from Hurricane Katrina. The most recent statistical data on workplace violence is also provided, including new charts and tables. Other critical topics include coverage of regulator influence, effective mitigation strategies, enlisting the media's assistance in recovery planning, contingency planning, loss prevention, facility evacuation, employee training, chain of command, checklists, computer and data protection, bomb threat response, standby power, self-inspection, and more.

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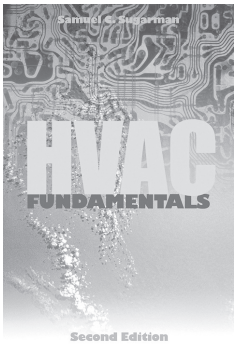

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GUIDELINES FOR NEW CONSTRUCTIONS
MISCELLANEOUS GUIDELINES

1) All mechanical equipment shall be designed to conform with the energy management system. Inclusive of this will be HVAC equipment, lighting, and lawn-sprinkler systems.

2) The contractor shall be required to provide temporary power during construction. This will reduce the possibility that the entity would pay for the contractor's use of energy, and may expedite completion of the projects.

3) At no time shall the entity provide air-conditioned areas for the contractor, such as the use of existing lounges/classrooms for construction workers to take breaks during the summer months. If it is determined that the contractor has turned on A/C or heat for personal comfort, then the entity will calculate energy costs and submit to contractor for reimbursement or deduction from contract amount.

4) Require compliance with ANSI/ASHRAE/IESNA Standard 90.1-2001.

LIGHTING GUIDELINES

Exterior

All exterior lighting levels shall meet recommended IES guidelines. In situations where levels greater than standard are determined, an appropriate foot-candle level shall be established prior to selection of the lighting.

1) All exterior high-intensity discharge lighting shall be high pressure sodium or metal halide. Lighting should not include use of quartz, mercury vapor, incandescent, or fluorescent.

2) Soffit and/or canopy lighting shall be metal halide (75 watt maximum) or fluorescent, meeting IES standards, and utilize same photocell as other exterior lighting.

3) All exterior lighting shall be controlled by one photocell (not one photocell per fixture). This reduces maintenance costs related to materials and labor.

4) An auxiliary contact for the exterior lighting shall be provided to allow for the lights to be controlled by the energy management system. This contact would control the lighting through the control of the power to the photocell.

Interior

1) All interior lighting levels shall meet IES standards. Lighting level standards vary significantly when analyzing area such as classrooms, hallways, bathrooms, and storage areas.

2) No incandescent lighting shall be used. In areas in which the square footage is minimal (such as small storage closet), and the use of standard fluorescent fixture provides excessive lighting levels, than the use of an incandescent fixture is acceptable, but the specified lamp for this fixture shall be a screw-in florescent lamp.

3) Provide separate switching for vestibule areas. This will allow for the vestibule lighting to be turned off during times of day in which natural daylight provides appropriate lighting levels. At no time should the light switch for an entire hallway control the lighting in a vestibule area.

4) A key switch shall be provided for vestibule lighting in lieu of a typical toggle switch. This will allow the lighting to be turned off during the day, and not allow individuals to turn the light on without authorization.

5) Fluorescent lighting fixtures for all interior spaces should be provided with electronic ballasts.

6) Hallway lighting shall be standard 2′ × 4′ 2-lamp fluorescent fixtures. Provide two-toggle light switch per hallway, switched in the following manner: one toggle switch shall control the proper number of fixtures to provide a lighting level of 5 foot-candles during evening hours. This will allow for nighttime lighting for

custodial work. The other toggle switch will control the remaining fixtures in the hallway for daytime activities.

7) No emergency lighting shall be provided through the use of existing fluorescent fixtures. Emergency lighting shall be provided through the use of wall-mounted emergency power packs or separate fluorescent fixtures with battery back-up.

8) Ornamentation lighting for hallways (for display purposes) shall be switched separately from normal hallway lighting.

9) Ornamentation or specific-use lighting for classrooms, office areas, etc. (such as soffit lighting for chalkboards or display lighting for pictures), shall be switched separately.

10) Room lighting shall be provided with two switches. Each switch shall control a portion of the lamps installed in each fixture. Consider installation of electronic ballasts that would allow the lamps to be automatically dimmed based on the amount of natural sunlight entering the classroom in relationship to the recommended lighting levels.

11) All exit signs shall be LED-type to allow for greater energy efficiency.

HEATING VENTILATION AND AIR CONDITIONING (HVAC)

Mechanical

1) When designing individual HVAC units for classrooms or individual offices, the following is a priority listing of type of unit and installation of each system, with "a" being most preferred.
   a. Roof-top unit, self-contained.
   b. Split system, with the condenser located on the roof, and the blower located in a floor-level space.
   c. Split system, with the condenser located on the ground, and the blower located in a floor-level space.
   d. Split system, with the condenser located on the roof, and the blower located in the building attic space.

e. Split system, with the condenser located on the ground, and the blower located in attic space in building.

2) All HVAC units shall be properly sized. Units that are oversized cause as many problems as units that are undersized. The consulting engineer should determine the proper unit size during the design phase.

3) All HVAC units for individual rooms shall be electric cooling and gas-fired heat. When natural gas is available, the entity should not recommend the use of heat pumps.

4) No fiberboard shall be used for installation. Flex duct shall be used in a situation where the length does not exceed 5 feet, and is not considered a part of the main duct run from the unit to the room.

5) All contractors shall be required to meet the equipment manufacturer's recommended requirements for installation and warranty.

6) Return air grilles and filters shall be a standard size. Also, filters must be installed per manufacture's recommendation.

7) HVAC equipment shall meet minimum efficiency requirements for heating and cooling.

8) All units shall operate through the use of electric/electronic controls that are 100 percent compatible with the entity's energy management system. There shall be no use of pneumatic control devices unless specifically approved by the entity during the design phase. The EMS vendor will provide the necessary information to determine compatibility, prior to approval of equipment submittals.

9) All fan-coil units shall be provided with face/bypass dampers or modulating valves.

10) The new design of a hot-water system for heating shall make use of modular, high efficiency boilers. The system will be designed

so that a constant hot water supply temperature can be controlled and regulated through the energy management system, by means of a primary loop-secondary loop configuration and 3-way valve, or through the staging of several modular boilers. The supply loop temperature will be able to be reset based on outside air temperature or other factors to be determined by the entity.

11) All water piping located above conditioned spaces (attics, walls, plenums, etc.) shall be properly insulated. This includes sprinkler system applications. At no time shall conditioned air vents be allowed in unconditioned areas for the purpose of heating non-insulated piping.

NO-COST/LOW-COST STRATEGIES

A large percentage of the energy dollars that have been saved during past years has been through no-cost/low-cost strategies. These savings resulted from administrative directives and have amounted to approximately 20 percent of the cost reduction realized. These simple, readily implemented strategies are listed as follows:

SIMPLE CUT-OFF PROCEDURES

- All unnecessary lights off when not in use.
- Replacement of 40-watt fluorescent lamps and electromagnetic ballasts with 32-watt T8 lamps and energy efficient electronic ballasts.
- Weather-stripping and caulking of doors and windows.
- Insulation of Freon, hot water, and chilled water lines.
- Monitoring of flue gases for optimum combustion of boilers.
- Optimization of water temperatures for all HVAC equipment and domestic hot water.
- Night, weekend, and holiday cutbacks of heating and cooling systems.
- Cut off heating system pilot lights in early April, and re-light them late in October/November.

SPECIFICALLY FOR SCHOOL DISTRICTS:

- Turn off refrigerators, freezers, ice machines, hot water tanks, etc. as soon as school is out for the summer.
- Summer air conditioning—control all areas not used for instructional and administrative purposes to maximize savings while maintaining acceptable air quality/humidity conditions.
- Survey energy usage on each facility with building administrator.
- Optimize locations of summer and evening programs.
- Consider value of maintenance contracts.
- Review billing structure with utility companies for optimum rates.
- Review & approval of monthly utility bills by energy management staff.

ABOUT THE AUTHOR

Jim Brown is a professional engineer who has specialized in the field of energy management and energy efficient design for the past 24 years, conducting energy analyses and designs of energy efficient installations for over 600 facilities. In addition, he has provided energy auditing consultation for six different state energy offices, the South Korean Energy Office (KEMCO), and three ESCOs established in China, which were partially funded by World Bank. Mr. Brown has presented energy management training seminars and performed energy efficiency audits for more than 320 school districts and 64 public hospitals in the states of Texas and Pennsylvania. He also developed and presented portions of the "Investment Grade Energy Audit" seminar for the Association of Energy Engineers, he is co-author of the book entitled, *Investment Grade Energy Audit: Making Smart Energy Choices*, and is currently conducting a seminar series for AEE entitled "Advanced Energy Auditing."

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