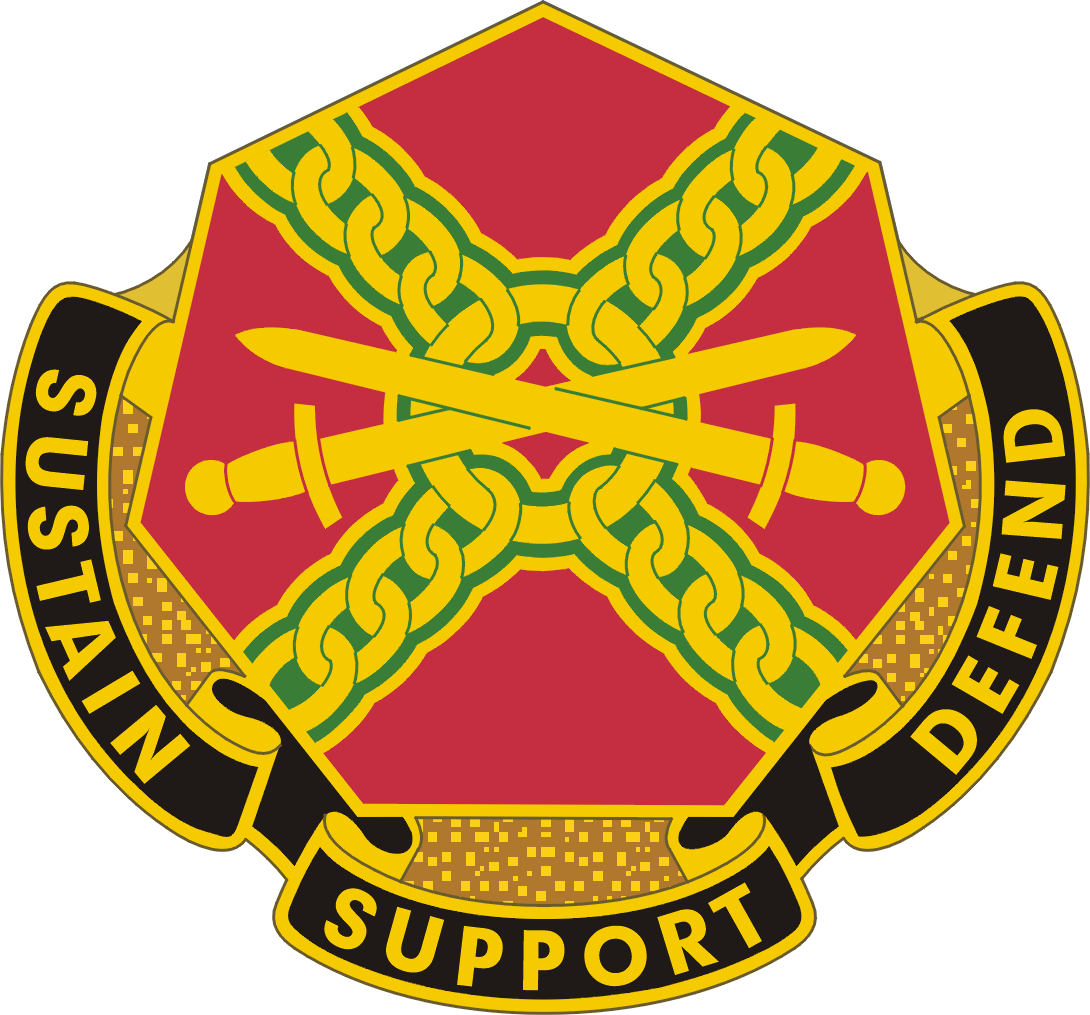
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**IMCOM Building Energy Monitor Program**

**Building Energy Monitor Handbook**

**2 May 2018**

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# **C:\Users\truett.d.sanchez\Desktop\homepage_banner.pngINTRODUCTION\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Energy Management makes good sense and increases comfort, productivity and savings. Installation Management Command’s (IMCOM) Building Energy Monitor (BEM) Program serves as guidance for developing, implementing and maintaining an energy program. Army Regulation (AR) 420-1 requires, “establishment of an energy awareness program including such measures as delamping, turning off unneeded lights, use of automatic occupancy temperature set point controls, closing doors and windows to prevent loss of energy required for heating and cooling, establishment of installation ‘energy waste/abuse hotlines’ and appointment and training of building energy monitors.” The BEM is an important link and partner leading to the success of the garrison’s energy program. Your active involvement is not only good for your unit, but builds upon the Army’s Energy Security and Sustainability Strategy goals. These 5 goals are:

**GOAL 2: Optimize Use**

Minimize demand and increase both efficiency and recovery to maximize resource and mission effectiveness for systems, installations, and operations.

The Army will improve productivity by reducing resource demand, investing in increased efficiency or enhanced recovery, and switching to renewable resources. Improved resource use can increase security and reduce expenses. We will minimize our environmental impacts from systems, installations, and operations by using natural resources more productively.

**GOAL 1: Inform Decisions**

Leverage Army culture to use resources wisely, improve mission effectiveness, and preserve future choice.

Army culture is the foundation that supports all we do. We will leverage those aspects of Army culture that emphasize reducing risk and developing the future force through improved resource use. We will ensure that Army planning and decision-making processes fully consider the current and long-term resource implications. Commanders, program executives, and garrison leadership teams must have knowledge of and access to the information necessary to assess how the direct and indirect consequences of their decisions affect capabilities, resource utilization, and associated vulnerabilities.

**GOAL 3: Assure Access**

Provide reliable access to energy, water, and land resources and protect delivery mechanisms to mission-essential functions and applications, both domestically and to contingency bases during operational deployments.

The Army will continue to ensure that mission essential and supporting assets are available and secure by pursuing options to diversify and expand resource supplies, to increase redundancy and multiple distribution pathways, and to manage vulnerability and risk.

**GOAL 4: Build Resiliency**

Advance the capability for systems, installations, personnel, and units to respond to unforeseen disruptions and quickly recover while continuing critical activities.

Resilience expands our focus from protecting key systems against specific threats to an outcome orientation that emphasizes flexibility, diversity, and a proactive posture. Resilience requires coordinated action to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. Adopting flexibility and adaptable approaches at all levels, from individual to enterprise, ensures that we can accomplish the mission in the face of both near- and long-term change.

**GOAL 5: Drive Innovation**

Identify new concepts; develop, test, and field new processes and technologies; and institutionalize and communicate best practices to maximize resource effectiveness.

While we continually seek out technological and doctrinal innovations, we need to link these innovations to more effective use of energy, water, and land to maximize our capabilities. As we invest in new technologies and the capabilities that they create or enhance, we need to ensure that we include the life-cycle energy and water requirements so that we maximize each technology’s effectiveness.

Your goal is to assist identifying and eliminating energy and water waste according to your buildings mission requirements. Familiarize yourself with the conservation measures in this guide.

In addition, the following materials have been developed to support your success:

* BEM Appointment Memo Template (Appendix A)
* BEM Building Walk Through Checklist (Appendix B)
* BEM Training Presentation
* BEM Training Exam
* BEM Training Certificate
* BEM Handbook
* BEM Building Performance Sample

**CHAPTER 1: Program Guidelines, Roles and Responsibilities**

The BEM Program **mission** is to establish a culture of increased energy and water stewardship by building relationships between assigned units, tenant organizations, service members, and garrison energy professionals by sharing responsibilities for their energy footprint and programs.

The program **goal** is to reduce IMCOM installations energy use index (EUI) by 2.5% annually through 2025 using 2015 baseline and reduce water 2% annually using 2007 baseline. Your Energy Manager will be able to show you the garrison’s baselines and progress.

**BEM Roles and Responsibilities:** Your primary responsibility is to help your organization buildings achieve federal mandates by raising awareness to building occupants and actively engaging in conservation measures with the installations energy team. Work with the Energy Manager to focus your efforts toward a common goal. As a Building Energy Monitor (BEM),your responsibilities include:

* Be appointed in writing by your unit to serve as BEM. Ensure you are trained within 60 days of being appointed and re-trained annually.
* Initiate and follow-up on work orders for low-cost maintenance and energy conservation measures (ECMs) and ensure your organization is complying with applicable Energy Efficiency and Water Policy requirements.
* Monitor the operation of your building and ensure all operations involving energy and water use are reviewed and consider all reasonable conservation measures that do not affect operations or quality of life.
* Ensure leadership is briefed on the status of the building(s) and is taking a proactive approach.
* Conduct energy inspections monthly in occupied buildings and bi-monthly in unoccupied buildings using the Building Walk Through Checklist provided by your Energy Manager. Maintain checklists for one year.
* Report change in occupancy, especially empty buildings due to deployments. The Energy Manager will be able to adjust the buildings settings to reflect the new usage levels.
* Ensure the Energy Managers BEM database is current with: Name, contact info, unit, building(s) assigned to, date trained, and Date Estimated Return from Overseas (DEROS) date.
* If applicable, develop a way to track building performance and/or mock billing with your Energy Manager. Post these reports in a prominent location.

To do your job, you will need to know something about water and energy-consuming components of a building and how they can work more efficiently. The concepts in this handbook will help you get some ideas for ECMs. Keep in mind that this handbook may be supplemented with local policies and unique ECMs for your garrison.

When you discover an ECM, you should discuss it with the Energy Manager. If it is technically sound, you might be requested to prepare and submit a work order or service order. If the idea requires a capital investment or is applicable to a broad range of buildings, the Energy Manager may manage the project.

Additionally, your organization can fund ECMs or perform self-help projects. However, coordinate with the Energy Manager and follow local policies. In addition it is recommended to obtain additional training outside the BEM program. There are numerous local and national programs that offer courses and certifications.

**Compliance:**

The Army is promoting an energy and water stewardship culture. Providing members with the mindset and skills necessary to use energy and water more efficiently and effectively, thus contributing to increased performance in accomplishing Army missions. A culture of energy and water stewardship enhances the Army’s ability to project power and to operate in austere environments in response to unforeseen contingences. The follow are the current key Army Policies and Regulations.

* Energy Security and Sustainability (ES2) Strategy (2015)
* Energy Independence and Security Act of 2007 (EISA07), Section 432, dtd 19 Dec 07
* Energy Policy Act of 2005 (EPAct05). dtd 8 Aug 05
* Executive Order 13514 – “Federal Leadership in Environmental, Energy and Economic Performance” dtd 5 Oct 09
* Executive Order 13693 – “Planning for Federal Sustainability in the Next Decade” dtd 25 March 2015
* AR 420-1, Army Facilities Management, Rapid Action Revision (RAR), dtd 24 Aug 12
* Memorandum from ASA (IE&E), Sustainable Design and Development Policy Update, dtd 17 Jan 2017
* Memorandum from ASA (IE&E), Energy and Water Goal Attainment Responsibility Policy for Installations Update, dtd 13 Jan 2017

# **C:\Users\truett.d.sanchez\Desktop\homepage_banner.pngCHAPTER 2: Net Zero Initiatives**

Army Net Zero is a holistic strategy founded on long-standing sustainable practices and incorporates emerging best practices to manage energy, water, and solid waste at Army installations. The intent of the Army Net Zero Initiative is to enhance mission effectiveness and increase installation resiliency. The Net Zero initiative directly supports the Army’s Energy Security and Sustainability (ES2) Strategy. Net Zero aligns with the ES2 roadmap to foster a more adaptable and resilient force that is prepared for a future defined by complexity, uncertainty, adversity, and rapid change.

The Army defines “Net Zero energy” as an installation that achieves the following:Reduce overall energy use, maximize efficiency, implement energy recovery and cogeneration opportunities, and then offset the remaining demand with the production of renewable energy from onsite sources, such that the Net Zero energy installation produces as much renewable energy as it uses over the course of a year.

The Army defines “Net Zero water” as an installation that achieves the following:Reduce overall water use, regardless of the source; increase efficiency of water equipment; recycle and reuse water, shifting from potable water use to non-potable sources as much as possible; and minimize inter-basin transfers of any type of water, potable or non-potable, such that a Net Zero water installation recharges as much water back into the aquifer as it withdraws.

The Army defines “Net Zero waste” as an installation that achieves the following:Reduce, reuse, recycle/compost, and recover solid waste streams, converting them to resource values, resulting in zero landfill disposal.

**CHAPTER 3: Energy Awareness\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

To be successful, a Building Energy Monitor Program not only requires your hard work, dedication, and commitment, but also support at all levels. Discuss with your Energy Manager actions that may be appropriate for your building.

* **Develop a BEM Action Plan.** After reviewing this handbook, discuss with your Energy Manager what would be appropriate for your building, and outline a brief action plan with priority ECM’s for your building.
* **Set up a suggestion box for personnel to submit energy and water-saving ideas.** This gets everyone involved. If possible set-up a reward system to go along with the suggestion box. This award can be in the form of DFMWR credits, unit awards or some other type of incentive - be creative!
* **Conduct joint building energy audits.** Get your organization involved by having occupants join you on energy walkthroughs. These walkthroughs can also provide “up close and personal” contact with building personnel. This in return enhances energy awareness to a larger audience and encourages others to submit their ideas and voice their concerns.
* **Follow through with actions based on the results of your energy audits.** Self-help jobs, service calls, or “attitude adjustment” initiatives are developed by the BEM/EM team based on list generated during monthly walkthroughs. Extensive project scope deficiencies and/or recommendations are also identified for potential future development.
* **Keep your building occupants informed of the issues and your garrison goals, objectives, programs, and events**. Some garrisons establish a comprehensive network of BEMs to serve as focal points for distribution of information, data gathering and feedback. The BEM network ensures distribution of awareness materials to military and civilian personnel. This network of building supervisors, energy monitors, and building engineering teams can be engaged to circulate posters and flyers, and prepare Energy Awareness articles.
* **Visually post your progress and goals.** Develop bulletin board messages, Plan-of-the-Day/Plan-of-the-Week messages and/or e-mail messages to educate, inform and motivate your building’s occupants.
* **Celebrate Energy Action Month and Earth Day.** What better times to promote energy and water efficiency than October, Energy Action Month and Earth Day, 22 April. These events provide another opportunity to promote energy and water efficiency as part of our environmental responsibility and stewardship. Check with your Energy Manager to see if any of these awareness programs are in place and how you can be included.

**CHAPTER 4: Building Envelope\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The building envelope is the physical separator between conditioned interior space and the exterior environment. It insulates against air, water, heat, light and noise. Heat is lost or gained due to air entering or leaving a building through cracks around doors, windows and outside shell of a building. This not only causes discomfort to occupants it is a major contributor to unnecessary heating and cooling costs. The following ECMs will help reduce the rate of infiltration in your building and associated energy use.

* Ensure all doors and windows are closed when actively conditioning occupied spaces (signs help to remind occupants to close doors). Ensure cracked or missing windows are reported and immediately repaired.
* Keep doors closed between unheated/uncooled rooms and conditioned areas. Ensure these doors are properly insulated.
* Ensure loading dock doors are closed when not in use and have dock curtains installed.
* Periodically check weather stripping and caulking. If you can see light or feel a draft, then it needs to be corrected. If caulking is old, dried, peeling or missing have it repaired.
* Report roof leaks and any water/ wind intrusions.
* Inspect for air leakage in and around electrical outlets. Rubber inserts are generally available through self-help to seal any leaky outlets.
* If the building is drafty, check to see if there is insulation in the attic, walls and elevated floors.
* Check for cracks or openings outside the building. Inspect joints where the foundation meets the siding or wherever exterior walls are penetrated by pipes, ducts and conduits. Such openings are candidates for caulking.
* If your building has many entrances, suggest closing some off, fire codes permitting. Likewise, ensure fire exits are not propped open or used as general exits. If these are not alarmed, consider adding a door alarm.
* If your building has window air conditioners (if permitted by local policy), make sure that they are covered and vents are closed during the heating seasons or have them removed whenever possible.
* If people continuously leave their windows open during the heating or cooling season, then this is an indication that the heating or cooling control system may be broken and needs repair.

**CHAPTER 5: Heating, Cooling and Ventilation\_\_\_\_\_\_\_**

Heating, ventilating and air conditioning (HVAC) systems can be the largest energy consumers in buildings. Air brought into your building must be heated, cooled or humidified/ dehumidified. If more air is conditioned than is needed, it translates into energy waste. Since HVAC systems can be complex, the following suggestions should be considered as guidelines only, and any major changes must be approved by the DPW.

The figures below show temperature ranges per current policy, however check with your Energy Manager for any supplemental policies.

FIGURE 5.1 – HEATING TEMPERATURE SETTINGS

|  |  |  |
| --- | --- | --- |
| **HEATING** | | |
| **Type of Room** | **Occupied Temp** | **Unoccupied Temp** |
| Occupied Working and Living Spaces | 68°F + /- 2°F | 55°F + /- 5°F |
| Warehouses and Maintenance Bays Spaces (if frequency occupied on a daily basis) | 60°F + /- 5°F | 45°F + /- 5°F |
| Warehouse Spaces (if infrequently occupied on a daily basis, and does not need freeze protection) | Do Not Heat | Do Not Heat |
| **IAW ASA(IE&E) Energy and Water Goal Attainment Policy, dtd 13JAN17** | | |

FIGURE 5.2 – COOLING TEMPERATURE SETTINGS

|  |  |  |
| --- | --- | --- |
| **COOLING** | | |
| **Type of Room** | **Occupied Temp** | **Unoccupied Temp** |
| Occupied Working and Living Spaces | 78°F + /- 2°F | 85°F + /- 5°F |
| Storage, equipment rooms, garages | Unconditioned | Unconditioned |
| **IAW ASA(IE&E) Energy and Water Goal Attainment Policy, dtd 13JAN17** | | |

General Tips:

* Check with your Energy Manager to see if your building has a utility monitoring and control system (UMCS). If so get read-only access or building usage report.
* Coordinate with the Energy Manager to establish your buildings heating/cooling schedule. Understand these settings and educate occupants.
* Ensure proper controls/ thermostats are installed in order to operate your building efficiently. Ensure installed equipment is operating properly, not broken or tampered with.
* Ensure thermostats in your building are tamperproof. Install cover locks if necessary. Educate occupants on Army regulated temperature settings.
* Turn down heating/cooling systems during unoccupied times or contact UMCS operators if the office will be unoccupied for a considerable period of time.
* If building is used after-hours, ensure occupied areas are limited. This assures the entire building is not unnecessarily conditioned.
* Ensure air vents and intakes are not obstructed and lines have proper insulation. Check for leaks and faulty maintenance.
* If occupants complain about cold/ hot areas suggest they rearrange their rooms to place desks away from exterior walls and windows that may cause drafts.

Heating Tips:

* Space heaters are prohibited unless approved by the DPW.
* Radiator or heater registers shall be shut off completely in vestibules, corridors, stairwells and lobbies unless necessary for freeze protection.
* If you notice any steam or hot water leaking from the heating system, immediately inform the Energy Manager. Such leaks can mean substantial energy losses.
* If the winter sun is shining on a window use it to partially heat the room. On the other hand, when the winter sun does not shine on windows draw the drapes, shades or blinds to help insulate the room.
* Periodically check to see that windows are tightly closed in winter. Speak to occupants with windows open to see if a demand maintenance order is needed to fix a building issue or educate the building occupant on how their actions are contributing to unnecessary energy waste.
* Keep the windows clean to permit maximum sunlight transmission during the winter.

Cooling Tips:

* If cool outdoor air is available, consider cooling building during the night and early morning hours using only the outside air with A/C off (if humidity levels permit).
* During hot weather, adjust blinds, drapes or shades to prevent sunlight from heating the building. Treat skylights as you would a window.
* Schedule clothes washing and drying in cool morning hours. This also reduces installation electrical demand contribution.

Ventilation Tips:

* Suggest that ventilation units operate only as needed. Consider shutting them off to any area that will remain unoccupied.
* Do not block the ventilation system with cardboard, plastic bags, or other items in an attempt to change the amount of air flow. Engage with the Energy Manager to learn how dampers on heating and cooling systems should be set for a particular season.
* Periodically inspect the condition and operation of outside air dampers. Faulty operation or bad fit causes loss of heated or cooled air. Keep foliage and plants out of air intakes and air exhausts.
* Engage with the Energy Manager to investigate the possibility of installing time clocks or motion detecting sensors in common use areas such as restrooms so that the fans and lights are not energized all the time.
* Check crawl space ventilators to assure they are open in the summer and closed in the winter.
* Know your maintenance schedule to ensure that filters and systems are being serviced timely.

NOTE: If odors or other symptoms of poor ventilation become apparent, bring them to the attention of the DPW.

**CHAPTER 6: Water\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Hot water generation and consumption can account for 10% of a building’s energy use, more if your building has dining, cafeteria or laundry facilities. There are many opportunities for saving energy, but most will require the installation of new equipment. This work should be done together with your Energy Manager. Hot water temperature is governed by Army Regulations, Energy Directives, and local laws. Check with your Energy Manager to obtain the proper temperatures for your building.

Usually hot water is supplied at a temperature that is too hot to be used directly. Cold water must be mixed with it at the tap. Here are some possible energy savings tips:

* Check with the Energy Manager to see if the DPW can reduce hot water temperature for domestic, administrative, or general cleaning. Sometimes boosters can be installed where temperatures must be higher (i.e. dishes, laundries, etc.)
* Ensure all sinks and showers have low flow aerators. Flow rates shall be 0.5 gallons per minute (GPM) for public lavatory faucets, 1.5 GPM for private lavatory facets (such as barracks, housing) and 2.0 GPM for showers. Most aerators have flow rates marked on them.
* Toilets flush cycle shall be 1.6 gallons per flush (GPF) and urinals shall be 1.0 GPF not to exceed 4 to 5 seconds.
* Check to see if self-closing or automatic sensor faucets can be installed.
* Check toilets for leaks. Any sounds or movement of water, when the toilet is not being flushed, is an indicator of a water leak.
* Inspect and have insulation repaired on hot water piping and tanks.
* Report any leaking faucets, toilets, urinals, showers or water fountains.
* Shut off the hot water pumps when the building is unoccupied.
* Report unauthorized use of external watering.
* Report leaking fire hydrants.

**CHAPTER 7: Lighting\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

There are many possible ways to save on lighting energy. It is especially important for you to recognize that major alterations to the lighting system can have impacts on the HVAC.

Before making suggestions, you must recognize that lighting is a system. Many elements are interrelated. While energy can be conserved by properly implementing suggestions offered below, these actions should be taken only after you look into the effects on the entire system.

* The #1 action for light energy reduction is: **TURN OFF LIGHTS WHEN NOT IN USE!**
* Incandescent bulbs are **NOT** allowed and shall be replaced with compact fluorescents lights (CFL) or light Emitting Diodes (LED).
* Ensure all switches are placed in visible locations so that occupants will remember to turn off the lights.
* Eliminate lights if not needed in storage rooms and delamp vending machines and bulletin boards. Reduce lights in meeting rooms and unassigned areas (as local policy and safety allows).
* Ensure lights are turned off when the building is unoccupied except those needed for security and emergency egress.
* Automatic lighting controls may need to be recalibrated. If lighting controls are not working properly, inform the DPW.
* Lighting fixtures, especially around fluorescent lamps, should be kept clean.
* Interior building walls should be kept clean and painted using light colored paint. If your building is undergoing renovation, use light colors for walls and floors to improve the reflected light.
* If your building has many high partitions, you might look into or consider the potential for lowering them and “sharing” the light among the occupants.
* To make maximum use of daylight be sure windows and skylights are clean and cleared. Appropriate use of this source will save electrical energy, decrease the heating requirements and generally not increase the building cooling load.
* Check blinds, drapes, and shades – open them to improve the use of daylight, but don’t forget how this may affect the cooling system.
* Ensure building occupants use “task” lighting rather than overall room illumination. This gets more of the light where you actually need it rather than lighting the whole room. Task lights shall use CFL or LED bulbs, not incandescent lights.

The following requires assistance from your Energy Manager to help with a survey and the detailed calculations that may be needed. Your energy manager can give you guidance on proper lighting levels.

* Ensure there are no incandescent lights installed in your building (inside and outside). These lights are not allowed. This includes incandescent lights installed by employees in personal lamps.
* Just removing tubes from a fluorescent light does not stop the light from using electricity. The ballast, a small transformer that provides the high voltage necessary to strike the tube, needs to be disconnected. Submit a work order or contact the Energy Manager to have them removed.
* Lights in corridors may be eliminated without a significant reduction in lighting levels.
* Ensure all restrooms, hallways, storage rooms are equipped with motion sensors.
* Conduct a walkthrough of the outside of the building to ensure outdoor lights are off during the day. Ensure outdoor lights such as athletic fields and athletic courts are off when not needed. If outdoor lights are on switches, request that they be put on light sensors or motion sensors.
* In many areas of a building, for example storage and corridors, the existing lights can be replaced with lower wattage lights or delamped.
* Ensure burnt out lights are replaced with high efficiency lights, including LED retrofits.
* Request the installation of dimmers to take advantage of daylighting.
* Some areas with available daylighting may be good candidates for light dimming systems that adjust the electric lighting with the amounts of natural daylighting.

**CHAPTER 8: Office and Other Electrical Equipment\_\_\_**

Office equipment is often overlooked when energy conservation measures are implemented.

* All equipment is required to be Energy Star rated and have a sleep mode. Purchase of equipment that does not meet Energy Star or Federal Energy Management Plan (FEMP) designation is not authorized. Scanners, copy machines, faxes, printers and other such equipment shall be programmed with sleep modes to activate automatically when not in use.

* Energy used for computers should be minimized by following the installations National Electrical Code (NEC) and garrison computer shut-off policy.
* Scanners, copy machines, printers and other such equipment shall be turned off at the end of every work day, on weekends and holidays. Eliminate or unplug office equipment no longer being used or rarely used.
* Conduct all business electronically. Reduce the number of printers serving a work area. Only make photocopies or print documents as necessary.
* Eliminate and remove all unauthorized refrigerators, microwaves, coffeepots, space heaters, and other appliances that service only one or two persons. Permit only the quantity of appliances needed for the number of personnel. Turn off or unplug all office/home appliances when not in use for extended periods of time.
* Refrigerators are authorized in work and office areas for area use with sizing based on number of personnel supported. Use one cubic foot per person as an average to determine size and quantity of refrigerators that are appropriate. Refrigerators in work areas and offices intended for only one person’s use are prohibited. Exceptions allowed for general officers and commanders who have conference room meeting requirements that justify the single use.
* Remove non-Energy Star appliances from the workplace. Remove non-complying appliances from the building so that they do not simply move to another office.
* Unplug unused electronics. Electrical devices use electricity even when the device is off. The use of power strips or “smart” power strips can help turn off equipment.

# **C:\Users\truett.d.sanchez\Desktop\homepage_banner.pngCHAPTER 9: Specialty Buildings\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

There are many special buildings in the Army inventory which have unique needs and requirements. These include laundries, computer facilities, kitchen, etc. The energy conservation techniques suggested in the preceding sections will work in these buildings, but some specialized techniques and things to look for are necessary. We discuss some of them in this section.

**Laundry:** The laundry is obviously a major consumer of hot water for washing and hot air for drying. There are many opportunities for energy conservation but most will require detailed assistance from the Energy Manager. If these ideas look feasible to you, be sure to suggest them to the Energy Manager so that appropriate analyses can be carried out.

* Combine operations to reduce the number of washers and post signage to encourage washing of full loads.
* Many laundries have installed heat recovery devices. While these devices have a high capital cost, it is often recaptured with the savings in energy.
* Use cold water detergents.
* Be sure that filters are cleaned regularly. Keep the basket and the working parts of the washer clean for maximum efficiency.
* Suggest that clothes be sorted according to type and run washers on the minimum cycle necessary for clothing to become clean. Set timers appropriately.
* Clean lint screens and exhaust blowers at least twice each day.

**Computer Facilities (Data Centers):** Computers often need very particular environmental conditions for their efficient operation. However, these are often not followed completely. Doing so can save energy for the installation.

* Ensure Energy Star equipment is installed in both data centers and personal computers and equipment (if applicable).
* Check the manufacturer recommendations for temperature levels and humidity requirements and see if they are followed. Ensure your IT personnel are involved in this process.
* Lower lighting levels to those recommended by the manufacturer or lighting code.
* Don’t confuse main frame computers with personal computers. Each have different operating requirements. Turn off personal computers when not in use according to local policy.

**Kitchens and Dining Facilities:** These types of buildings, located throughout the installation, are major consumers of energy. Whether they are in the Post Exchange or the Officer’s Club, savings can often be obtained. Again, analyses will often be required; check with the Energy Manager.

* Suggest the reduction or possible elimination of humidification.
* Exhaust fans serving kitchens are often interlocked with outside air fans or dampers. Be sure the staff shuts down the entire system when not needed.
* Combine cooking areas together to reduce ventilation needs.
* Dishwashers are major consumers of hot water. Often the hot water delivery temperature is set for this equipment. Recommend that the overall temperature be dropped and then use a booster if necessary for dishwashing.
* Avoid keeping infrared food warming lamps on when no food is being kept warm.
* Kitchen equipment shall be Energy Star rated where applicable.

**Maintenance Bays/ Shops:** These types of buildings use heavy electrical equipment for repair and construction. The guidance listed throughout this handbook will help reduce the energy and water waste.

* Identify leaks in compressed air systems. The compressor should not be running when there is no compressed air activity. Report leaks and ensure faulty air tools are repaired, replaced or disconnected from system when not in use.

# **C:\Users\truett.d.sanchez\Desktop\homepage_banner.pngCHAPTER 10: Troop Deployments**

When troops deploy and facility utilization drops below 50%, certain ECMs become economical. The DPW will have a procedure in place to manage these building(s). The BEM will play an important role to help ensure energy and water conservation measures are implemented. The following applies:

* Conduct energy inspections bi-monthly in unoccupied buildings using the Building Walk Through Checklist provided by your Energy Manager. Note: This may be a different checklist.
* Rear detachment shall have trained/ appointed facility manager(s) who shall act as BEM and will be the point of contact for vacated/ affected facilities. Garrison representative(s) shall walk the facility with the BEM(s) pre- and post-deployment, and as needed.
* Utilize the low occupancy rate to take advantage of facility improvements before the deployed unit(s) returns.
* Ensure the building is watertight.
* Ensure all personal equipment is unplugged, including defrosting refrigerators and ice makers, washers/ dryers, microwaves, coffee pots, etc.
* If possible, have utility companies or DPW, as appropriate disconnect, shut off, or fully inspect the water, gas, and electric lines. Close all gas and water valves and ensure drains are plugged to prevent any sewer gas backup.
* Ensure vending machines are emptied and unplugged or removed.
* Ensure all office equipment (printers, monitors, copiers, non-essential computers, etc.) is unplugged or removed. Best practice is to redistribute computers and printers, or declare them as excess property for disposition by Units Property Book Office.
* Contact the units IT specialist to see if routers and servers can be powered down.
* Heating, Ventilation, and Air Conditioning (HVAC) systems shall not be set to comfort temperatures. Instead, maximize energy savings and avoid damage by setting the temperatures back to no less than 85F for air conditioning and 55F for heating. If automated controls are not installed, activate procedures for manual adjustment of all heating and cooling equipment at the end of every work day and for any periods an area is unoccupied during work hours. Ensure that the building is ventilated and humidity is controlled according to local environmental requirements.
* For water systems, turn off gas, electricity, and water service to the water heaters, circulating pumps, and drain. If possible, close the water valves to thetoilets, sink fixtures, and exterior faucets. Ensure exterior lines are empty to avoid freezing. Ensure drains are plugged to prevent any sewer gas backup.
* Ensure all lights in unoccupied areas are turned off. If the building is vacant, then the lights can be turned off at the circuit breakers or with the utility company. Ensure daylight sensors or timers are adjusted or deactivated.
* Ensure parking areas used only for the deploying units are evaluated for either reduction in lamps or adjusted to the operation hours.
* Ensure the building is properly ventilated. If applicable open interior doors for ventilation purposes.
* Has the facility been checked within the last 2 months or more frequently depending on local prevalence of mold for interior dampness or excessive humidity?
* When units are about to return, ensure Power/ Water/ Gas is restored. Reset occupied temperature controls. Often reactivated buildings take time to restore normal heating and cooling conditions, and if not monitored can over/under heat and cool.

# **C:\Users\truett.d.sanchez\Desktop\homepage_banner.pngCHAPTER 11: Online Resources\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Army Energy Program**

Provides information and links regarding the strategic energy security goals of the Army’s Energy Security and Implementation Strategy

*http://army-energy.hqda.pentagon.mil*

**Department of Energy (DoE)**

Offers an overview of the DoE’s efforts across the United States

*http://www.energy.gov/*

**Energy Efficiency & Renewable Energy (EERE)**

Focuses on efficiency and renewables and describes competitions, successes, manufacturing initiatives, etc. Also shares important information about energy-saving homes and buildings, and renewable electricity generation

*http://www.eere.energy.gov/*

**Energy Saver**

Collects energy tips, articles, and guidance on energy savings to include lighting, heating and cooling, building envelopes, seasonal instructions, and more.

This resource is a valuable link to share with those who are being taught how to save energy and money through efficient habits

*http://energy.gov/energysaver/*

**Federal Energy Management**

**Program (FEMP)**

Focuses on energy used in federal facilities, with an eye for changing the behaviors of entire organizations to increase efficiency. The site includes educational materials, laws and regulations, and training modules

*http://www1.eere.energy.gov/femp/index.html*

**U.S. Energy Information**

**Administration**

Provides independent statistics and analysis of the status of energy — fossil fuels, renewables, utilities, and more — across the United States

*http://www.eia.gov/*

**Environmental Protection**

**Agency (EPA)**

Shares important information related to initiatives such as the Clean Power Plan and national water issues, with additional focus on how energy use impacts the environment

*http://www.epa.gov/*

**ENERGY STAR**

Features tools to build energy management programs, improve building performance, earn recognition for energy efforts, and learn more about ENERGY STAR products and how they can be used

*http://www.energystar.gov*

**American Council for an Energy- Efficient Economy**

Shares extensive information about energy policy, energy efficiency in buildings, and opportunities for behavior change

*http://www.aceee.org/*

******APPENDICES\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**APPENDIX A: Sample Appointment Letter:**

*Office Symbol Date*

MEMORANDUM FOR*Employee Name*

SUBJECT:Appointment Orders for Building Energy Monitor (BEM)

1. EFFECTIVE: On *Date* , the following personnel are appointed as the BEM for *unit/organization name/building number*.

2. PURPOSE: To manage, implement, and execute the BEM requirements within this Command/Organization.

3. REFERENCES:

a. Army Regulation 420-1 Army Facilities Management, Rapid Action Revision (RAR) 24 August 2012.

4. PERIOD: Until officially released from appointment or reassigned.

5. SPECIAL INSTRUCTION: Appointed individuals must be familiar with the overall operation of their respective unit/organization, energy conservation regulations and have computer access.

6. RESPONSIBILITIES: The BEM is responsible to attend the annual training given by the Energy Manager, to keep the BEM checklists completed in their files and to participate in and fully support the installation’s BEM program.

7. POINT OF CONTACT: *Name*, *telephone number*.

SIGNATURE BLOCK\*

*\* Should be signed by someone at a supervisory level above the BEM who has authority over the operational area that the BEM is being appointed to manage.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Building Energy Manager (BEM) Checklist** | | | | | |
| **BUILDING # BEM NAME: DATE** | | | | | |
| **BEM E-MAIL: BEM PHONE NUMBER(S):** | | | | | |
| **Assessment Areas** | **Y** | **N\*** | **NA** | **CORRECTIVE ACTION\*\*** | **Location and Comment** |
| **HEATING AND COOLING** |  |  |  |  |  |
| 1. Are unused areas and rooms closed off? |  |  |  |  |  |
| 2. Are air conditioners turned off after normal hours? |  |  |  |  |  |
| 3. Are air conditioning or heating vents unobstructed? |  |  |  |  |  |
| 4. Are exterior doors closed? |  |  |  |  |  |
| 5. Are windows closed? |  |  |  |  |  |
| 6. Are radiators off in stairwells and vestibules? |  |  |  |  |  |
| 7. Are window air conditioners covered during the heating season? |  |  |  |  |  |
| 8. Are plants and foliage distanced from air intakes and exhausts? |  |  |  |  |  |
| 9. Is the thermostat undamaged, properly set, and calibrated? |  |  |  |  |  |
| 11. Are radiators clean? |  |  |  |  |  |
| 12. Are air filters clean? |  |  |  |  |  |
| 13. Are pipes in good condition (no visible steam leaks)? |  |  |  |  |  |
| 14. Are pipes fully insulated? |  |  |  |  |  |
| **BUILDING** |  |  |  |  |  |
| 1. Are windows/doors in good shape (not broken)? |  |  |  |  |  |
| 2. Is exterior door aligned? |  |  |  |  |  |
| 3. Is caulking around windows, doors and exterior joints smooth (not cracked)? |  |  |  |  |  |
| 4. Is there functioning weather stripping around windows and doors? (Tight building envelope) |  |  |  |  |  |
| 5. Do windows have shades/curtains? |  |  |  |  |  |
| 6. Does outside air intake damper close tight? |  |  |  |  |  |
| 7. Do exhaust air outlet(s) have damper(s)? |  |  |  |  |  |
| 8. Are there any roof leaks? |  |  |  |  |  |
| **LIGHTING** |  |  |  |  |  |
| 1. Are lights turned off in unoccupied areas and occupancy sensors used where possible? |  |  |  |  |  |
| 2. Are lights turned off when daylight provides sufficient lighting? |  |  |  |  |  |
| 3. Are exterior lights turned off during the day? |  |  |  |  |  |
| 4. Is task lighting optimized to avoid unnecessary overall room illumination? |  |  |  |  |  |
| 5. Have unnecessary lights been removed (i.e., over stacks of supplies or equipment)? |  |  |  |  |  |
| 6. Are walls and/or windows clean? |  |  |  |  |  |
| **OTHER ELECTRICAL** |  |  |  |  |  |
| 1. Is equipment turned off when not in use? |  |  |  |  |  |
| 2. Are personal heaters, coffee pots, refrigerators and other personal appliances eliminated? |  |  |  |  |  |
| 3. Are vending machines turned off during the weekend (where food spoilage is not a problem)? |  |  |  |  |  |
| 4. Are vending machines delamped (bulbs removed)? |  |  |  |  |  |
| 5. Are non-critical electrical equipment and major appliances turned off during peak demand hours (i.e., cell-phone chargers, computers not in use, |  |  |  |  |  |
| **WATER** |  |  |  |  |  |
| 1. Are faucets in repair (no leaks)? |  |  |  |  |  |
| 2. Is hot water pipe insulation in good condition? |  |  |  |  |  |
| 3. Is the hot water outlet temperature set correctly? |  |  |  |  |  |
| 4. Is hot water delivered only to critical areas? |  |  |  |  |  |
| 5. Are pipes in operational order (no steam/water leaks)? |  |  |  |  |  |
| 6. Is domestic hot water only circulated during occupied hours? |  |  |  |  |  |
| 7. Is the hot water tank insulation in good condition? |  |  |  |  |  |
| 8. Are dish washers and clothes washers run with full loads only? |  |  |  |  |  |
| 9. Are toilets in working order (i.e., no leaking)? |  |  |  |  |  |
| 10. Do showers have low-flow shower-heads? |  |  |  |  |  |
| 11. Do faucets have aeration devices installed? |  |  |  |  |  |
|  | | | | | |
| **\*Describe any negative findings ("NO's") in the Comments Column** | | | | | |
| **\*\*Corrective Action Code:** | | | | | |
| **1 - Building Energy Monitor (BEM) submits a work order; 2- BEM takes corrective action (Explain in Location/Comment Column); 3 - BEM contacts Energy Team/Energy Manager to take action** | | | | | |
| **ENERGY MANAGER NAME** | **ENERGY MANAGER E-MAIL** | | | | **ENERGY MANAGER PHONE NUMBERS** |

**APPENDIX B: Building Walk Through Checklist:**

**APPENDIX C: Acronyms**

ASA Assistant Secretary of the Army

BEM Building Energy Monitor

BTU British Thermal Unit

CFL Compact Fluorescent light

DEROS Date Employee Returns from Overseas

DPW Directorate of Public Works

ECM Energy Conservation Measure

EISA Energy Independence and Security Act

EM Energy Manager

ES2 Energy Security and Sustainment

F Fahrenheit

FEMP Federal Energy Management Plan

GPF Gallons per Flush

GPM Gallons per Minute

HVAC Heating, Ventilation and Air Conditioning

IE&E Installation, Energy and Environment

IMCOM Installation Management Command

LED Light Emitting Diode

NEC National Electrical Code

RAR Rapid Action Revision

UMCS Utility Monitoring and Control System