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BUILDING TECHNOLOGIES PROGRAM

# Assessing and Reducing Miscellaneous Electric Loads (MELs) in Banks

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Pacific Northwest NATIONAL LABORATORY

Commercial Building Initiative

BUILDING TECHNOLOGIES PROGRAM

# Assessing and Reducing Miscellaneous Electric Loads (MELs) in Banks

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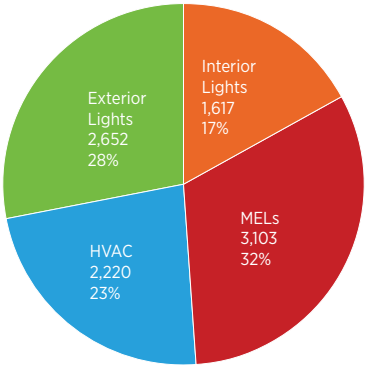
# Assessing and Reducing Miscellaneous Electric Loads (MELs) in Banks




Bank Branch Energy Shares from End-Use Data in a Cold Climate

Miscellaneous electric loads (MELs) are the loads outside of a building's core functions of heating, ventilating, air conditioning, lighting, and water heating. MELs are becoming an increasing fraction of total building energy use. The explosive growth in products that plug into an outlet coupled with increasing efficiency in core building functions has made MELs a larger percentage of total building energy loads.

Taken across the entire commercial building sector, MELs now account for roughly 30% of total energy use; this amounts to about 5% of all U.S. primary energy use (McKenney, 2010). Limited studies in bank branches conducted under DOE's Commercial Building Partnerships Program show that MELs energy use is consistent with other commercial buildings at about 30% of total building load. The pie chart to the left presents the energy loads found within a bank branch located in a cold climate.

This same study found the following equipment contributing to the MELs:

- Office computers and monitors
- Video displays including security monitors and televisions
- ATMs
- Printers, faxes, and copiers
- Teller stations
- Servers
- Refrigerators
- Coin deposit machines, and
- Vending equipment

### METERING MELS

The first step in metering plug loads is to select the right meter. At a minimum, the meter should be able to measure and log one week of electrical power (Watts) data at a sampling interval of 30 seconds. The meter should be designed for the type of circuit to be metered (e.g., 120 Volt, 15 amp, 60 Hertz). Also, the MELs in office buildings are numerous and varied, so the meter should be able to accurately meter loads of 0–1800 W. Other desirable features include an external display, an internal clock that timestamps each data point, an Underwriters Laboratories listing, and a way to transmit data to a local or remote repository.

The typical steps to meter a given plug load are:

1. Set up the meter to measure electrical power only at a sampling interval of 30 seconds.
2. Power down and unplug the device to be metered.
3. Plug the device into the meter. Plug the meter into an outlet.
4. If necessary, clear the memory on the meter and go through any other initial setup, such as setting the date and time.
5. Power on the device to be metered.
6. Meter the device for an entire typical work week. During that period, use the device as normal.
7. Calculate the average occupied and unoccupied hours load.


## Miscellaneous Electric Load Reduction Program Development

Reducing MELs in a bank setting requires both local and corporate action. Corporate action centers on activities to prioritize and allocate the right resources to correct procurement and central control issues. Local action includes branch assessment or audits to identify specific loads and needs. The worksheet at the end of this guide can help with cataloging needed information and estimating savings potential. The following steps provide a guide to MEL reductions in Bank Branches. The general process has been adapted from a process developed for office buildings the National Renewable Energy Laboratory (NREL, 2011).

### Step 1: Establish a Plug and Process Loads Champion and Team

The first step in addressing MELs in a low-energy building is to establish a MEL champion (or a team of champions) to initiate and help with the process. This person needs to understand technical energy efficiency opportunities and design strategies and be able to independently and objectively apply business model cost justifications. He or she must be willing and able to question the owner's operations, institutional policies, and procurement processes. Team members working with the champion may include individuals from bank branches and representatives from key corporate functions such as information technology (IT) and branding.

### Step 2: Develop a Business Case for Addressing Plug and Process Loads

To gain buy-in from all parties involved, especially the building owner, the champion must develop a business case for addressing MELs. In most projects, the business case will be the energy and cost savings associated with each strategy. The business case gives all parties a financial incentive to investigate MELs and pay close attention to mass-distributed items and large load, low quantity, continuous use items.

### Step 3: Benchmark Current Equipment and Operations

An energy audit needs to be performed to establish a baseline of MELs and operations. The audit may include metering to measure specific loads and to establish operating schedules. The sidebar on the left describes the metering process. Manufacturers' specification sheets can be helpful in determining specified loads. The worksheet at the end of this document can assist in branch energy audits. The audit should include a survey of equipment contributing to MELs. Important data to collect include the following:

- Equipment type, make, model and age.
- Equipment nameplate energy use data, e.g., watts used during different modes of operation (if listed).
- Daily operating schedules—these data may be available though corporate IT or facilities departments.
- Daily utilization schedules—short of having metered data, these are best observed as how often equipment is fully energized yet not being use.

Once collected, these data should be assembled and grouped by either equipment type (e.g., all office computers) or area of use (e.g., break room/kitchen area). These groupings will be used to assess the potential for efficiency improvements by group or area.

### Step 4: Identify Occupants' "True" Needs

Assess occupant and task "true" needs. A true need, as opposed to a perceived need, is required to achieve a given business goal or an assigned task. Often occupants perceive that they must use a certain piece of equipment in a particular way to do their jobs; however, their perceived method may not be the most efficient.

To reduce MELs, the MEL champion must be willing to understand what employees produce as part of their jobs and what tools they require, but must also be diplomatic enough to help them do their jobs energy efficiently without making them feel their purposes are being questioned. Every employee, including those working in sensitive operations (e.g., security, information technology, upper management), must be accounted for. Each of these staff are potential allies in finding better ways to successfully accomplish tasks. Determining occupant needs will reveal any nonessential equipment that may be taken out of service.

### Step 5: Meet Needs Efficiently

Once the list of true occupant and institutional needs is determined, each must be met as efficiently as possible and combined with accurate use scheduling. Simply specifying ENERGY STAR® and EPEAT® equipment is not sufficient. These databases should be thoroughly reviewed and the most efficient equipment must be specified. ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy targeting energy efficiency and environmental stewardship. EPEAT (Electronic Product Environmental Assessment Tool) is a web based tool helping institutional purchasers select and compare computer desktops, laptops and monitors based on their environmental attributes.

Nonrated equipment must be researched to find the most efficient model, which should be turned off when not in use, if possible. Parasitic loads (energy that is being used while device is turned-off, but still plugged in) require special attention, even if the equipment is energy efficient. There will always a more efficient way to perform operations. This is accomplished by using more efficient equipment in a more efficient manner.

### Step 6: Turn It All Off

Most office buildings are unoccupied for two-thirds of the year. A key strategy in any MEL reduction program is to reduce energy use during non-business hours. Most energy use during non-business hours is generally wasted energy.

### Step 7: Adopt Corporate Policies

The day-to-day energy efficiency of any building depends largely on the decisions of occupants, facility managers, and owners, all of whom play key roles in whole-building energy consumption. For persistence of MELs savings a policy commitment should be made starting with corporate management and carried through to branch management and staff. Recruit and engage corporate leaders in areas such as IT, branding, and facilities management to help innovate and implement new processes and products. Policy directives should be enacted with the following goals:

- Equipment procurement—establish procurement guidelines for all MELs equipment of ENERGY STAR of better.
- Ancillary/personal electronic equipment—establish and enforce policies to eliminate the use of non-bank issued equipment (e.g., space heaters, coffee makers, refrigerators, etc.).
- Employee education—because MELs savings rely on staff interaction and awareness, an educational program should be developed to highlight activities and recognize actions and staff.

### Step 8: Address Unique Miscellaneous Electric Loads

Some equipment is not specified by the building owners or occupants. For example, outside contractors or vendors typically control food service areas. For such situations, the building owner should contractually require or provide the most efficient equipment available.

### Step 9: Promote Occupant Awareness

A crucial step in designing MELs for a low-energy building is to promote occupant awareness of efficiency measures and best practices, because MEL energy use is largely dictated by occupant behavior.

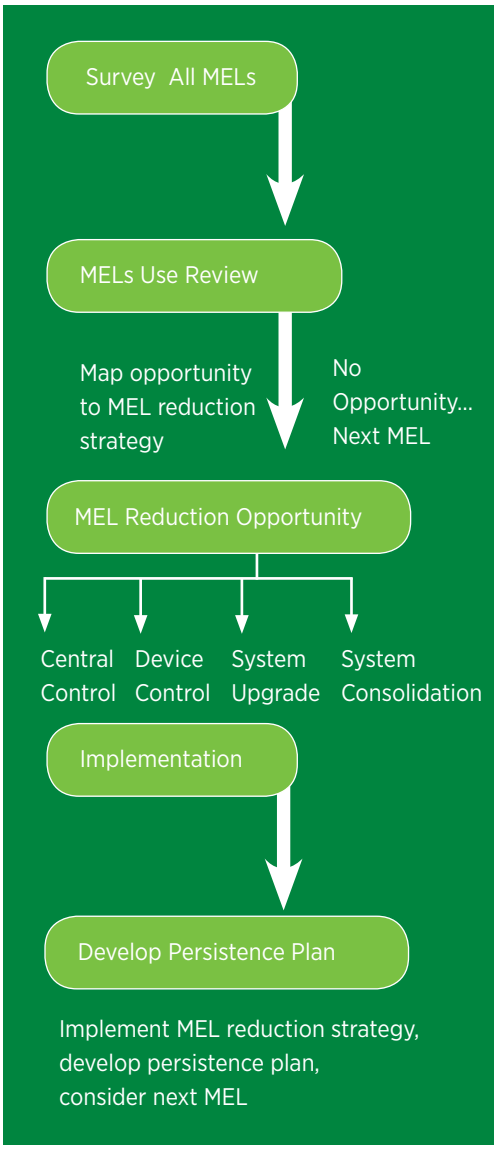
### Step 10: Address Plug and Process Loads in Design

New construction and renovation projects bring additional MEL reduction opportunities that the design team should address. The design team should question standard specifications, operations, and design standards that limit energy savings opportunities. One key role the design team plays in reducing MELs is maximizing space efficiency. This strategy increases the ratio of occupant use per building area or piece of equipment. By implementing space efficiency, the amount of equipment in the building is decreased. Break rooms, common print areas, and cafeterias typically have a high MELs density. With increased space efficiency, the number of these areas is decreased, equipment is more efficiently used, and MELs are reduced.

The design team has the opportunity to further reduce energy use by integrating MEL control strategies into the building's electrical system. Early in the design phase, the design team can build features into the electrical system to control the outlets at workstations and in common areas. This strategy can be as simple as installing switches, vacancy sensors, or timed disconnects for outlets, or as sophisticated as controlling outlets through the building management system.

The design team is typically responsible for specifying equipment such as elevators and transformers. Before elevators are specified, the stairs should be designed to be as inviting and convenient as possible. Elevators should then be carefully scrutinized to find the most efficient model. Some important features to look for are reduced speed, occupancy-controlled lighting and ventilation, and smart scheduling. Some projects may require the design team to specify general appliances such as refrigerators, dishwashers, and drinking fountains. To achieve greater energy savings, the most efficient equipment models must be specified.

The design team is also responsible for process cooling systems in areas with concentrated plug loads (such as server rooms and information technology closets). These systems should use, where applicable, economizers, evaporative cooling, and waste heat recovery. In server rooms, energy use can be further reduced through hot and cold aisle containment, which allows cold air supply temperatures to be higher than usual, thus reducing the process cooling load.




Flow diagram showing the process for Steps 3-10.

## Miscellaneous Electric Load Strategies by Bank Branch Major Use Areas

Strategies for affecting the energy use of MELs fall into one of four main categories:

- **Central Control.** With careful planning MELs be controlled from a remote location. Central control options include programmed control at the electrical service panel (motorized electrical breakers), control using a building automation/energy management system, or control over a network interface.

- **Device-Level Control.** The stand-alone control of MEL devices can offer efficiency savings through optimized device "on-time." Stand-alone control devices include equipment timers and/or occupancy-based controllers. These are generally focused on non-critical systems and appliances such as computer monitors and certain types of vending machines.
- **Equipment Upgrade.** With technology advances, notably in high-efficiency power supplies and electronic controls, many new MELs are benefitting from reduced power needs. Depending on power costs, some equipment may be cost-effective in an "early-replacement" scenario versus the typical "end-of-life" replacement.
- **System Consolidation/Equipment Removal.** There are certain MELs that lend themselves well to consolidation from numerous distributed (smaller) devices to one or a few centrally located (larger) devices. Included in this category are printers, faxes, and compact refrigerators.

The costs associated with improving MELs efficiency will vary with MEL and proposed strategy.

The **central control** strategy represents one of the most cost-effective MELs efficiency measure because of its potential to affect multiple systems with a single point of implementation. This measure is often applied to computers and other ancillary business equipment that are left on during non-business hours. Costs associated with this measure relate to the technologies that affect central control; dedicated circuit control, building automation, or networked services. Paybacks on the order of 2 years or less are common depending on the MEL and control type.

Controlling MELs at the **device level** offers the economic benefit of being selective in application and used in situations where central control is not an option. Capital costs of device-level control systems range from under $5 (timers) to about $100 (occupancy-based controllers). Paybacks vary with device controlled, but are typically under 3 years.

The **equipment upgrade** strategy can be the most capital-intensive option, but also may have the greatest energy savings potential. Costs associated with this option are directly related to the device being upgraded. The economics of this option are dictated by the remaining useful life of equipment being replaced. If the old equipment required replacement, the increment cost (efficient over standard technology) can be nominal resulting in a very quick payback. If replacement requires early retirement, the incremental cost should include the value of the remaining equipment life and can result in longer paybacks.

There is no better energy savings strategy than removing a connected load from a building's energy demand. The **system consolidation/equipment removal** strategy eliminates equipment through a consolidation approach. The capital cost and resulting economics depend on the type and numbers of equipment consolidated and the remaining useful life on equipment being replaced, but when distributed equipment such as printers or compact refrigerators are replaced with an efficient central device, the paybacks may be measured in months.

Strategies for specific bank branch areas are described in the following sections.

### Lobby Area

Increasingly, the lobby areas of banks are offering self-service amenities to customers. These amenities range from free coffee and internet kiosks to coin redemption/deposit devices and TV/video presentations. With these increased amenities (and resulting increasing electric loads), opportunities are presented to make equipment- and operational-efficiency decisions.

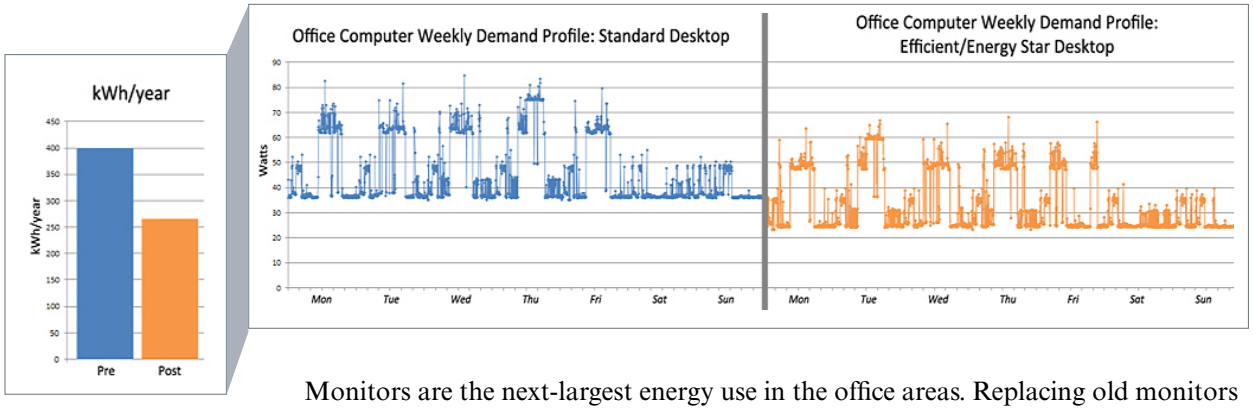
All relevant lobby-area devices should be specified as ENERGY STAR or better and be included in electric load management best practices, e.g., occupancy-based operation and night shutdown protocols.

### Office Areas

Bank office-area MEL use is typically dominated by desktop computers, monitors, printers, and possible fax/scanner devices. All these devices should be upgraded to ENERGY STAR listed equipment.

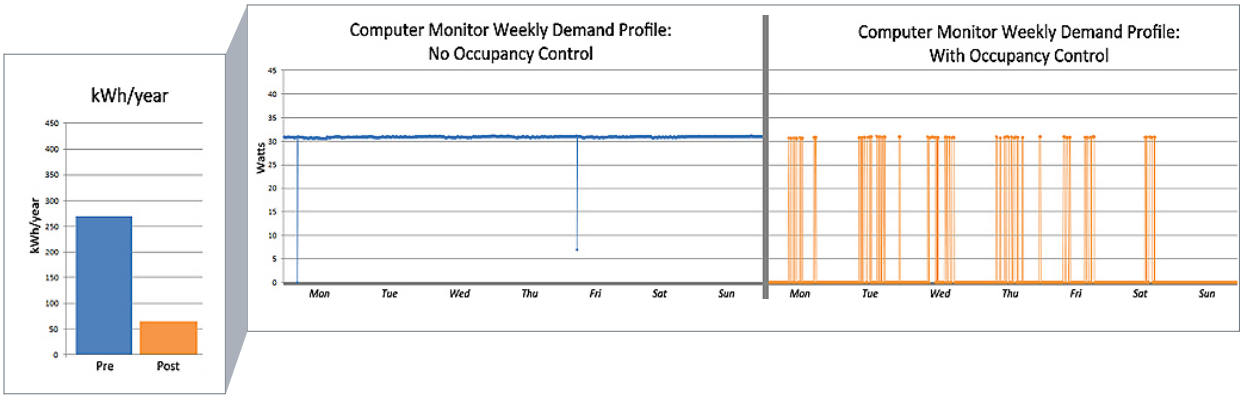
A standard desktop computer and monitor will use on average of between 350 – 450 kWh per year. Replacing desktop computers with the latest high-efficiency models can save between about 100 – 300 kWh per year. It is important to set the power options to save energy when the computer is not in use. Computers that sit idle or run screensavers when they are not being used waste considerable energy. The power options should be set so that the computer and monitor(s) go into standby or sleep mode after 10 or 15 minutes of idle time. The following figure shows the proposed benefit of installation of new efficient desktop computers.

Sample Energy Savings Potential From the Replacement of an Office Computer with a High-Efficiency Computer – 135 kWh/yr

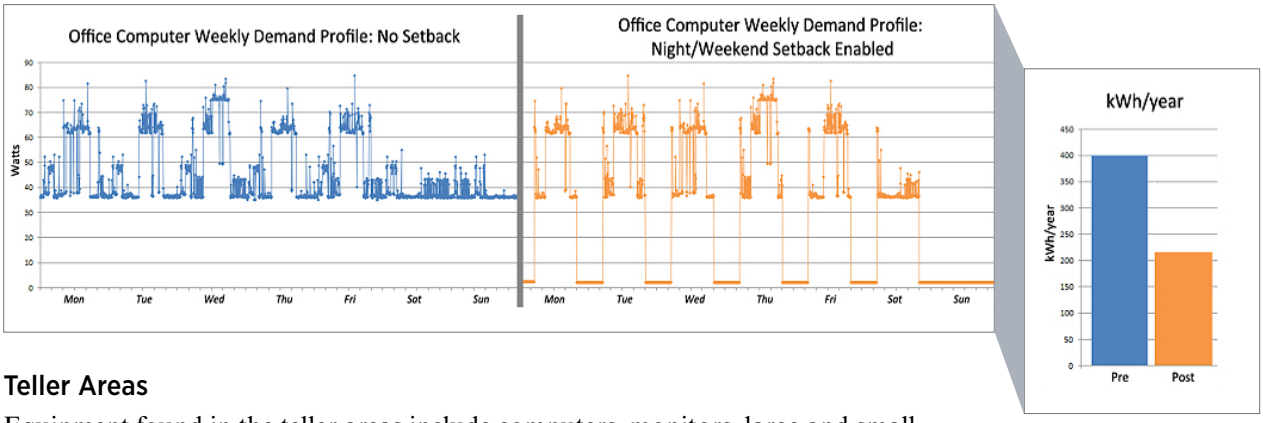



Monitors are the next-largest energy use in the office areas. Replacing old monitors with energy-efficient liquid crystal display (LCD) monitors saves energy. To achieve the greatest savings, light-emitting diode (LED) backlit LCD monitors should be used. The first figure below shows energy savings from adding a device level control to a computer monitor. The second figure shows the savings from adding a central control to a single computer.

Sample Energy Savings Potential From Occupancy-Based Device-Level Control of a Computer Monitor - 210 kWh/yr



Sample Energy Savings Potential From Central Night Shutdown of an Office Computer - 180 kWh/yr



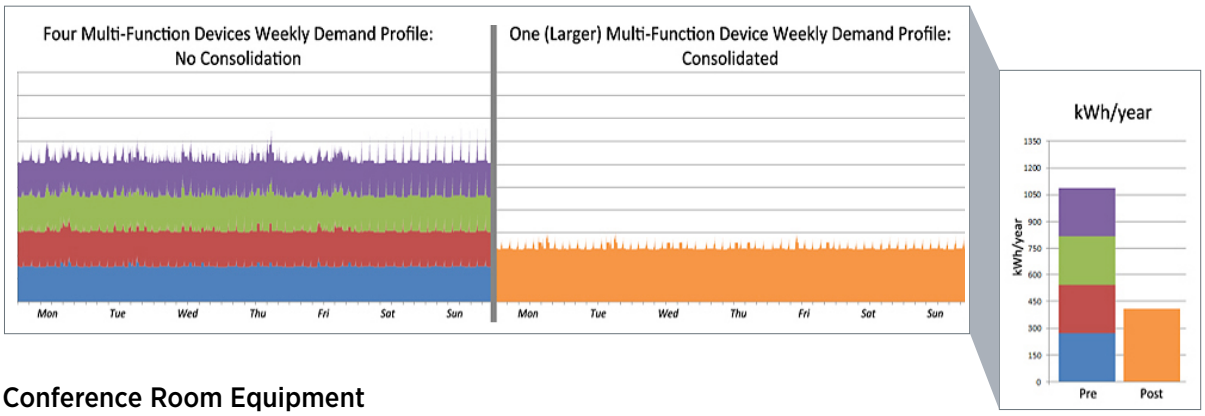

## Teller Areas

Equipment found in the teller areas include computers, monitors, large and small printers, check scanners, and money counters. Of these devices, computers and their monitors are usually the largest energy uses. Following the same recommendations provided above for ENERGY STAR and the highest efficiency equipment is recommended.

Where possible, teller loads should be connected to a power management surge protector power strip or centrally controlled. Local occupancy sensors, reduce or eliminate stand-by loads of all connected equipment when the space is unoccupied.

This figure shows potential energy savings from consolidating printers.

Sample Energy Savings Potential From Consolidation of Four Printers to One Central Printer - 1,000 kWh/yr




## Conference Room Equipment

Conference rooms can have widely varying uses and schedules. A key to MELs energy use reduction is to use controls that disconnect or turn off equipment when the space is unoccupied. Occupancy-based electrical outlet timers can be used to power down equipment during unoccupied and non-business hours. In addition to load control, the equipment installed in conference rooms should be energy efficient and ENERGY STAR listed where available.

### Network/Server Room

Strategies within bank network and server rooms focus on the procurement of the highest efficiency components, these include:

- Blade servers with energy-efficient power supplies and variable-frequency fans
- Uninterruptible power supplies with ratings of 95% efficiency
- ENERGY STAR rated monitors

### Break/Lunch Rooms and Kitchens

One of the largest single MELs opportunities is with refrigerators; inefficient refrigerators should be replaced with the most efficient and properly sized ENERGY STAR refrigerators. It is important to remove all personal mini-refrigerators and underused full-size refrigerators. A mini-refrigerator can use the same energy as a full-size refrigerator and an empty refrigerator can use as much or more energy than a full one.

Items such as coffee pots, toasters, and microwaves should be upgraded with units that have limited standby energy use from any lights or displays – these will be ENERGY STAR listed. In many cases, the lights and displays are not needed and waste energy. These items make good candidates for powering electrical outlet timers so they are powered down during unoccupied hours.

Vending machines can consume as much or more than a full-size refrigerator. The first step in vending machine savings is to remove underused equipment and to replace aging, inefficient vending machines with the most efficient ENERGY STAR models. Removing display lighting yields additional energy savings. One study (Deru et al. 2003) found that by combining a load-managing device with delamping could reduce energy consumption in vending machines by 45%–55%.

### Security Monitors

All old cathode ray tube (CRT) style security monitors should be replaced by LCD monitors.

## Recommended Miscellaneous Electric Load Energy Reduction Opportunities for Banks

The worksheet below was developed to help identify potential energy savings by reducing MELs – Step 3 in Bank Branch Assessment section.

For each strategy listed below, answer the question "Is your building doing this?" If the response is "NO" for any strategy, fill out the adjacent cells to the right to determine the total approximate savings that the given strategy could yield. Strategies that are listed without savings numbers are highly variable depending on the building being assessed.

Data used to generate the savings values are from the following references and first hand studies conducted in banks:

Deru, M., 2003; ECOS 2011; Esource 2008; Frank, S., 2010; Lobato, C., 2011; McKenney, K. 2010; NREL 2011; Navigant Consulting 2009; TIAX 2004.

# Recommended Miscellaneous Electric Load Energy Reduction Strategies for Banks

| Strategies | Is your building doing this? YES | NO | N/A | If you answered "NO," fill out these columns to determine the approximate savings in your building: Savings for 1 Piece of Equipment in kWh/year saved | | Quantity in Your Building | Total Approx. Savings for Your Building |
|---|---|---|---|---|---|---|---|
| **Lobby Area** | | | | | | | |
| Customer Kiosk Computer | | | | | | | |
| Replace existing Kiosk computers with high-efficiency/ENERGY STAR desktop computers. | ☐ | ☐ | ☐ | **135 kWh/year** for each Kiosk computer replaced with an ENERGY STAR model | 135 X | | |
| Enable night and weekend shutdown of existing Kiosk desktop computers (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **180 kWh/year** for each Kiosk computer with night and weekend shutdown enabled | 180 X | | |
| Computer Monitor | | | | | | | |
| Disable computer screen savers and enable the power option settings to standby after 15 minutes. | ☐ | ☐ | ☐ | **75 kWh/year** for every monitor with standby options enabled | 75 X | | |
| Lobby Television | | | | | | | |
| Replace standard TV with high-efficiency/ENERGY STAR TV. | ☐ | ☐ | ☐ | **440 kWh/year** for each television that is powered down nightly and on weekends | 440 X | | |
| Enable night and weekend shutdown of lobby TV (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **460 kWh/year** for each television that is powered down nightly and on weekends | 460 X | | |
| Coin Deposit Machine | | | | | | | |
| Enable night and weekend shutdown of coin deposit device (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **155 kWh/year** for every coin deposit machine with night and weekend shutdown enabled | 155 X | | |
| Printer | | | | | | | |
| Replace laser printer with ink jet/ENERGY STAR. | ☐ | ☐ | ☐ | **165 kWh/year** for every laser printer replaced with an ink jet/ENERGY STAR model | 165 X | | |
| Multi-Function Device | | | | | | | |
| Replace standard laser multi-function device with high efficiency/ENERGY STAR device. | ☐ | ☐ | ☐ | **105 kWh/year** for each laser multi-function device replaced with an ENERGY STAR model | 105 X | | |
| Enable night and weekend shutdown of existing multi-function device (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **115 kWh/year** for each multi-function device with night and weekend shutdown enabled | 115 X | | |
| **Teller Area** | | | | | | | |
| | | | | | | | |
| Enable night and weekend shutdown of teller station equipment: computer, monitor, check scanner, receipt printer (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **320 kWh/year** for every teller station with night and weekend shutdown enabled | 320 X | | |
| Computer Monitor | | | | | | | |
| Disable computer screen savers and enable the power option settings to standby after 15 minutes. | ☐ | ☐ | ☐ | **75 kWh/year** for every monitor with standby options enabled | 75 X | | |
| Automatic Currency (Bill) Counter | | | | | | | |
| Enable night and weekend shutdown of currency counter (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **95 kWh/year** for every currency counter with night and weekend shutdown enabled | 95 X | | |
| Printer | | | | | | | |
| Replace laser printer with ink jet/ENERGY STAR. | ☐ | ☐ | ☐ | **165 kWh/year** for every laser printer replaced with an ink jet/ENERGY STAR model | 165 X | | |
| Multi-Function Device | | | | | | | |
| Replace standard laser multi-function device with high efficiency/ENERGY STAR. | ☐ | ☐ | ☐ | **105 kWh/year** for each laser multi-function device replaced with an ENERGY STAR model | 105 X | | |
| Enable night and weekend shutdown of multi-function device (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **115 kWh/year** for each multi-function device with night and weekend shutdown enabled | 115 X | | |

| | Is your building doing this? | | | If you answered "NO," fill out these columns to determine the approximate savings in your building | | | |
|---|---|---|---|---|---|---|---|
| Strategies | YES | NO | N/A | Savings for 1 Piece of Equipment in kWh/year saved | | Quantity in Your Building | Total Approx. Savings for Your Building |
| **Office Area** | | | | | | | |
| Computer CPU | | | | | | | |
| Replace desktop computers with high efficiency/ ENERGY STAR laptop computers. | ☐ | ☐ | ☐ | **250 kWh/year** for each desktop computer that is replaced with a laptop | 250 X | | |
| Replace desktop computers with high-efficiency/ ENERGY STAR desktop computers. | ☐ | ☐ | ☐ | **135 Kwh/year** for each desktop computer replaced with an ENERGY STAR model | 135 X | | |
| Enable night and weekend shutdown of existing desktop computers (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **180 KWh/year** for each computer with night and weekend shutdown enabled | 180 X | | |
| Computer Monitor | | | | | | | |
| Replace CRT monitors with LED backlit monitors. | ☐ | ☐ | ☐ | **100 kWh/year** for every CRT monitor replaced with a LED backlit model | 100 X | | |
| Disable computer screen savers and enable the power option settings to standby after 15 minutes. | ☐ | ☐ | ☐ | **75 kWh/year** for every monitor with standby options enabled | 75 X | | |
| Printer | | | | | | | |
| Replace laser printer with ink jet/ENERGY STAR. | ☐ | ☐ | ☐ | **165 kWh/year** for every laser printer replaced with an ink jet/ENERGY STAR model | 165 X | | |
| Multi-Function Device | | | | | | | |
| Replace standard laser multi-function device with high efficiency/ENERGY STAR. | ☐ | ☐ | ☐ | **105 kWh/year** for each laser multi-function device replaced with an ENERGY STAR model | 105 X | | |
| Enable night and weekend shutdown of multi-function device (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **115 kWh/year** for each multi-function device with night and weekend shutdown enabled | 115 X | | |
| **Conference Rooms** | | | | | | | |
| Computer CPU | | | | | | | |
| Replace desktop computers with high efficiency/ ENERGY STAR laptop computers. | ☐ | ☐ | ☐ | **250 kWh/year** for each desktop computer that is replaced with a laptop | 250 X | | |
| Replace desktop computers with high-efficiency/ ENERGY STAR desktop computers. | ☐ | ☐ | ☐ | **135 kWh/year** for each desktop computer replaced with an ENERGY STAR model | 135 X | | |
| Enable night and weekend shutdown of existing desktop computers (daily shutdown 8 pm to 5am and all day Sunday). | ☐ | ☐ | ☐ | **180 kWh/year** for each computer with night and weekend shutdown enabled | 180 X | | |
| Computer Monitor | | | | | | | |
| Replace CRT monitors with LED backlit monitors. | ☐ | ☐ | ☐ | **100 kWh/year** for every CRT monitor replaced with a LED backlit model | 100 X | | |
| Disable computer screen savers and enable the power option settings to standby after 15 minutes. | ☐ | ☐ | ☐ | **75 kWh/year** for every monitor with standby options enabled | 75 X | | |

| | Is your building doing this? | | | If you answered "NO," fill out these columns to determine the approximate savings in your building | | | |
|---|---|---|---|---|---|---|---|
| Strategies | YES | NO | N/A | Savings for 1 Piece of Equipment in kWh/year saved | | Quantity in Your Building | Total Approx. Savings for Your Building |
| **Break/Lunch Rooms** | | | | | | | |
| Refrigerator | | | | | | | |
| Replace standard refrigerators with high efficiency/ ENERGY STAR model. | ☐ | ☐ | ☐ | **400 kWh/year** for each inefficient refrigerator replaced by an ENERGY STAR model | 400 X | | |
| Remove personal compact-refrigerators. | ☐ | ☐ | ☐ | **350 kWh/year** for every mini-refrigerator that is removed | 350 X | | |
| Vending Machine | | | | | | | |
| Replace standard refrigerated vending machines with high efficiency/ENERGY STAR model. | ☐ | ☐ | ☐ | **1,500 kWh/year** for each vending machine that is replaced with most efficient ENERGY STAR model | 1,500 X | | |
| Remove underused refrigerated vending machines. | ☐ | ☐ | ☐ | **3,500 kWh/year** for each vending machine that is removed | 3,500 X | | |
| Install occupancy-based load management device. | ☐ | ☐ | ☐ | **950 kWh/year** for each vending machine with an occupancy-based load management device installed | 950 X | | |
| Remove vending machine display lighting. | ☐ | ☐ | ☐ | **650 kWh/year** for each vending machine with an occupancy-based load management device installed | 650 X | | |
| **Non Quantified/Application Specific Opportunities** | | | | | | | |
| Network/Server Rooms | | | | | | | |
| Replace standard servers with high-efficiency blade servers | ☐ | ☐ | ☐ | | | | |
| Replace standard uninterruptable power supplies (UPS) with 95% efficient UPS | ☐ | ☐ | ☐ | | | | |
| Replace other ancillary equipment (computers, monitors, etc.) with ENERGY STAR or better | ☐ | ☐ | ☐ | | | | |
| Miscellaneous | | | | | | | |
| Implement management policies to minimize or eliminate use of personal electronic equipment (personal coffee makers, fans, heaters, mini-refrigerators, decorative lighting, etc.) | ☐ | ☐ | ☐ | | | | |
| Educate employees on program goals and importance of their role, e.g., impacts of turning off equipment when it is not in use. | ☐ | ☐ | ☐ | | | | |

| | | |
|---|---|---|
| TOTAL ENERGY SAVINGS | Add up the estimated energy savings for all devices. | kWh/year |
| TOTAL DOLLAR SAVINGS | Multiply the average electricity rate of the location by the estimated energy savings. | $/year |
| TOTAL PORTFOLIO DOLLAR SAVINGS | Determine the number of sites the estimated energy savings could apply to and multiply that by the total dollar savings. | $/year |

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## Resources

*ENERGY STAR Purchasing Specifications.* ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy focused on saving energy, money and helping to protect the environment through energy efficient products and practices. ENERGY STAR has series of electronic tools and product specifications targeting the highest efficiency commercially available products. This set of tools and specifications can be found at: *http://www.energystar.gov/*

*Federal Energy Management Program (FEMP) Purchasing Specifications.* FEMP has developed a set of electronic tools for specifying energy-efficient products that are organized by major category and product type. This set of tools can be found at: *http://www1.eere.energy.gov/femp/technologies/eep_purchasingspecs.html*

*Consortium for Energy Efficiency (CEE).* CEE is a nonprofit public benefits corporation that develops initiatives to promote the manufacture and purchase of energy-efficient products and services. CEE promotes and supports a number of appliance and equipment efficiency efforts and provides extensive lists of high-efficiency-qualifying products. These product categories and lists can be found at: *http://www.cee1.org/*

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