

# Plug Load & Appliances

## Optimize large and small appliance loads

Up to 33 percent of a small commercial building's energy use is consumed by the appliances that occupants use daily.<sup>1</sup> Energy efficient buildings can underperform if plug loads are high and occupant behavior is wasteful. Optimizing settings, upgrading appliances and altering behavior can make a significant difference on your energy bill.

A building's plug load consists of all the small and large appliances that plug into the wall and draw electricity. In a typical commercial space these may be:

- Task lights
- Vending machines
- Office equipment including computers, copiers and printers
- Residential and commercial kitchen equipment
- Electronics, including televisions and AV Systems
- Servers, network equipment and data center storage

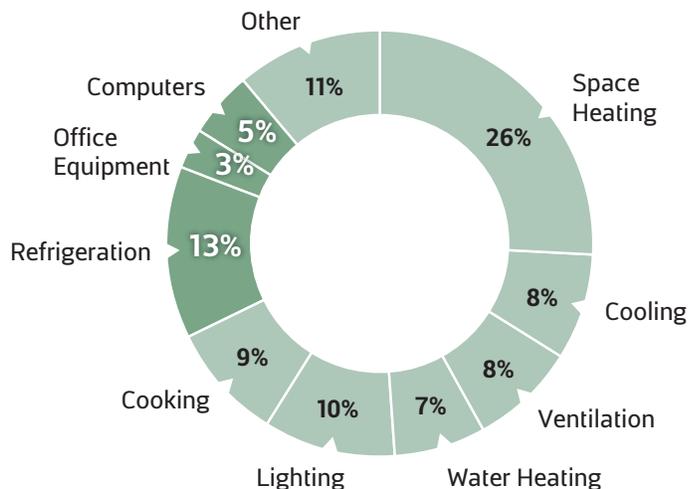


Figure 1 – Up to 33 percent of a small commercial building's energy-use is consumed by the appliances that occupants use daily.

## Lower cost improvements

Many energy-saving strategies are simple, low-cost measures that focus on optimizing the efficiency of current appliances and improving occupant behavior.

### REDUCE CONSUMPTION

Electricity consumption can be decreased by simply reducing how many appliances are used and improving the way they are used. Power management strategies can effectively reduce plug loads by 25-50 percent.

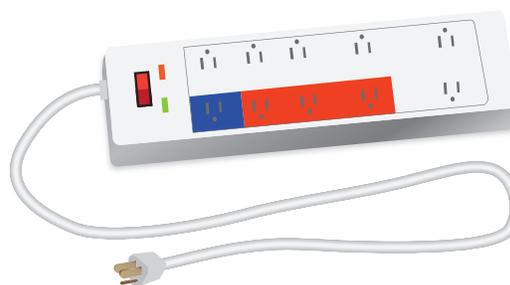
- Use shared printer/scanner equipment rather than many individual units
- Consolidate multiple refrigerators/freezers/coffee makers into fewer units and install in desirable break-room kitchen spaces
- Run dishwashers only with full loads and set to air dry mode
- Conduct a survey of all plugged-in devices and work with occupants to reduce unnecessary loads
- Check occupants' comfort complaints and adjust mechanical systems accordingly to prevent usage of individual fans and heaters

### Timing appliance usage

Electricity rates vary by the time of day. Peak time usage (usually between 12pm and 6pm) results in higher rates. By shifting the time of day appliances are used to off-peak periods, the electricity rate is lowered and energy cost savings are realized. Running washing machines, dryers, dishwashers, etc. in the evening hours will result in lowering peak energy rates. Most appliances have a "delay" setting that allows for easy setup of overnight run-modes.

### When not in use, switch it off

Many small appliances continue to draw electricity from their power sources even when not turned on. These so-called "phantom loads" can be mitigated easily by using a variety of devices to reduce unnecessary electricity consumption. Advanced Power Strips are electrical outlets offering advanced control over electricity sourcing. They are inexpensive and offer users either the option to manually control electricity flow to multiple devices (great for work stations) or function in tandem with an occupancy sensor.



## Higher cost improvements

### UPGRADING TO HIGH EFFICIENCY APPLIANCES

Often the most cost-effective time to upgrade equipment is when units are replaced at end-of-life, but in some cases the savings incurred by superior equipment can offset the replacement cost. Also, planning for upgrades and replacing equipment before it fails allows time for adequate design and product selection. Emergency replacements often result in lower efficiency based on what is currently in stock.

**ENERGY STAR**® labeled appliances are guaranteed to meet the federal efficiency and performance standards for the following appliances:

- Office equipment: computers, printers, copiers
- Commercial and residential kitchen equipment
- Clothes dryers and washers
- Televisions, monitors, cable boxes
- Data center storage, servers, network equipment



As a general rule of thumb, always look for the ENERGY STAR label when selecting new equipment. Consult [ENERGY STAR online resources](#) and identify appliance models that have been certified to operate most efficiently.

### PRIORITIZING REPLACEMENTS

If replacing every appliance in your building is not in the budget, then prioritize certain appliances according to:

- Frequency of use
- Efficiency Rating
- Age
- Condition

Upgrading equipment that has low frequency of use in your building may be unnecessary. Server rooms and vending machines are both very energy-intensive and commonly found in commercial spaces. Outsourcing your server requirements can reduce energy consumption of these units. Vending machines consume electricity 24 hours a day every day. By removing these units or by using

regulators such as VendingMiser® controls to prevent unnecessary compressor cycling, you can significantly reduce your utility requirement.

ENERGY STAR certified appliances are tested for efficiency and will reduce energy usage over the life of the unit. Once age and condition are recorded for frequently used appliances, ENERGY STAR replacements can be prioritized. This effort can result in a timely and effective purchasing process.

### SMART APPLIANCES

Smart appliances use wireless technology to receive real-time usage data for energy efficient operation. Examples are thermostats, security systems, washers and dryers that can be controlled via a wireless connection.



### GENERAL PLUG LOAD INFORMATION

[energy.gov/eere/femp/plug-loads-appliances-and-electronics-energy-conservation-measures](http://energy.gov/eere/femp/plug-loads-appliances-and-electronics-energy-conservation-measures)

[www.energy.ca.gov/research/buildings/appliances.html](http://www.energy.ca.gov/research/buildings/appliances.html)

### REFERENCES AND RESOURCES:

1. McKenney et. al. Commercial Miscellaneous Electric Loads: Energy Consumption Characterization and Savings Potential in 2008 Building Type.