



Improving Your Bottom Line

How Energy Efficiency Can Reduce Carbon Emissions and Boost Profitability

A Guidebook for Small and Medium Businesses in the Silicon Valley



Summary

This guidebook outlines common methods for cost-effectively improving the efficiency of the primary equipment types used by typical small and medium businesses in the Silicon Valley. As part of this project, ten local businesses in the Silicon Valley were interviewed for best practices and lessons learned in implementing energy efficiency projects. The suggestions in this publication are based on the experiences of these local businesses, as well as industry best practices. The guidebook offers a starting point with low-cost strategies for improving energy efficiency and saving money, and provides ideas to guide further investments. There are many additional measures, resources, technologies, and strategies that could not be included in this brief publication. Cost estimates for typical measures are based on 2005 data and are offered for general context, not as a reflection of current market pricing.

Please contact Sustainable Silicon Valley to tell us how these guidelines have benefited you and to share your recommendations for improving them.

Acknowledgments

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- Applebee's Redwood City
- Casto Travel
- Integrated Design Associates, Inc.*
- LifeScan, Inc.*
- Milk Pail Market
- NetApp, Inc.*
- Quadrus Office Complex*
- Roche Palo Alto*
- Specialty Solid Waste & Recycling*
- Togo's

Sustainable Silicon Valley

SSV is a voluntary partnership of business, government, academic, and non-governmental organizations collaboratively creating a more sustainable future for Silicon Valley. SSV partners pledge to set their own individual carbon dioxide reduction targets, report their progress, share information, and mentor one another in quarterly educational forums and monthly meetings.

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Introduction: Energy Savings Count

How much do you pay for utilities every month? Are you paying more than last year? Did you know that saving energy can be one of the easiest ways to **cut operating costs** and **boost your bottom line**?

Energy is the largest controllable expense for many businesses. The typical office building spends 30% of its operating budget on energy. Your costs may be even higher. The good news is that businesses of every size can reduce their energy use and improve their profitability by taking simple, energy-saving steps.

According to the Flex Your Power campaign (California's statewide energy efficiency marketing and outreach campaign), organizations that implement energy-efficiency measures outperform their competitors by as much as 10%. In addition, for every 100 kilowatt-hours (kWh) in energy savings, you may reduce greenhouse gas emissions by 60 pounds. These results really add up for businesses and the surrounding communities.

Improving energy efficiency isn't difficult, but it does require **commitment** and **action**. Whether you lease or own your space, you will benefit directly from implementing energy-efficiency measures.

- ◆ Building owners can boost net operating income by reducing operating expenses. Every \$1 invested in energy efficiency returns an estimated \$3 in benefits. Owners will enjoy a more marketable building with fewer maintenance calls and more satisfied tenants.
- ◆ Tenants, if you lease your space and pay your utility bills, then the savings will flow directly into your business. If utility costs are included in your rent, you may be able to negotiate a lower lease rate or additional tenant improvements. Many energy-efficiency upgrades also boost comfort, improve lighting quality, and reduce background noise, which can significantly enhance your daily work environment and employee productivity.

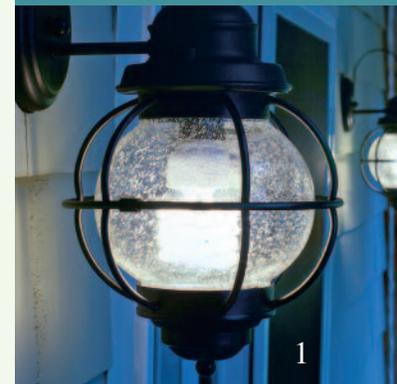
Reducing energy costs may be the easiest way for some businesses to increase their profit margins. According to ENERGY STAR®, a 10% reduction in energy costs for the average limited service restaurant can boost net profit margins by as much as 4%. For the average supermarket, a 10% reduction in energy costs can boost net profit margins by as much as 16%.

Your investment in energy efficiency will benefit your business and the community. Every step counts and every day offers a chance to save, so **make a commitment and start today**.

Did You Know?

Energy costs = 30% of the operating expenses for a typical office building.

Jim Thorne, owner of a Togo's restaurant in Sunnyvale, advises, "If you want to save money, you should retrofit for efficiency. There's no reason not to."



Getting Started

This guidebook outlines common methods for improving the energy efficiency of the equipment used by typical small and medium businesses in the Silicon Valley. As illustrated in Figure 1, the typical business energy end-uses include: lighting, refrigeration, office equipment, cooking equipment, water heating, and heating and cooling.

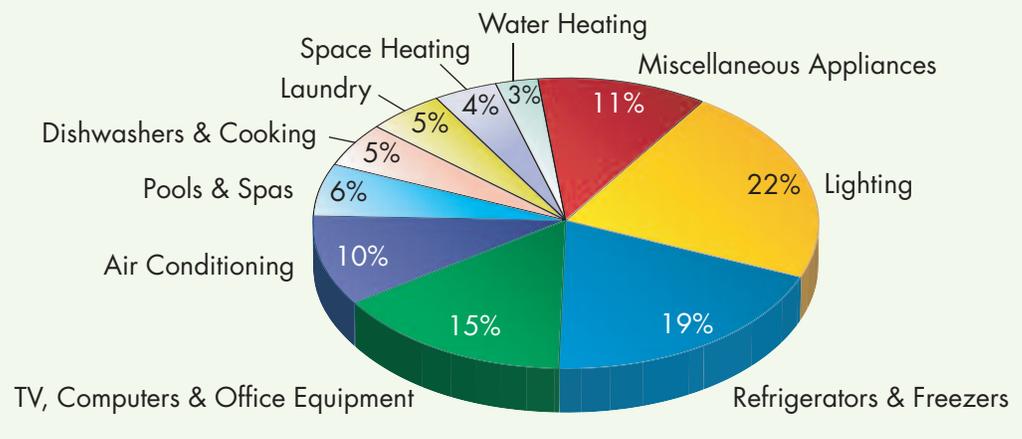
Are you ready to start saving energy and money? Follow these steps:

- ◆ Assess your options
- ◆ Get buy-in
- ◆ Chart your course
- ◆ Take a step
- ◆ Pay attention to prevention
- ◆ Promote your efforts and results
- ◆ Review progress and make necessary adjustments

Figure 1

Source: California Statewide Commercial Sector Energy Efficiency Potential Study, California Energy Commission, July 9, 2002

Figure 1: Energy Use in a Typical California Business



Practice What You Promote

IDeAs (Integrated Design Associates) is a small electrical engineering firm in San José that focuses on green building design. The company demonstrated its commitment to sustainability by designing a zero carbon emissions building for its new headquarters. “It was very important for us to lead by example,” said IDeAs principal, David Kaneda. IDeAs was willing to invest in a dramatic reduction in energy use and environmental impacts, since it reflected and reinforced the company’s values and purpose. Building-mounted photovoltaic panels provide 100% of the electricity. Energy use is minimized through efficient lighting systems; appliances and office equipment; occupancy sensors and controls; carefully-placed, high efficiency windows; daylighting; and other strategies. David notes that the additional upfront cost for the energy efficiency upgrades (about 6.5% compared to code requirements) will pay back in energy savings and that “it’s a great building to work in.” The building has also provided a strong platform for marketing the company’s services.

Assess Your Options

While every business has its own investment priorities and operating procedures, the type of business you operate may reveal your greatest opportunities for money-saving improvements. Similar business types share similar energy usage patterns. For grocery stores, refrigeration is the largest energy consumer, while in lodging, water heating is a major factor, and in retail, it's lighting. Top users in office buildings are lighting, cooling, and office equipment. For most restaurants, food preparation equipment is second only to heating and cooling. Table 1 illustrates the relative level of opportunity for reducing energy costs, by equipment and for different business types, based on typical usage.

There are several ways to evaluate your opportunities, some more exact and comprehensive and others that follow best practices and good rules of thumb. The approach you choose will depend on several considerations including the size of your business, age of the building and equipment, cash flow, external funding resources, and internal expertise, to name a few. In general, businesses with access to strong cash flow and skilled technical staff are more likely to conduct a thorough, quantitative assessment. Energy-intensive businesses in older buildings using large and aging equipment are also good candidates for more detailed examination. Businesses with limited resources can employ a simpler approach, such as suggested below, and focus on the equipment with the greatest energy-saving potential as highlighted in Table 1.

One approach to identifying energy-saving opportunities is to invite licensed, insured contractors to evaluate your building and equipment and provide recommendations for improvements. Be sure to ask for references for similar projects (and check them!) and get cost estimates in writing. Ask for life-cycle costs and annual energy usage for a standard model and the more efficient model and compare the two. The standard model may have a lower purchase price but will cost more to operate. The efficient model may cost a little more to purchase but typically pays back quickly through energy savings.

Table 1: Comparing Opportunities to Save Energy, by Business Type

This table suggests likely targets for different business types based on typical energy usage patterns. It offers a general framework for assessing opportunities, but is not intended as a definitive decision tool.

- Dominant energy end-use, good starting point, likely to have attractive payback
- ◐ Substantial energy use, worthwhile to evaluate
- Good energy savings potential but lower priority

	Lighting pg 9	Office Equipment pg 11	Cooking Equipment pg 12	Water Heating pg 14	Refrig- eration pg 16	HVAC pg 17
Small Office	●	●	○	○	○	●
Restaurant	◐	○	●	●	●	◐
Retail	●	◐	○	◐	○	◐
Food Store	◐	○	●	●	●	◐
Lodging	●	○	◐	●	○	●
All Offices	◐	●	○	○	○	●

Green Savvy
Be wary of “green” claims that aren’t backed up with reliable energy and performance data.

Table 1
Source: 2006 CA Commercial End Use Study. PG&E Results by Segment. (pp. 187, 189)

Small business owners may want to start with a hands-on or participatory approach to identifying opportunities. How? Become an energy sleuth. Collect your clues to potential energy savings.

- ◆ Assess the age of major energy-using equipment. Has it been well-maintained? Consider whether or not it is operating smoothly. Will it need to be replaced soon? Don't wait until it breaks to make a purchasing decision — your options may be more limited if you're in a hurry.
- ◆ Review your utility bills and look for unusual trends in usage. This may reveal operational problems (such as equipment not cycling off during down-times), employee actions (leaving doors open), or seasonal issues (leaving equipment on over holidays) that need to be addressed.
- ◆ Check the incentives offered by your local utility. If the utility is offsetting the cost of installing a particular type of equipment (e.g., lighting, refrigeration controls, occupancy sensors, or variable speed drives), it is likely to produce energy savings for typical area businesses.
- ◆ Enlist employees in your investigation. Ask staff for ideas on ways to cut energy use. Consider holding a contest and awarding a prize for the recommendation that ends up saving the most energy. Form a “green team” of employees to keep the ideas flowing and to help implement energy-saving strategies.

The most methodical way to evaluate your energy-efficiency opportunities is to establish a baseline of your energy use (benchmark) and conduct a comprehensive, professional energy audit. A benchmark will help you to know how much energy you are using and how your usage compares to similar businesses. An audit will identify your opportunities for improvement. This approach may be best suited for larger businesses or those with dedicated resources for the effort.

The ENERGY STAR website (www.energystar.gov) has free software tools that can help you benchmark your facility's energy use and track energy and water consumption. If you have internal engineering or maintenance staff, they may be able to conduct a walk-through audit and gather the necessary data, or you may need to hire licensed, experienced energy professionals. Your utility may offer rebates or referrals for energy audits.

The first step for pharmaceutical company Roche Palo Alto, was installing “a lot of meters” to collect more detailed and precise data, according to Jerry Meek, facilities manager. “It's important to understand your load profile and use that information to focus energy-efficiency efforts.” Roche worked with City of Palo Alto Utilities to cost-effectively install smart meters at every facility.

See for Yourself

Plug your equipment into a Kill-A-Watt (or similar device), to see how much electricity it really uses and how much it costs to operate.



Get Buy-In

Each business has its own process for making decisions and implementing projects. You may be the primary decision-maker or you may be making recommendations for management consideration. Regardless of the specific process, it is important to get the appropriate buy-in before proceeding with a project.

If you rent your space, you may need approval from the building manager or owner. This may be a good time to negotiate a cost-sharing arrangement with the landlord. Be sure you emphasize the project benefits: cost savings, increased asset value, reduced tenant turnover, etc. Reference the Flex Your Power and ENERGY STAR websites for data to support your proposal.

Larger businesses should ensure that upper management approves and endorses energy-saving efforts. Connect the project benefits to the organization's goals. Confirm decisions in writing. Some businesses may need to coordinate with city agencies, oversight committees, or governing bodies (like the FDA for laboratories).

In every business, employee buy-in is a key component of successful implementation. The most fundamental energy-saving strategy—turning off equipment—requires group commitment. Remember, employees are sensitive to the CEO's lead. Managers can make a powerful statement by announcing a new (or expanded) commitment to saving energy throughout the business. Give employees a vision, then engage and empower them to boost the business's operating performance and contribute to its competitive edge.

When a course is set, be sure to inform employees about the strategies you are implementing and their role in success. Lock in continued collaboration by recognizing outstanding individual and team efforts to save energy. Provide ongoing feedback through established communication methods, like email updates or staff meetings.

Jerry Meek of Roche Palo Alto, agrees with the importance of employee buy-in. "When you are doing something that will affect someone's space, you need to get them on board. Sell what you plan to do before you implement."

The best way to inspire your staff to stay on the efficiency track is to create a clear link to their self-interests. Appeal to their desire to improve their personal workspace, simplify operations, boost business performance and profitability, and protect the environment. How? Here are a few examples:

- ◆ We are installing energy-efficient lights, which emit less heat and create a more comfortable environment for employees and customers. These lamps will improve lighting quality, reduce eye strain, and make daily operations easier. Efficient lights also last longer, meaning fewer trips up the ladder to change dead bulbs and fewer interruptions to your work schedule.
- ◆ When you close refrigerator doors between uses, rather than propping them open, you preserve product integrity, reduce premature spoilage and inventory gaps, and help us to deliver a quality product. Less spoilage means less waste to haul to the dumpster, lower disposal costs, and less trash for landfills.

***Did You Know?**
You can cut your energy costs by 10% or more simply by implementing low-cost and no-cost measures.*

- ◆ By raising the thermostat a few degrees during the day and using fans, we will maintain a comfortable temperature while saving energy, reducing greenhouse gas emissions, and safeguarding the environment.

Healthy Competition

Casto Travel, based in San José, implemented a company-wide competition to improve the company's carbon footprint. Each person was given a pedometer. The division that walks the most during the challenge time period is eligible to win a trip to Las Vegas. This effort has reduced the company's carbon footprint, improved employee health, and boosted office morale.

Chart Your Course

You may start by targeting the highest energy-using equipment in your business or you might begin with low-cost measures. You may focus on maintenance and preventative measures or you might prioritize projects with the fastest payback. The important thing is to choose a plan of action and implement it. As you chart your course, consider the best timing for implementation and establish basic goals for each project, so you know when to celebrate your success and when to adjust your approach.

Consider when you will need to replace existing equipment or purchase additional equipment. Plan for the most efficient model that fits your requirements and budget. If your company has an equipment-purchasing policy, build energy efficiency into the policy by setting minimum efficiency levels for all new equipment. Are you planning to expand your business operations? Has aging equipment driven up your repair bills? Do you need to update electrical or plumbing infrastructure? These factors may influence your timing. Schedule your improvements to minimize disruptions to daily operations.

Peggy Lo, property manager for Quadrus Office Complex in Menlo Park, advises, "The best time to embark on energy efficiency initiatives is when a lease has expired and prior to a new tenant occupying the space." It's easiest to install upgrades in an empty space. While most businesses will have to make accommodations for some contractor activity during operating hours, you can work with your installation contractor to limit the impact on productivity.

Your project goals do not have to be elaborate, but they should be measurable and in writing. Quantify or describe what you would like to achieve: specific cost savings, comfort improvements, productivity increases, reduction in downtime, etc., and compare with what is actually achieved after a project is completed (see page 8 last step, Review Progress). Also remember that you will likely need some documentation and employee training to ensure new procedures are effectively implemented and equipment is safely operated.

Did You Know?
Your electricity bill has two main charges – usage (kWh) and demand (kW). Usage reflects how much energy your business consumed during the month. The demand charge is based on your highest usage during the month, which often occurs during peak periods when costs are the greatest. Improving energy efficiency may reduce your consumption and demand charges.

Take a Step

It all comes down to this: taking action. If resources are tight or project support is thin, begin with no-cost/low-cost activities. The following sections contain equipment-specific tips for improving efficiency with little or no investment. These are simple steps that can return significant savings. **Regular maintenance** is an important part of this plan.

Build on the success of your initial efforts with another small step. Be sure to inform employees about results and any adjustments to the plan. Use the energy savings from initial steps to fund larger investments. Contact your local utility and ask about equipment rebates and other incentives. Look for local, state, and federal tax credits. **Make energy efficiency an integral part of your business plan.**

Pay Attention to Prevention

A little effort spent on maintenance goes a long way. According to the U.S. Department of Energy, a well-crafted operations and maintenance (O&M) program can save 5% to 20% on energy bills without a significant capital investment. This guide offers a brief list of O&M tips for key types of equipment. You should reference user manuals, technician instructions, and other information specific to your equipment for additional guidance.

Do you currently have an O&M plan? Do you have a nightly closing schedule to make sure equipment is properly turned off? Give your plan a review and see if it needs to be updated or expanded. Be sure that all applicable employees and service providers (e.g., cleaning service) have current copies. Post reminders in relevant, hard-to-miss places. Spot-check to ensure the actions are being implemented and recognize employees who make special efforts to save energy.

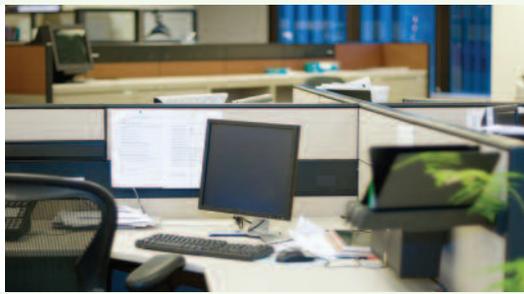
If you do not have an O&M plan, it's definitely time to outline one. Your O&M plan may include activities such as:

- ◆ Heating and cooling tune-up
- ◆ Cleaning refrigerator condenser coils
- ◆ Changing air and water filters
- ◆ Verifying operation and adjusting set-points of sensors and controls
- ◆ Calibrating thermostats, humidistats and time-clocks
- ◆ Cleaning light fixtures and kitchen equipment
- ◆ Group re-lamping
- ◆ Flushing sediment from water heaters, steam boilers

The plan should account for changes in occupancy and use, such as after-hour, weekend, and vacation shutdowns. Some of these activities can be conducted internally and some may require a contractor. One easy approach to ensure follow-through is to get a calendar and mark down the major O&M activities for each month. Write reminders for service appointments so you can schedule contractors before the busy season.

Did You Know?

A simple step like adjusting HVAC control set points and modifying existing equipment has saved companies as much as 50% on their energy consumption.



Financing Tip

Take advantage of local, state, and federal tax credits and utility rebates to reduce the upfront costs. Many of the energy-saving measures listed in this guidebook are eligible for local utility rebates. Some utility programs offer free energy surveys to help identify potential efficiency improvements.

PR Note: Promote What You Practice

Don't forget to make the most of your business's energy efficiency efforts and share your story. This can be as easy as posting an announcement in your lobby or other public space. Add a note to your menus, website, newsletters, and brochures. Communicate your plans and results to current employees and recognize individual efforts. Tell potential employees about your energy efficiency commitment. Many customers are looking for green businesses to support. Distinguish yourself as a leader in the marketplace. Look for green business certifications, membership organizations, industry awards, and other opportunities to emphasize your unique efforts.

David Kaneda recognizes that his company's investment in energy efficiency also offers marketing opportunities. Their office building reflects the same principles the company pitches to clients, so it's a great example of IDEAs' work. "When our building opened, the mayor of San José used it as a backdrop to announce his big green policy. We have also received local and national media coverage. It is very exciting to know that people are really interested in energy-efficient buildings."

Marc Casto, owner of Casto Travel, noted, "Making responsible energy, transit, and recycling decisions has been pivotal in recruiting employees whose motivations reflect our company values."

"Investing in energy efficiency, recycling, and composting improves my bottom line and allows customers to support a business that reduces its greenhouse gas emissions and is part of the climate change solution," said Nick Falco, general manager of Applebee's restaurant in Redwood City.

Review Progress and Make Adjustments

You should periodically review your action plan and assess the results of your energy efficiency efforts. Use this feedback along with new information to make any necessary course corrections. Take into consideration any new technologies and product innovations. Check online resources and gather ideas from the many public forums on energy efficiency held in the Bay Area.

Your feedback mechanisms on energy efficiency measures may be analytical or anecdotal, depending on your goals, actions, and the resources available for measurement. Every business can track changes in energy use and costs by comparing utility bills from before and after the project. Does your usage decrease following the energy efficiency upgrade? If not, are there any unusual factors that might influence energy usage, such as extreme weather, changes in production activity, vacation schedules, business expansion, etc.? Evaluate your progress and determine if you need to adjust your approach.

Lighting

Benefits Overview

Cut lighting energy costs

Reduce burden on cooling system from waste heat

Decrease maintenance demands, materials inventory

Reduce eye strain, boost productivity

Create a more attractive visual environment

Improving lighting efficiency is a sound investment for most Silicon Valley businesses. Lighting accounts for a major portion of typical business energy use and nearly 40% of commercial electricity use in California. Peggy Lo, property manager for Quadrus Office Complex in Menlo Park, observed that despite an increase in tenants and square footage managed, their energy expenditures remained stable. She attributes this to the company's recent lighting efficiency improvements.

Lighting upgrades are also a good starting point for most businesses as they typically have short payback periods and are relatively easy to implement. You will save money on your lighting energy bills and reduce your cooling load by cutting the heat emitted by inefficient lamps. Since efficient products usually last much longer, you can decrease your maintenance demands, reduce your materials inventories, and save a few trips up the ladder. Lighting upgrades can also boost productivity and safety by improving the visual environment. Some lighting vendors offer free lighting audits and recommend upgrades as a way to market their services.

Taking Action

The most fundamental energy-saving strategy can save big in any business: shut off unneeded lights. Jerry Nabhan, owner and general manager of Specialty Solid Waste & Recycling and the SmaRT Transfer Station in Sunnyvale, notes that the company saved \$3,000 in one year at the SmaRT Transfer Station location just by turning off lights at night. If you have an after-hours cleaning team, be sure to factor them in the shut-down plan, inform them of expectations, and post reminders. Make the task even easier by using sensors, controls, and timers.

Look for areas that have excessive lighting relative to the task or activity. A common complaint: over-lit computer stations. You can often remove one or two lamps from a four-lamp overhead fixture and still provide adequate light for the space. You may save \$30 to \$50 annually for every T12 linear fluorescent lamp you remove from a fixture.

Controlling your lighting system is often as important as having an efficient lighting system. Reduce your lighting energy costs by up to 40% by installing occupancy sensors in rooms with irregular traffic (e.g., break rooms, restrooms, janitorial closets, storage areas, and conference rooms). These sensors detect occupant motion and automatically turn lights on or off. In partitioned areas, use ceiling-mounted ultrasonic sensors, which can detect motion over cubicle walls. Occupancy sensors typically run \$40 to \$120 per unit and are fairly inexpensive to install.

Install timers or photocells on parking, signage, and other outdoor lighting to automatically turn lights on at dusk and off at dawn. This step may also improve safety by ensuring lights are on when needed most. Adjust timers during the year as daylight hours change.

Did You Know?

Lighting accounts for more than one-third of total energy use for retailers—the single largest energy expense.

Opportunity Knocks

More than 50% of commercial buildings still use inefficient T12 lighting with magnetic ballasts. More than 90% of the energy produced by incandescent lamps is emitted as heat, not light. This added heat raises the indoor temperature and increases your cooling burden in the summer.

Start Saving Now
LifeScan Inc. installed
38 two-lamp T8 fixtures,
as well as daylighting
and motion sensors
in its Milpitas facility.
The project saved
265,135 kWh and
\$29,847 annually,
paying back their
\$30,000 investment in
approximately one year.

Larger facilities should consider installing energy management system (EMS) technology to control lighting systems automatically. Energy savings from EMS can range from 10% to 15% of total lighting energy use. These systems provide more accurate equipment control and can integrate HVAC, security, fire detectors, and other equipment.

Consolidate Your Steps

Save on maintenance by cleaning and replacing all your lamps at the same time (group relamping), generally at about 70% of their calendar life. Though it means replacing some lamps before they expire, it dramatically reduces the time spent replacing each lamp, which can reduce your lighting maintenance budget by more than 25%. It also saves storage space.

Prioritize Improvements

When prioritizing lighting upgrades, look first at the systems that run the longest. High-use lights are likely to be the most cost-effective to change. High wattage and older fixtures also make good candidates. If you are relamping or replacing several fixtures, consider the entire system. As you plan your lighting project, be sure to maximize the efficiency of each lamp and ballast. Most utilities offer rebates or incentives for lighting retrofit projects. The incentive amount might influence which project to implement first. Consider the following strategies:

- ◆ Install ENERGY STAR qualified compact fluorescent lamps (CFLs) in place of incandescent lamps. CFLs cost about 75% less to operate and last almost 10 times longer. Replacing a 100-watt incandescent with a 32-watt CFL can save approximately \$30 in energy costs over the life of the bulb.
- ◆ Replace T12 fluorescent lamps and magnetic ballasts with T8 fluorescent lamps and electronic ballasts to reduce lighting energy use by 35% to 45%. Upgrading a typical two-lamp four-foot fixture can cost in the ballpark of \$40 to \$60.
- ◆ Remove lamps from fixtures in over-lit areas, especially when upgrading old T12 lamps to T8 fluorescent lamps.
- ◆ Replace incandescent exit signs with LED models and save up to 90% on the device's energy costs. You'll also cut maintenance requirements since the LED lamps last a lot longer.
- ◆ Replace high intensity discharge (HID) lights in high bay systems (often in warehouses) with T5 high output (HO) lamps and fixtures to cut lighting energy use by almost 50%.
- ◆ Consider installing skylights with daylight controls when constructing or renovating a building. Skylights create a more spacious feeling for customers and reduce lighting energy use when daylight controls are added.
- ◆ Replace exterior incandescent lamps with high-pressure sodium lamps and save up to 75% of lighting energy use.

Be sure to dispose of fluorescent lamps properly. To find your nearest recycling center, call 800 CLEAN-UP (253-2687) or visit the Earth 911 website (earth911.com), and enter your zip code in the recycling center finder.

Office Equipment

Benefits Overview:

Reduce electricity costs

Cut burden on cooling system from waste heat

Reduce background noise

Extend equipment lifetime

Whether you operate a restaurant, retail storefront, or repair shop, you probably have several pieces of office equipment working for you. This equipment consumes energy and emits waste heat. Depending on the age of the equipment, it may also create a lot of background noise.

As with other equipment, the most important energy-saving step for office equipment is to be sure it is turned off after your business closes. Post reminders for staff. Consider assigning an “energy captain” to make sure equipment is turned off. Don’t overlook audio-visual equipment and electronics—televisions, sound systems, and projectors draw a significant amount of energy. This conservation step can also reduce equipment wear and extend its lifetime.

Simple Savings

IDEAs, an engineering firm located in San José, implemented a simple but innovative approach to ensuring office equipment was shut off after hours. They linked the office printers and copiers into the security system, which automatically turns off the equipment at night and on weekends.

Check your computers. Have you activated sleep settings on computers and monitors? You can save \$10 to \$30 per monitor and \$15 to \$45 per computer each year just by activating these settings. Sleeping computers still draw some energy, so be sure to turn them off when done, along with other personal equipment like adding machines and shredders. Plug them into power strips to simplify the step—just switch off the power strip before leaving. Add reminders to screen savers, calendar pop-ups, and other prominent locations.

When replacing or purchasing new equipment, look for ENERGY STAR qualified models. These office and imaging products use 30% to 75% less electricity than standard equipment. Also, consider ink jet printers in place of laser printers and laptops instead of desktop computers, as they use less energy.

Do you know what’s lurking in your break room? Does anyone unplug the coffee machine during off-hours? Is the refrigerator a relic or an efficient model? What about your vending machines? Adding energy-saving devices to beverage and snack vending machines can reduce each machine’s consumption up to 80%. These controls cost about \$200 for a refrigerated beverage machine and around \$100 for an unrefrigerated snack machine.

Don’t forget the hard-working office water cooler. A standard hot and cold bottled water cooler can use more energy than a large refrigerator. An ENERGY STAR qualified model requires about half as much energy. If your cooler is provided as part of a bottled water service, talk to your supplier about energy-efficient cooler options.

Bargain or Beast?

Compare life-cycle costs of efficient and standard equipment models. This includes purchase price and operating costs.

Inefficient equipment—new or used—may be the cheapest to buy, but it will cost more every month to operate. This applies to all types of equipment from fan motors to fax machines to freezers.

Commercial Cooking Equipment

Benefits Overview

Reduce energy costs

Cut added heat from idling equipment

Extend equipment lifetime

Improve indoor air quality

Restaurants and other facilities with commercial cooking equipment use almost 2½ times as much energy as other commercial buildings. Some of this energy use can be easily cut just by turning equipment down or off during slow periods. Business owners or kitchen managers should create simple checklists with instructions about when to turn equipment on and off, and regularly remind staff to eliminate energy waste. Review efforts during shift meetings. Your instructions may include:

- ◆ Shut off fans, lights, cooking equipment, holding cabinets, computers, and signs when not in use.
- ◆ Turn broilers, ovens, fryers, and exhaust hoods down or off during slow times to cut standby losses.
- ◆ Close refrigerator, freezer, oven, and steamer doors between uses.
- ◆ Pre-heat cooking appliances only as long as needed.
- ◆ Stagger start times of heavy-duty electric cooking equipment to keep demand charges down.

Keep in mind that carefully maintained equipment lasts longer and wastes less energy. Be sure your O&M plan includes the following steps:

- ◆ Check and adjust thermostats on cooking equipment.
- ◆ Regularly clean the fryer heating element and remove sediment for best performance.
- ◆ Clean burners. Check oven doors for loose hinges.
- ◆ Flush out steamer boilers and remove mineral buildup.
- ◆ Check the equipment user manuals for additional guidance and recommended service timeframes.

Give Your A/C a Break

Insufficient ventilation can make your kitchen hot and muggy and cause your air conditioner to work harder.

Every kilowatt-hour of cooking heat that is not vented away will cause the air conditioner to use another 300-watt hours to get the heat out.



Make Prudent Purchases

When shopping for new equipment, remember that a bargain isn't always a bargain. Purchase prices often drive procurement decisions, but you should keep the big picture in sight. Inefficient equipment—new or used—may be the cheapest to buy, but it will cost more every month to operate. The energy savings produced by more efficient products continue over the lifetime of the equipment and can really bolster your profitability.

The best way to save when buying new kitchen equipment is to look for the ENERGY STAR label. Commercial fryers, hot food holding cabinets, broilers, and steam cookers may earn the ENERGY STAR label and can save up to 50% on energy costs compared with conventional models.

According to ENERGY STAR, qualified deep fryers can typically save between \$60 and \$180 per year; hot food holding cabinets can save up to \$280 per year; and steam cookers can save between \$450 and \$820 per year depending on the fuel they use. Also consider purchasing thermostatically controlled griddles and insulated braising pans.

Clear the Air

Effective ventilation is critical for comfort, health, and safety. It also makes a big difference in your energy use. Every kilowatt-hour of cooking heat that is not vented away will cause the air conditioner to use another 300 watt-hours to get the heat out. Consider the following strategies to save energy:

- ◆ Operate multi-speed fans on the lowest setting possible. Remind staff to match speed to need.
- ◆ Even better, add controls to your kitchen exhaust system to reduce operating costs by 30% to 50%. Variable-speed, demand-based exhaust controls use sensors to monitor your cooking and adjust the exhaust fan speed to match your ventilation needs.
- ◆ Reduce gaps between cooking appliances and the exhaust hood. This could be as basic as pushing the appliance against the wall or centering it under the hood.
- ◆ Have a professional balance your ventilation system to ensure proper air distribution. A sure sign that your system is out of balance is an outside door that blows open frequently or is difficult to push open due to suction.

Simple Savings

Steve Rasmussen, owner of the Milk Pail Market in Mountain View, has improved operational efficiency and cut his dumpster bill simply by offering his trash to other businesses. The market separates out greens and other re-usable products and makes them available for pick-up. This simple practice cuts the volume going to landfills and reduces the use of chemical-based fertilizer in local farms. “Composting is not only the right thing for the environment and community, it has also saved me thousands of dollars a month.”

Water Heating

Benefits Overview

Cut energy costs

Reduce water and sewage costs

Save on cleaning chemicals with efficient dishwashing

Did You Know?

Water heating accounts for 42% of total energy use in the lodging industry.

The cost of heating water is a significant operating expense for hotels and restaurants. Businesses can slash this cost by paying attention to maintenance, purchasing efficient equipment, and implementing a few simple procedures. When you reduce hot water consumption, you save twice— on energy and water bills. You may also save on sewage charges and cleaning chemicals depending on the steps you implement.

Consider your O&M plan and your typical kitchen procedures. Can you make any adjustments to improve efficiency? Here are some suggestions:

- ◆ Use cold water to operate a food disposer. Cold water solidifies grease so it can be ground up and washed away. This simple step saves energy, water, and potential plumbing problems.
- ◆ Thaw frozen food in the refrigerator rather than under a stream of warm water.
- ◆ Check the temperature setting. Does it meet your business requirements without overheating the water? When the only need for hot water is hand washing, such as in an office, adjust the setting to 105°F or even lower. Most automatic dishwashers need 140°F water.
- ◆ If your water heater has an automatic flue damper, be sure it is on, so heat doesn't escape up the flue.
- ◆ Fix dripping faucets and pipe joints. Install aerators on hand sink faucets. Post reminders to turn faucets all the way off. Even better, install sensors.
- ◆ Insulate the first 6 feet of exposed hot water pipes.
- ◆ Flush sediment from the tank twice a year according to manufacturer's directions.
- ◆ If your system has a recirculation pump, install a timer to turn it off when the kitchen is closed.
- ◆ If you have an older electric water heater, wrap it with a UL approved insulating blanket and save up to 12% on water heating expenses.

Is your water heating equipment aging or inoperable? Do you need additional capacity? Consider the following when making your purchasing decision:

- ◆ When purchasing a conventional, electric storage water heater, look for a model with a high Energy Factor (EF—the measure of a water heater's efficiency) and low stand-by losses. Because water is constantly heated in the tank, energy can be wasted even when a hot water tap isn't running. This is called standby heat loss. The bigger the tank, the bigger the likely losses, so don't buy more capacity than you need. Look for models with tanks that have a thermal resistance (R-Value) of R-12 to R-25. For electric water heaters look for an EF in the range of 0.86 to 0.95.

The Sound of Money Down the Drain

How much can a drip cost? If one faucet has a minor leak of 10 drips per minute, you are wasting 525 gallons each year.

- ◆ When purchasing gas storage water heaters, look for a model with thermal efficiency of 90% or higher. Consider a gas-condensing water heater. This technology enables the fuel to transfer nearly all of its heat to the water, leading to 95% efficiencies or greater. A gas-condensing water heater may save up to 20% on energy costs, depending upon the usage pattern.
- ◆ Consider installing tankless water heaters to cut standby losses. These units can supply hot water to a bathroom or an entire facility.

Don't forget about the appliances that use hot water:

- ◆ Replace old, high-volume kitchen pre-rinse sprayers with high-velocity, low-flow models. You'll use half the water, cut energy use for water heating, and reduce your sewage costs.
- ◆ Install ENERGY STAR qualified commercial dishwashers to save an average of \$850 each year on energy bills. Businesses can also expect to save more than \$200 and 52,000 gallons annually due to reduced water usage. Cut dishwashing cycles and you'll also save on chemicals.
- ◆ Even better, replace a 10- to 20-year-old conventional dishwasher with an infrared gas dishwasher and save up to \$2,900 annually.
- ◆ If your business has laundry facilities, consider installing high-efficiency commercial washers, which can cut energy costs up to 50% and use about 30% less water (18 to 25 gallons of water per load, compared to 40 gallons used by a standard machine). Energy-efficient and front-loading commercial clothes washers also last 5 to 10 years longer than standard, top-loading machines.

Simple Savings

Nick Falco, general manager of Applebee's in Redwood City, expects to save \$1,000 this year just from turning down the temperature on the restaurant's water heater. The appliance still heats water to code-required temperatures but doesn't overheat it.



Refrigeration

Benefits Overview

Cut energy costs

Improve product integrity and lifespan

Maintain stable indoor temperatures

Did You Know?

Refrigeration consumes the most electricity in food stores, followed by lighting.

Refrigeration comprises a huge component of energy use in grocery stores and restaurants. The quality of refrigeration affects product integrity, freshness, and lifespan, all of which directly impact your bottom line. Businesses can reduce this expense by educating staff on better practices, installing simple controls and covers, conducting maintenance, and purchasing efficient appliances.

First, check your O&M plan and ensure it includes the following steps. Reference the equipment manufacturer's recommendations for further guidance.

- ◆ Clean condenser and evaporator coils every one to three months, depending on how quickly they get dirty.
- ◆ Check current temperature settings monthly with an accurate thermometer and adjust to manufacturer's recommendations as necessary. Check the defrost settings to prevent the defrost cycle from running longer than needed. A typical cycle is 15 minutes, four times daily.
- ◆ Recharge low refrigerant.
- ◆ Replace torn or loose door gaskets.
- ◆ Insulate bare suction lines.

Simple Savings

Steve Rasmussen, owner of the Milk Pail Market in Mountain View, recognizes the savings potential from simply cleaning evaporator and condenser coils. "Clean those twice a year and you can greatly reduce your energy cost," Steve advises.

Next, implement simple, low-cost measures:

- ◆ Improve the efficiency of your walk-ins (and better preserve your perishables) by checking floors for proper insulation levels and adding strip curtains. Strip curtains have to cover the entire door opening so replace curtains that have flaps missing.
- ◆ Use visible and audible "Door Open" signs on walk-ins to minimize loss of refrigerated air.
- ◆ Switch incandescent lamps in your walk-ins to ENERGY STAR qualified compact fluorescent lamps (CFLs) to reduce lighting energy use by 75% and cut the heat added by inefficient lamps.
- ◆ When installing or replacing evaporative fan motors in refrigerated cases and walk-in coolers, use high-efficiency motors to reduce motor energy use by up to 70%. This measure also reduces the amount of heat generated by the motor that must be removed from the case.

- ◆ Add night covers to open display cases to trap refrigerated air and keep food colder. The covers reduce electricity use by up to 40% and keep product temperatures lower for several hours after the covers are raised. This measure reduces product loss and improves product integrity. It also helps stabilize indoor air temperatures.
- ◆ Install anti-sweat heater controls. These controls sense humidity conditions and turn the heaters off when unneeded, rather than allowing them to run 24 hours a day. Energy savings are estimated to range from 6% for grocery store display cases to 20% for reach-in refrigerators.
- ◆ Save \$160 each year by installing auto-closers on reach-in freezer doors and \$30 on reach-in coolers. Auto-closers are a relatively simple retrofit and they ensure a door is fully closed after each access.
- ◆ Install heat recovery systems to use heat removed from display cases to heat water. A 7.5 horsepower (hp) compressor can supply close to 100% of the hot water requirements in a medium-sized grocery store all year long.

Plan to purchase high efficiency equipment when it's time to add or upgrade:

- ◆ ENERGY STAR labeled commercial solid door refrigerators and freezers save up to 45% of electricity use with a 1.3 year payback compared to other models.
- ◆ High-efficiency ice makers save energy and water. Set ice production to overnight hours to reduce demand charges. When choosing an ice maker, remember that bigger machines are typically more efficient than smaller.

Heating, Ventilating and Air Conditioning (HVAC)

Benefits Overview

Cut energy costs

Improve indoor air quality and comfort

Boost productivity

Decrease ambient noise

Inefficient or malfunctioning heating, ventilating, and air conditioning (HVAC) systems increase energy costs, create comfort problems, and contribute to poor indoor air quality. Older systems are often noisy. Summer cooling loads drive up peak energy use and increase demand-related charges on your utility bills. You can save energy, cut operating costs, improve comfort, and boost productivity by improving the efficiency of your HVAC system.

If your HVAC system is approaching the end of its rated lifetime, requires extensive repairs, or is inoperable, replace this equipment with high efficiency models to save 20% to 50% of energy consumption. The incremental cost increase for a high efficiency model may be in the range of \$700-\$1,200 per ton depending on the unit. Ask your contractor to indicate the life-cycle costs of a standard model and a high efficiency model. The energy savings of the efficient model should pay back any increased initial cost. Be sure the system is properly sized according to industry guidelines (ACCA Manual N): a bigger unit is not necessarily better. An oversized HVAC system will cost more to purchase, can increase your operating expenses, and may cause comfort and moisture problems.

Did You Know?

Climate control accounts for approximately 31% of an office building's total electricity consumption.

If your HVAC equipment is less than 10 years old and operating effectively, it is probably more cost-effective to focus on optimizing the existing system and conducting proper maintenance than on replacement. The following low-cost strategies may produce significant energy savings for small and medium-sized businesses.

Optimize System Operations

Consider how your business operates and if you can make any simple changes to reduce your cooling or heating demand. For example, try stationing a greeter to open the front door for customers rather than propping it wide open. Can you shift the most heat-producing jobs to cooler, non-peak hours in the summer? Can you ratchet down the thermostat a few degrees in the winter when you have ovens at full blast? Assess whether you can implement a telecommuting policy or adjust business hours to reduce heating and cooling requirements during peak periods.

Do you know if your equipment is scheduled to support your hours of operation or if it is running day and night? You may be cooling an empty facility or running more equipment than necessary for building tenants or production activities. Consider whether you can turn off motors for air compressors or ventilation fans at night. Make the task easier by using timers or sensors to switch the motor on and off. Experiment with the optimal time to turn on the conditioning system before your business opens.

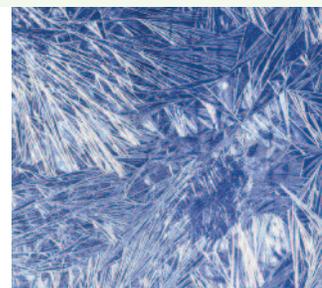
Are your systems competing? Check your equipment set-points and programs to ensure you are not simultaneously heating and cooling the facility. A 10-degree “dead band” is usually recommended for cooling and heating thermostats so you don’t cool a room down and then heat it up. A dead band is the setting between the point where the air conditioner stops cooling and the point before the heating begins.

Would it feel more comfortable if you actually raised the temperature a few degrees in the summer? Many work spaces are overcooled, as evidenced by space heaters at desks and employees wearing sweaters year-round. Ask staff for input. Try changing the temperature one degree at a time until a suitable comfort level is reached. Each degree you raise the thermostat in the summer can save 3% to 5% on cooling costs.

Try using ceiling or portable fans to improve air circulation and boost comfort without changing the thermostat. Fans can help delay or reduce the need for air conditioning. A temperature setting of as much as three to five degrees higher can feel just as comfortable with fans and circulating air.

Save energy and avoid the office thermostat wars by installing an ENERGY STAR qualified programmable thermostat to automate your HVAC system. Program it to adjust for changing occupancy patterns and production activity. A programmable thermostat costs \$25 to \$150, and it could cut your HVAC energy expenses by about 30%. Add a locking cover to prevent tampering with thermostat settings.

Exposing a Myth
Don't leave heaters or air conditioners running in unoccupied areas. It does save energy to let the building cool down or heat up and then restore it to the desired temperature before occupancy.



Larger facilities should consider a centralized energy management system (EMS). These systems provide more precise control over HVAC and other equipment, which can improve efficiency, reduce maintenance, minimize peak demand usage, and create a more comfortable environment.

You may be able to reduce the energy use of your HVAC air handler up to 75% by adding a variable speed drive (VSD). A VSD matches the motor's speed to the load and continually adjusts the motor relative to the power needed. A VSD can cut energy use and reduce wear and tear on the motor and its related components.

Maintain Your Equipment

Regular maintenance is particularly important for keeping HVAC systems running efficiently and reliably. Proper maintenance activities can save up to 30% of fan energy and up to 10% of space conditioning energy use. Consider the following suggestions and reference your HVAC manufacturer's instructions for further guidance.

Ralph Renne, site operations manager at data storage and management company NetApp in Sunnyvale, recommends checking ducts in older buildings for air flow, leaks, and correct balance. "Conducting retro-commissioning on our older buildings revealed several opportunities to save energy and improve the indoor environment." For spaces that have been subdivided multiple times, like offices, it is particularly important to balance the HVAC system and ensure proper air distribution. With a properly balanced system, you will be able to set your thermostats at more energy saving levels. Check the duct system and building shell for leaks and seal gaps with appropriate materials.

Schedule a system tune-up by a licensed contractor prior to heating and cooling season. This will keep your equipment performing efficiently and may expose impending repairs or replacements.

Have a licensed, insured technician inspect, clean, and repair, if necessary, air conditioning dampers and economizers. If these vents are not operating properly, they can allow too much outside air in or can increase energy used by the supply fan. This can dramatically increase energy costs and cause excess wear on the system.

Replace or clean your HVAC unit's filters every one to three months (or as recommended by the manufacturer) to save energy and maximize equipment life. Each dirty filter can cost your small business up to \$5 per month in energy and may shorten the service life of your equipment.

Clean the evaporator and condenser coils on your heat pump, air conditioner, or chiller. Have a qualified technician inspect motors, belts and steam traps for proper operation.

Regularly check thermostat settings and adjust to meet current business operations. These settings may be changed based on personal staff preferences, to make up for system degradation, or in response to vacation, holidays, or seasonal changes.

Ask your contractor or building engineer to check your HVAC fan and determine if it is running at the correct speed. The energy consumption of fans and pumps varies according to the speed raised to the third power, so small changes in speed can make big changes in energy consumption. HVAC equipment can often be reset on-site by an HVAC technician if a slower speed will still deliver the necessary airflow. Be sure that reducing fan speeds won't adversely affect indoor conditions. Most air conditioning equipment is designed to deliver about 400 cubic feet per minute of airflow per ton of cooling capacity.

Small and Mighty
The electricity used to power fan motors comprises a significant portion of space conditioning costs.

Seal Sneaky Leaks
Check your exterior doors for gaps and replace or install weather-stripping to eliminate these leaks. An innocent-looking gap may be allowing a lot of conditioned air to escape. For example, a pair of 6-foot, 8-inch exterior doors with no weather-stripping can have a quarter-inch gap, which is equivalent to a 16-square-inch opening! Check the windows for similar gaps.

Conclusion

Congratulations! You have armed yourself with energy efficiency information and resources. This is a key step to improving your business's operating performance and reducing its carbon footprint. Take a minute to pat yourself on the back and then get started with those improvements! Continue to invest in energy efficiency and you're likely to save money and improve your profits.

Additional Resources

Starting Point

Technical help and financial incentives, search by California zip code:
www.fypower.org/

Guidelines for Recruiting and Contracting Energy-related Services
www.fypower.org/pdf/contractguidelines.pdf

Pacific Gas & Electric Energy Efficiency Rebates Participating Vendors
www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/vendorssponsors/list/

Pacific Gas & Electric Energy Analyzers & Audits
www.pge.com/mybusiness/energysavingsrebates/analyzer/index.shtml

California's Resource for Global Climate Change Information
<http://climatechange.ca.gov/>

Measure your carbon footprint: <http://climatechange.ca.gov/action/index.html>

Funding and Decision Tools

Significant rebates and financial incentives are available to local businesses seeking to improve energy efficiency in their facilities.

Flex Your Power: Comprehensive source of energy efficiency information for California businesses and residents. www.flexyourpower.com/

Making the Business Case for Energy Efficiency, Flex Your Power
www.flexyourpower.com/pdf/energy_efficiency.pdf

Tax Incentives Assistance Project: www.energytaxincentives.org

WaterWiser's Drip Calculator: www.awwa.org/awwa/waterwiser/dripcalc.cfm

Local Resources

Silicon Valley Leadership Group Energy Watch: Offering energy-efficiency retrofits, monitoring-based commissioning and training and education:
www.calenergywatch.com/SVLG.htm

Pacific Gas & Electric Energy Watch partnerships: Offering a range of energy efficiency options for commercial, small business, and residential customers, as well as municipal facilities: www.pge.com/energywatch/

Bay Area Green Business Program: A program that recognizes and assists businesses to operate in an environmentally friendly manner; offering a green business certification: www.greenbiz.ca.gov

California Incentives for Renewables and Efficiency
www.dsireusa.org [click on California]

Pacific Energy Center: Provides educational programs, design tools, advice, and support to create energy-efficient buildings. www.pge.com/pec

Best Practices Guides

ENERGY STAR Small Business Guide: Putting Energy Into Profits
www.energystar.gov/ia/business/small_business/sb_guidebook/smallbizguide.pdf

Boosting Restaurant Profits with Energy Efficiency, Flex Your Power
http://fypower.org/pdf/BPG_RestaurantEnergyEfficiency.pdf

Commercial Office Buildings Best Practices Guide, Flex Your Power
<http://fypower.org/bpg/index.html?b=offices>

A Guide for Hotels: Boosting Profits with Energy Efficiency and Conservation, Flex Your Power. <http://fypower.org/com/bpg/view.html?b=hotels>

Retailer Energy Alliance: www1.eere.energy.gov/buildings/retailer/resources.html

Industrial Energy Efficiency Clearinghouse: Introduction to technologies, management strategies, training, and financing opportunities available to industrial energy users
www.ase.org/section/topic/industry/clearinghouse

Technology Resources

Department of Energy: Cost calculators for energy-efficient products
www1.eere.energy.gov/femp/procurement/eep_eccalculators.html

ENERGY STAR: Building Upgrade Manual, Qualified appliances, HVAC, lighting, office equipment; marketing resources for partners. www.energystar.gov

ENERGY STAR: Power Management for Windows and Macintosh operating systems to place monitors and computers into a low-power “sleep mode.”
www.energystar.gov/index.cfm?c=power_mgt.pr_power_management

Food Service Technology Center: www.fishnick.com

Motor Maintenance Checklist, Department of Energy, FEMP
www1.eere.energy.gov/femp/operations_maintenance/om_motorchecklist.html

New Buildings Institute, Advanced Lighting Guidelines
www.newbuildings.org/ALG.htm

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