

# A Guide to Green Maintenance & Operations



# A GUIDE TO GREEN MAINTENANCE AND OPERATIONS

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Responsible and proper operations and maintenance (O&M) is essential to keep a building running efficiently and effectively, and to provide a healthy environment for building occupants. This Guide offers an approach to O&M for offices and workspaces in commercial and institutional buildings that is based on several fundamental objectives:

- 1. **Improve energy efficiency**
- 2. **Improve indoor air quality & overall health and comfort of building occupants**
- 3. **Conserve natural resources**
- 4. **Make the buildings where we work last longer and cost less to operate**



# WHAT IS GREEN OPERATIONS AND MAINTENANCE?

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Energy efficiency is a cornerstone of green maintenance. Improving energy efficiency practices and sourcing renewable energy improves air quality and reduces the emissions of greenhouse gases that cause climate change. It also reduces ongoing operating costs by cutting utility bills.

Strategies like continuous adjusting and commissioning of a building's energy consuming systems (e.g. lighting, heating, ventilation and air conditioning) will keep systems operating optimally. Replacing burned out components with the most recent energy efficient products is a cost effective way to increase a building's efficiency over time.

Conventional building operations consume large amounts of resources, both in maintenance and in repairs/replacements. Selecting products that are durable, contain recycled content, or are designed for reuse/recycling helps reduce waste and conserves natural resources. Choosing water conserving faucets and fixtures saves money and reduces demand on limited water supplies.

A common source of indoor air pollution is the off-gassing of chemicals found in building materials, furnishings and maintenance products. Many paints, adhesives, sealants, binders, floor finishes and furniture, emit odors and unhealthy volatile organic compounds (VOCs). Mold and mildew can also build up as a result of moisture infiltration or poorly designed and maintained heating and cooling systems. Fortunately, alternative products are available, and good maintenance practices can help. Choosing furnishings, finishes, and maintenance products for avoided VOCs and other air contaminants can significantly improve tenant satisfaction.

## HOW THIS GUIDE CAN HELP

This Guide includes considerations for selecting and purchasing environmentally preferable products and services in building maintenance. It highlights practical, effective operation and maintenance strategies for energy efficiency, conserving natural resources, and protecting indoor air quality.



### Say Yes to Sustainable O&M

No matter how sustainable (“green”) a building may have been in its design and construction, it can only remain so if it is operated and maintained properly. For instance, the use of toxic cleaning products can deteriorate indoor air quality; poor maintenance can lead to early system or equipment failure; and occupant over-ride of designed control set points can compromise energy efficiency.



## WHO SHOULD USE THIS GUIDE?

Purchasers, remodelers and anyone specifying products or providing O&M service for offices and workspaces in commercial and institutional buildings.

## WHAT'S NEW

Each section in the 2013 Guide has been revised with updates of key issues (e.g. new chemicals of concern for human health); updated descriptions and links for certifications and standards; expanded lists and information about proven, practical strategies for preventing waste as well as smart product purchasing; and an updated list of resources.

Notable changes include updated or new regulations, standards, and certifications. These include revisions to the California Energy Commission's (CEC's) Title 24 Building Energy Efficiency Standards and alterations to existing standards for paint, flooring, and furniture. Third party certifications and standards play an increasing role in product purchasing decision-making, and the use of credible single- and multi-attribute product standards are critical to meeting the goals mentioned above.

### THE HUMAN ELEMENT

While this Guide outlines many products and practices that can improve a building's environmental and health performance, a final critical consideration is human behavior. To ensure a successful Green O&M effort, building staff and occupants must be engaged: Include O&M personnel in project planning and implementation processes; provide opportunities for employees and other building occupants to engage in "greening" practices; and train building occupants, facility managers, and maintenance staff in sustainability principles and methods.

# LIGHTING

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Lighting operations and maintenance practices can have a significant effect on a building's energy use and the productivity of its occupants. Energy savings over time return a pay back on any higher costs upfront and improved lighting can foster a healthier work environment. For instance, by switching to more efficient and effective exterior lighting systems, California businesses can realize 30% to 75% energy savings over traditional exterior lighting systems (see PG&E resources below).

In addition, energy efficient and low-mercury lighting options are increasingly available in the marketplace. Several states in the U.S., including California, have mirrored the European Commission's low-mercury requirements in lighting laws and standards and the [US Green Building Council's LEED Rating System](#) offers a Sustainable Purchasing credit for reduced mercury in lamps.

For energy efficient lighting and energy efficiency options for maintenance and operations, [BetterBricks](#) helps commercial building professionals use energy efficiency strategies to achieve sustainable high performance buildings.

[Architectural Lighting](#) sponsors a website and publishes a magazine exclusively for specifiers of quality lighting products. See a sample of local vendors that carry energy efficient lighting products in their [Green Product Directory](#).

The following guidelines will help you develop a combination of purchasing and building maintenance practices that will best maintain the proper lighting levels and light quality to provide a more productive working environment, while employing safer environmental practices, and maximizing positive return on investment over time.

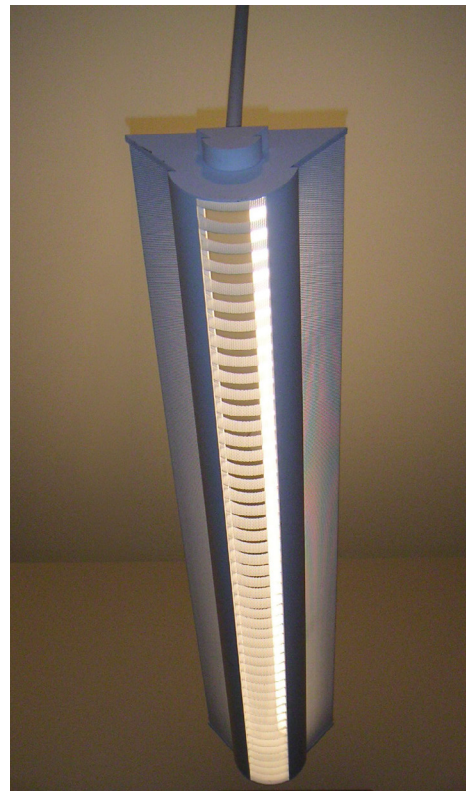
## CA BUILDING CODE/ENERGY EFFICIENCY REQUIREMENTS

As in other sections of this Guide, another important consideration for purchasing commercial lighting is meeting Title 24, part 6 of the [California Code of Regulations](#) (CCR), or the California Building Standards Code. This set of measures has a significant impact on the way lighting and controls are used in California buildings.

The Code requires that new and existing buildings preserve both outdoor and indoor environmental quality, including turning off exterior lighting



Photo: Lori Cheung



during daylight hours. This applies to outdoor areas and parking lots, entrance and exit canopy areas, and wall-pack lighting. Additionally, some lighting applications now also require motion controls. Visit [PG&E Exterior Lighting Solutions for Business](#) for details.

## ACTION ITEMS AND PURCHASING STRATEGIES

### 1. Replace incandescent, CFL, linear fluorescents, high and low pressure sodium, and halogen lighting with **ENERGY STAR LED** (light emitting diode) lighting:

- LED lighting lasts an average of five times longer than CFL lighting, reducing replacement frequency and saving on operating expenses. Visit the [energy.gov](#) website for information on LED lighting and energy savings.
- LED tubes can last up to 50,000 hours and some can be directly installed in a fixture without changing the tombstones or replacing the fixture, saving on installation costs
- LED lights do not contain mercury, are durable, and can be recycled
- LED's are often compatible with dimmers, motion sensors and other lighting controls which can lower energy consumption even further (check manufacturer labels for dimmable fixture compatibility).

**Note:** Fluorescents may still be needed in commercial or institutional environments, when there is a specialty lighting use where there is not yet an LED counterpart available. For this case, see additional fluorescent lighting information at the bottom of this section (appendix A).



- ### 2. Clean fixtures and lamps to gain more light.
- Use a soft, moist (to prevent static) cotton cloth, soft-bristled brushes with anti-static material or a low-powered hand vacuum to clean lamps and fixtures. Avoid disposable cleaning materials (e.g. paper towels).
- ### 3. Turn off lights (and other equipment) when not in use.
- Standby power, also called vampire power, refers to the electricity many gadgets and appliances still use when they are turned off but still plugged in. This plug-load energy use can account for as much as 40% of your commercial monthly electricity bill. See [Southern California Edison's Guide to Greater Energy Savings](#).
- ### 4. Employ bi-level switching.
- Bi-level switching allows you to control a lighting system in groups of fixtures or lamps to ensure that appropriate lighting levels are maintained.
- ### 5. Use daylight sensors (photocells).
- A common inefficiency of both interior and exterior lighting systems is a tendency to “day-burn,” leaving exterior lights on during the day, wasting energy and money. This problem can be prevented by installing daylight sensors that turn the lights on and off automatically.

6. **Install LED exit signs which consume about 2 watts per fixture, as opposed to 10-40 watts for typical incandescent and fluorescent products.** They also have a significantly longer life, sometimes lasting up to 10 years. Use replacement lamps with low or no mercury content by specifying for low - mercury lamps. Look for LED replacement sign lamps that are the color you need (white, red or green). An adaptor may be needed (and can be found in an LED exit sign retrofit kit), which can be significantly less expensive than replacing an entire exit sign. Look for products that are UL rated.
7. **Install occupancy/vacancy sensors.** Lighting occupancy sensors save energy and money by detecting activity in work areas and automatically turning lights on when people enter a room and off when people have left. Used properly, occupancy sensors can be a cost-effective way to reduce the operating time of lighting systems, resulting in significant energy savings.
8. **Always ask lighting vendors about their recycling services, including the collection, recycling, disposal and certification of recovery elements of their program.**
9. **See the resources section below to determine if any local rebates or incentives are available for your lighting project.**



If all U.S. companies switched to ENERGY STAR qualified exit signs, they would save \$75 million in electricity costs.

## LAMP DISPOSAL AND RECYCLING

Because of the toxicity of mercury contained in many lighting products, it is required that any mercury-containing lamps be disposed of or recycled properly as a hazardous waste. For disposal and recycling vendors and services related to lamps and ballasts, please search on [Recycle Where?](#)

For recycling requirements and best management practices, see CalRecycle's "[Fluorescent Lamps and Tubes](#)."

## LIGHTING RESOURCES

- 🌐 [Pacific Gas & Electric's website](#) lists rebates and incentives for lighting retrofits.
- 🌐 [PG&E's LED Lighting Guide](#)
- 🌐 [Bay Area Regional Energy Network](#) - a collaboration of local governments in 9 Bay Area counties.
- 🌐 [Free lighting classes](#) from PG&E - on-line and at the Pacific Energy Center in San Francisco.
- 🌐 [Directory of ENERGY STAR certified lighting products.](#)

For State of CA Energy Efficiency and Green Building Standards & Resources, see:

- 🌐 [2016 Energy Lighting Standards](#)
- 🌐 CalGreen's [Compliance Manual for Building Efficiency Standards \(Section 5\)](#)
- 🌐 [Latest State Energy Codes](#)



## LIGHTING APPENDIX A – FLUORESCENT LIGHTING

- **Use compact fluorescent (CFL) or T8 or T5 linear fixtures instead of incandescent fixtures.** Select longer-life linear fluorescent lamps with a minimum of 12,000 hours rated life.
- **Ensure the ballasts are electronic (as opposed to magnetic) for higher efficiency and better light quality (no flicker and lengthy start-times).**
- **Choose low-mercury lamps.** Look for green print or caps on the end of the linear tube.
- **Determine a replacement schedule for lamps based on current use.** Where possible (in a large, open office area, for example), consider group re-lamping. Group re-lamping tends to cost less on a per-lamp basis and helps ensure lighting of the same quality in areas where this is practiced.

## PAINT

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### KEY ENVIRONMENTAL & HEALTH CONSIDERATIONS

The key environmental considerations when purchasing paint are:

- **Volatile organic compounds (VOCs)**
- **Chemicals of concern**
- **Recycled content (exterior applications only)**



### VOLATILE ORGANIC COMPOUNDS

The strong smell that paint normally emits is from evaporation of volatile organic compounds (VOCs). While smells may appear to dissipate during the first few days after painting, several US EPA studies found off gassing of VOCs can last months. VOC emissions can affect the health and comfort of painters and occupants during that period. Exposure can cause a variety of symptoms including headaches and respiratory distress. However, new paint technologies have created paints that have low to zero VOCs, and therefore reduced odor, allowing occupants to be less disturbed by paint fumes.

Generally a “low VOC” paint has less than 50 grams per liter (g/L) per the (California) South Coast Air Quality Management District Rule 113 (Feb 2016) in all sheens, and use colorants that contain less than 50 g/L; “zero VOC” paint has less than 5 g/l. A product stating it is “VOC compliant” does not mean it is low VOC; it means the product does not exceed the State of California’s VOC limits. Look for the actual VOC content on the label.





## CHEMICALS OF CONCERN

A wide range of antimicrobials are used in paints and coatings but their use has been questioned in recent years as to their effectiveness as well as potential health impacts. While antimicrobials have been used to prevent mold and fungal growth in the paint, and prevent mold growth in exterior paint applications, manufacturers of paint products market added antimicrobials for enhanced infection control.

A 2003 study of infection control practices by the Centers for Disease Control and Prevention (CDC) concluded: “No evidence is available to suggest that use of these [antimicrobial-impregnated] products will make consumers and patients any healthier or prevent disease.” In some paint, antimicrobial chemicals contain Triclosan, a chemical of concern due to its persistence and acute toxicity in the environment.



## RECYCLED CONTENT

Select recycled content latex paint and primers for exteriors. Recycled paint is mixed with virgin materials to meet quality standards for consistency and color. The [U.S. EPA Comprehensive Procurement Guidelines](#) (CPG) recommend at least 20 percent post-consumer recycled content for white and light colors of latex paint and 50-99 percent for dark colors of latex paint. Recycled content paints, referred to as “reprocessed” by the U.S. EPA, are not recommended for interior use since the VOC content levels are typically higher than recommended VOC limits. For unused paints that have been consolidated, recycled content is 100 percent.

## ACTION ITEMS AND PURCHASING STRATEGIES

1. **Purchase interior paints following California’s [Green Building Standards Codes](#)** (see page 49 Table 5.504.4.3) that require permitted projects to use low-VOC paints which require no more than:
  - **Flat:** 50 grams/liter
  - **Non-flat:** 100 g/L
  - **High gloss:** 150 g/L
  - **Specialty coatings must meet strict VOC limits per CALGreen.**
  - **Select light and moderate tints** whenever possible since some manufacturers offer low or zero-VOC paints only in these lighter tints. VOC ratings are generally reported for the base paint before the product is tinted. Most tints are synthetic and add some VOCs, although a few brands have low or zero-VOC tints. While some manufacturers have developed darker colors with low or zero VOCs, generally saturated and darker colors have higher levels of volatiles than lighter colors.
2. **Look for paint without antimicrobials used for infection control, avoiding Triclosan (contained in Microban®) and a related chemical, Triclocarban, or other added or built-in chemical antimicrobials.** (This does not apply to antimicrobials added for the sole purpose of preserving the product.)

3. **Purchase water-based (latex) paint rather than oil-based when appropriate, and check that they do not contain the following chemicals: formaldehyde, halogenated solvents, aromatic hydrocarbons, mercury and mercury compounds.** Reference a label like Green Seal certified paint, which would not contain these chemicals; otherwise, view the Safety Data Sheet (SDS) for the specific product.
4. **Purchase paint without nonylphenol ethoxylates (NPEs).** Most paints contain NPEs, a persistent, bioaccumulative and toxic class of chemicals that are used in large amounts in products. According to several studies, the potential health effects from NPEs include hormone disruption and extreme aquatic toxicity and so US EPA has identified NPE as a high priority chemical of concern. The Green Seal GS-11 standard requires that certified paints do not contain NPEs.
5. **Avoid aerosol paint to reduce exposure to a number of health and safety concerns.**

## THIRD-PARTY CERTIFICATIONS

Select paint certified to meet a reputable third party standard for performance and environmental benefits. Third party standards and certifications for paint emphasize product performance as well as low toxicity and VOCs.

- [Green Seal](#), a non-profit certification organization, has certified paints that meet the environmental requirements of their GS-11 and GS-43 recycled paint standards. There are nine paint brands certified to Green Seal's GS-11 Standard for Paints, Coatings, Stains and Sealers. However, seek an even more stringent VOC of less than 50 g/L if possible; Green Seal's limit is 150 g/L.
- See [Master Paint Institute](#) (MPI) Green Performance 2 (GPS 2) and Extreme Green Paint standards and approved products list. Over a dozen brands are certified to meet MPI GPS2 and seven brands meet the MPI Extreme Green Standard for interior flat latex paint.

## PAINT RESOURCES

- 🌐 The [Green Product Directory](#) contains local vendors that carry no-VOC or low-VOC paint, primers and sealers.
- 🌐 [CA DGS Buying Green Guide](#) is a comprehensive resource on buying paint and includes paint specifications for recycled paint.
- 🌐 [Recycle Where?](#) and [Paintcare.org](#) can help find locations for paint recycling or proper disposal of spray, acrylic, latex, lead, and oil-based paints and paint thinners.

# FLOORING

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There are many factors that must be considered before specifying flooring, and each is dependent on the application, budget and desired aesthetics of a project. Where possible, select environmentally preferable products and clean them with least- or non-toxic cleaning products. Whichever flooring option is selected, prevent soils from tracking beyond the entryways to preserve the flooring and minimize replacement needs. Removing floor finishes can be one of the most labor intensive and hazardous of all major maintenance operations, and presents health risks for both cleaning personnel and building occupants. Emphasize intensive cleaning at entryways to capture soils there, rather than to remove dirt after it has spread throughout the facility. An ounce of prevention can save a ton of resources and unnecessary labor.

## PREVENTIVE MAINTENANCE STRATEGIES FOR ALL FLOORING

1. **To reduce cleaning costs and prolong material life, employ good entryway design: Specify track off mats at doors and the base of stairwells to collect water and dirt; indoor mats that aid in scrubbing shoes; and waterproof, smooth-surface flooring material removes contaminants from footprints (e.g. tile, stained concrete, or laminate products). The system should extend 30 feet into the building at entryways or as close to this length as is possible.**
2. **To spray buff or spot clean floors, apply solutions from a sprayer in a stream to minimize over-spray and the amount of material potentially inhaled.**
3. **Use microfiber mop heads which use up to 95% less water and chemicals and can be washed and reused; if using floor-cleaning machines, purchase those that charge water to clean instead of using floor degreaser.**
4. **Consider the potential toxicity of sealants or topcoats that protect the surface of the floor.**
5. **Consider mats made with recycled content materials.**
6. **Avoid installing carpet in entryways because it is hard to clean and it traps dirt.**



## FLOORING PRODUCT CHOICES

Resilient flooring is characterized by its durability when exposed to high traffic and compression. Compared to hard floor surfaces like stone, resilient flooring can seem somewhat “cushiony” when you walk on it and returns to an original shape after having been compressed.

Renewable options for resilient flooring include:

- **Natural linoleum**
- **Bamboo**
- **Cork flooring**
- **Rubber flooring**

Other resilient flooring products like PVC and polyolefin are typically not made of post-consumer recycled content and are difficult to recycle. They may also produce health hazards during both manufacture and when being maintained.

Non-resilient flooring is commonly referred to as “hard surface” and includes inflexible and hard surfaced flooring materials. These include:

- **Ceramic and porcelain tile**
- **Engineered flooring products.** Some pose health hazards due to a high use of formaldehyde-based binders.
- **Laminated flooring**

Carpeting is now available in low-VOC versions. Several carpet manufacturers have replaced petroleum-based materials with bio-based (agricultural crops and residues) materials. Bio-based carpet face fibers include wool, jute, sisal, hemp, coir (fibers of coconut shells), and sea-grass, all renewable and abundant sources. Recycled content carpets, carpet tiles, and backing can be made with recycled content. However, products made with recycled post-consumer carpet fiber (nylon or polypropylene) are uncommon and may be supplemented with additional sources such as fishing nets and pre-consumer fibers. Typically, most recycled content resides in the carpet backings, where traditional fillers like limestone have been replaced by coal fly ash and waste from kilns that burn carpets.

If selecting carpet, consider carpet tiles, which can be selectively replaced. They save money and significantly reduce waste during replacement. Also emerging from some carpet companies are carpet leasing and take-back models that ensure that your used carpet will be collected by the carpeting industry.





## ACTION ITEMS AND PURCHASING STRATEGIES

- 1. Choose flooring with a third-party certification** as it provides a “screen” that can help inform the specification of products. Look for labels that indicate that a flooring product meets or exceeds California Section 01350 Standard Practice. Carpet and rug products must demonstrate conformance with the NSF/ANSI 140 Sustainable Carpet Assessment Standard, operated by SCS Global Services. See [SCS Global Services Sustainable Carpet Certification Guidelines](#) for information on the assessment criteria and list of certified carpet products.
  - [FloorScore®](#) for resilient flooring
  - GreenGuard Certification for resilient flooring
  - NSF/ANSI 140 (Carpet), NSF/ANSI 332
  - NSF International’s NSF 140-2007e for carpeting
  - Green Label Plus (GLP) for carpeting
  - [Blue Angel](#), the eco-label of the federal government of Germany
  - [Green Squared® Certification](#) for ceramic and glass tiles and installation materials
  - [Certified Resilient Flooring](#) (Certified to the NSF/ANSI 332 Standard) for vinyl, linoleum and rubber flooring, wall base, stair treads and other associated products
  - [Cradle to Cradle Material Health Certificate](#): provides a third-party review of all ingredients in products and provides a “score” on relative health of the product.
  - [Declare](#) is a simple label that manufacturers can use to disclose the ingredients in their products. Any ingredients known to be hazardous are indicated in red.
  - More disclosure tools are in a [LEED credit for disclosure](#).
- 2. Use the [EPA’s Identifying Greener Carpet Guide](#) to identify key environmental considerations about carpeting** and to find specifications to use for better environmental attributes.
- 3. Request product ingredient transparency reports for the product if the content or ingredients of materials are unknown**, e.g. a Health Product Declaration, Cradle to Cradle Material Health certificate, or Declare label. More information on how to use a Health Product Declaration can be found on the [HPD Collaborative Website](#).
- 4. Select flooring that requires minimal or no stripping and finishes to reduce the use of toxic cleaners.**
- 5. Select products without added formaldehyde or that have lower emissions than the CARB regulations.** See the [CARB Guide for Composite Wood Products](#).
- 6. Consider Linoleum flooring;** vinyl is less durable and requires more material change-outs over the life of the building.

### ☑ BEST PRACTICES

Evaluate the total cost to own to help assess and compare products, and calculate the full cost to an organization including: costs of use, maintenance (cleaning) and disposal to make cost-saving decisions. For a free calculator see the [Greenhealth Cost of Ownership Calculator](#).

7. Check with suppliers for recycled content ceramic or glass tile products.
8. For wood floors, consider flooring certified by the Forest Stewardship Council (FSC).
9. Use an installer certified by the manufacturer. Surface preparation, cutting, and gluing require different methods for linoleum than for vinyl. Follow manufacturers' recommendations for adhesives.

## PURCHASING STRATEGIES SPECIFIC TO CARPET, ADHESIVES AND CARPET BACKING

1. Consider carpet that meets one of the following:
  - [Carpet and Rug Institute](#) (CRI) Green Label Plus and Standard Method V1.1 or Specification 01350 compliant, or
  - Meets NSF/ANSI 140 at the Gold level or higher (such as by Scientific Certification Systems (SCS) Sustainable Choice or other program),
  - Listed in the Collaborative for High Performance Schools (CHPS) [High Performance Products Database](#), and carpet cushion must meet CRI Green Label
2. Specify carpet without PFASs (per- or polyfluoroalkyl substances).
3. Specify carpet and backing free from added phthalates or metals (such as lead, cadmium, mercury).
4. If carpet contains recycled content, ask if the recycled content materials were tested for the chemicals listed above.
5. Ask during the bid process if the manufacturer offers a carpet Take Back Program to pick-up, reuse or recycle carpet at the end of product use. Some suppliers will take-back old carpet when a customer purchases new carpet.
6. Consider bio-based products: wool, jute or hemp.
7. Extend carpet life by specifying carpet tiles and/or implementing preventative maintenance strategies as described above. For low-emitting (VOC's) carpet product information, see: [BASC Resource Guide](#).
8. Look for carpet tile options, or a company that provides carpeting as a service or under a lease and will take back your used carpet.

### HEALTH HAZARDS TO WATCH

Many flooring options release toxins during their production, use, or disposal.

- Vinyl Composition Tiles (VCT)
- Halogenated flame retardants (HFR)
- Coal fly ash contaminant and fluoro-chemical treatments
- Phthalates such as BBP and DEHP in recycled content materials that contain recycled vinyl

## FLOORING RESOURCES

- 🌐 [The Model Bid Language Guide](#) - model bid language for purchasing carpet in CSI Format
- 🌐 [SF Approved New Carpet Regulation Guide](#) - City of San Francisco's model carpet purchasing requirements
- 🌐 [RecycleWhere? search tool](#) - flooring recycling options
- 🌐 [The Carpet America Recovery Effort](#) - useful resources on the recycling and reuse of postconsumer carpet

## FURNITURE

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### INTRODUCTION

Furniture in commercial and institutional settings includes: seating (chairs, stools, sofas, benches), work surfaces (tables, desks), built-in and modular casework, systems (walled desks with seating), storage units (cabinets, filing cabinets, drawers), shelving, panels and partitions, window coverings and related parts. Ideally, furniture provides comfort and privacy, and is crucial in helping employees be productive. Because people work on, sit in and are generally around furniture much of the day, impacts on human health are important when assessing furniture purchases or improvements. Due to increased consumer awareness and demand, certified low-emitting, high-performing furniture is now widely available from many established brands and major vendors. Realize health, environmental and economic benefits by selecting products made with environmentally preferable materials and processes.



### HEALTH AND ENVIRONMENTAL CONCERNS

Despite the fact that manufacturers continue to reduce health and environmental impacts in existing and new product lines, many tables, desks, partitions and bookcases still contain highly persistent and toxic chemicals (e.g. brominated flame retardants, fluorinated stain resistant chemicals) in adhesives, finishes, foams, and fabrics. For instance, the padding in upholstered furniture can contain soft vinyl compounds and formaldehyde to make the cushion springy, and some office furniture is constructed with a wood or plastic veneer over particleboard. Furniture production can also use a large amount of virgin resources, particularly wood and plastics. Much of the wood used in desks, chairs, tables and the frames of upholstered furniture comes from unsustainably harvested lumber, a contributor to the deforestation of tropical rainforests.

However, driven by large customer sustainability initiatives, the furniture industry has increased its use of recycled plastics, woods and metals when creating its products. Manufacturers are coming up with ways to integrate recycled and reclaimed materials in the core of their mission and product mix. In addition, furniture made with sustainably harvested wood or bamboo helps protect forest biodiversity and health. Extending the life of existing furniture and purchasing reused, recycled-content or remanufactured furniture also conserves wood, petroleum and other valuable natural resources. Look for products that are certified to meet furniture sustainability standards, such as Cradle to Cradle, BIFMA, GREENGUARD, or GOTS (the Global Organic Textile Standard).



## ACTION ITEMS AND PURCHASING STRATEGIES

Specify environmentally preferable furniture meeting the following criteria to minimize toxic chemicals, volatile organic compounds and health and safety concerns, and to help determine the safety and performance of products:

### 1. Seek products that are free from:

- **Flame-retardants:** While California's Technical Bulletin 117 (2013) allows foam in furniture to be made without added flame retardants, make sure to confirm with suppliers that flame retardants of concern have not been added in other materials.
- **Per- and polyfluoroalkyl substances (PFAS):** used as water and stain repellent treatments or other surface protection. According to US EPA, PFAS are persistent in the environment and some have been linked to cancer.
- **Formaldehyde:** should comply with CARB ACTM Phase 2, or with U.S. EPA TSCA Title VI outside of California. Acceptable labels include: "California 93120 Compliant for Formaldehyde" or "California Phase 2 Compliant", as well as "No added formaldehyde" (NAF) or "Ultra low-emitting formaldehyde" (ULEF). For a comparison of CARB Phase 2 and EPA TSCA formaldehyde requirements, see [Comparison Table of Key Requirements](#) of CARB and U.S. EPA Regulations to Reduce Formaldehyde Emissions from Composite Wood Products.
- **Intentionally added antimicrobial/antibacterial agents** (except for the purpose of preserving the product).
- **VOC emissions over the concentration limits** specified in California Air Resources Board (CARB) PHASE 2 requirements, OR should meet at least one of these four certification standards: (1) ANSI/ BIFMA LEVEL at level 1, 2, or 3, with at least one point score for Section 7.6; (2) Cradle to Cradle Gold or Platinum; (3) UL GREENGUARD Gold; or (4) SCS Indoor Advantage Gold.
- **Plan a safe area for airing out new furniture** (especially chairs and panels) with textiles. Unwrap and allow off gassing for at least 2 weeks prior to use, in area where no painting is being performed.



## **2. Specify commercial/office furniture, fabrics and other interior products that are:**

- Certified to any of these Certification Standards (see Resources below for further information):
  - a. The Global Organic Textile Standard or Oeko-Tex Standard 100 (textile fabrics)
  - b. Forest Stewardship Council (FSC) Controlled Wood Standard (FSC-STD-40-005-VS-1 EN) or meets the ANSI/BIFMA e3-2017 Furniture Sustainability Standard for bio-based renewable materials-sustainable wood
  - c. GREENGUARD low emitting products performance-based standards for indoor furniture
  - d. Cradle to Cradle Certified™ Product Standard
  - e. OE 100 standard for 100% certified organically farmed cotton in yarns, fabrics and finished goods
  - f. bluesign® voluntary standard for environmental, health and safety practices for textile manufacturers
  - g. Laboratory-testing data from an accredited lab is the “gold standard” for disclosure

## **3. When planning to purchase new office furniture, to reduce environmental impact:**

- Consider reused furniture which saves money, reduces landfill disposal, and keeps air quality from degrading since existing furnishings do not off-gas like some new materials do.
- Consider recycled content furniture. Recycled content can be found in fabrics, metals, plastics, and other polymers; post-consumer and pre-consumer recycled materials should be sourced from clean materials and free of chemicals of concern (refer to standards in this section).
- Consider reupholstering or repairing furniture, instead of buying new. Vendors may also offer a take-back/buy-back program that will reduce cost when the product is at the end of useful life.
- Review the option of leasing office furniture and partitioning. Tailor the agreement to the length of your lease to allow for payments to be fixed for the life of the agreement.
- Consider donating furniture that cannot be reused on-site or offering to employees.
- Consider modifying existing furniture for adaptive reuse, such as wall systems that can be un-mounted, relocated and reinstalled at new location, as with demountable partitions, to minimize future waste.
- Easy to repair or remanufacture (note that parts may be easy to replace/repair for only a few years before the item is discontinued). Seek an extended product and/or part warranty.
- Easy to disassemble into reusable or recyclable parts at end of use.

## FURNITURE RESOURCES

- State of California Department of General Services' office furniture specifications and contracts for new modular office furniture that meet the State's environmental specifications. Requires manufacturers to ensure no harmful use of adhesives or formaldehydes in the manufacturing process. See [DGS Buying Green Guide for Office Furniture](#).
- U.S. EPA's [Comprehensive Procurement Guidelines](#) have recommended minimum recycled content for office furniture and information on per fluorinated chemicals (PFAS's) used in furniture textiles at: [EPA's Basic Guide to PFA's](#).
- [GREENGUARD Environmental Institute](#) (GEI), part of UL Environment, has performance-based standards to define office furniture with low chemical and particle emissions for use indoors. See the Product Guide for low emitting products.
- Level® by BIFMA is an evaluation and certification system for environmentally preferable and socially responsible office furniture (certified to the ANSI/BIFMA e3-2017 Furniture Sustainability Standard): [levelcertified.org](#), [level.ecomedes.com](#).
- SCS Global Services offers 3rd party environmental certification and a database for furniture products: [Certified Indoor Air Quality](#) (compliance with California indoor air quality emission requirements and applicable U.S. Green Building Council LEED credits) including Indoor Advantage for office furniture and Indoor Advantage Gold for paints and coatings, adhesives and sealants, insulation, wall coverings, furnishings and other interior products.
- Certified Sustainable Fabrics (Certified to NSF/ANSI 336 Standard) for commercial furnishings including fabrics used for office furniture upholstery and panel systems at: [BIFMA Sustainability Certification For Furniture](#); and on-line certified [Green Products Database](#).
- [The Pharos Project](#) of the Healthy Building Network (HBN) is an independent, comprehensive (fee-based) database for identifying health hazards associated with building products.
- [The Global Organic Textile Standard](#) (GOTS) ensures organic fiber products are produced to strict criteria on quality, tracking, and social and environmental considerations.
- [Organic Exchange \(OE\) 100 Standard](#) for tracking and documenting purchase, handling and use of 100% certified organically farmed cotton fiber in yarns, fabrics and finished goods.
- [The bluesign® standard](#) is a voluntary standard that covers Environmental, Health and Safety (EHS) aspects along the textile manufacturing chain, based on: resource productivity, consumer safety, air and water emissions, and occupational health and safety.
- [Cradle to Cradle Certified™ Product Standard](#) looks at material health, material reutilization (including recycled content), renewable energy and carbon management, water stewardship and social fairness and awards products based on achievement to levels beginning with Basic, then Bronze, Silver, Gold and Platinum.
- [Green Purchasing Best Practices](#): Office and Dorm Furniture prepared for NASPO and Washington State Department of Ecology by Responsible Purchasing Network also provides guidance.

# ENERGY EFFICIENT APPLIANCES

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## INTRODUCTION: WHAT IS ENERGY STAR?

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and U.S. Department of Energy. It is a voluntary labeling program that aims to reduce greenhouse gas emissions by helping consumers purchase the most energy-efficient products available. In January of 2011, EPA implemented a third-party certification program for ENERGY STAR products across the more than 60 ENERGY STAR product categories for new products.

ENERGY STAR sets standards for energy efficiency that target roughly the upper 20% of current off-the-shelf technologies. Products that meet the requirements are eligible for the ENERGY STAR label. In addition to saving energy, many qualified products also save water. Most of these products are superior in quality and performance to unqualified models. While some ENERGY STAR appliances may cost more upfront, they will all cost less to operate over time from savings on utility bills.

In 2017, more than 2,200 product models from more than 140 manufacturers were recognized as “ENERGY STAR Most Efficient,” a distinction that recognizes products that deliver cutting-edge energy efficiency along with the latest in technological innovation.



## EVOLVING WITH THE MARKET

As technology improves and industries change, ENERGY STAR evolves with the market to deliver continued savings. For example, in 2016, EPA updated performance requirements for four product categories and added five new product categories: electric vehicle chargers, lab-grade refrigeration, smart thermostats, commercial coffee makers, and commercial boilers.

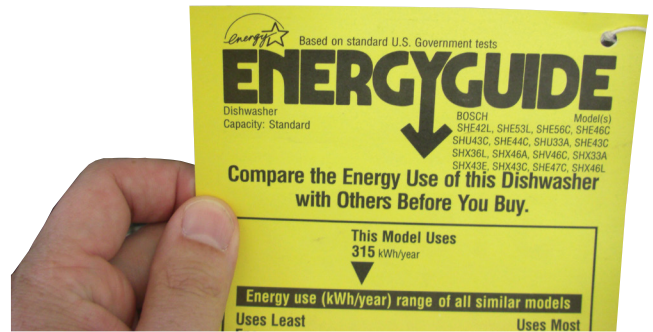


## ACTION ITEMS AND PURCHASING STRATEGIES

1. **Look for the ENERGY STAR label on numerous appliances**, including dishwashers, refrigerators, water coolers, and ventilation fans which will typically payback through energy savings in 3 years or less.
2. **Review the Energy Guide label on new water heaters** and select a model that uses the least amount of energy compared to competitors. See the Mechanical section of this Guide if you are considering purchasing or replacing a water heater.
3. **Consider maintenance when choosing appliances.**

## ENERGY EFFICIENT APPLIANCES RESOURCES

- For more information about ENERGY STAR products, see the [Energy Star Product Guide](#). ENERGY STAR offers procurement resources including savings calculators, product lists and sample procurement language for a variety of products. Choose commercial appliances on this list.
- [ENERGY STAR Portfolio Manager](#) is an online tool you can use to measure and track energy and water consumption, as well as greenhouse gas emissions. Benchmark the performance of one building or a whole portfolio of buildings, all in a secure online environment.
- [Pacific Gas & Electric](#) frequently offers rebates for qualifying appliances, and can offset a significant portion of any incremental cost increases.
- [BayREN](#) provides Small and Medium Commercial Buildings (SMCB) Business Energy Advisor Services and comprehensive, cost-effective measures to lower energy costs and improve facilities.
- [East Bay Community Energy](#) pools the electric load of participating municipal, commercial, and residential accounts for the purpose of purchasing and developing cleaner power at lower rates. Businesses can benefit from EBCE's lower rates and are also recognized for contributing to a local, green community.



## WATER EFFICIENT PRODUCTS

### INTRODUCTION

According to the US Geological Society, 20% of water use in the US is for domestic, commercial and industrial properties. Operations and maintenance personnel have a vital role in conserving this water, by keeping fixtures working well with regular cleaning and maintenance, and keeping water related costs low by employing frequent monitoring.

### CALIFORNIA REQUIREMENTS

California's Green Building Codes require water conserving plumbing fixtures for all permitted projects as follows:

- **Toilets:** less than or equal to 1.28 gallons per flush (gpf), must be Water Sense labeled.
- **Lavatory faucets:** less than or equal to 0.5 gallons per minute (gpm)
- **Kitchen faucets:** less than or equal to 1.8 gpm
- **Urinals:** less than or equal to 0.125 gpf
- **Showerheads:** less than or equal to 2.0 gpm



## LOW-FLOW FIXTURES

Water-saving fixtures have been around for many years, but many of the first low-flow products were not well designed and performed poorly. As a result, some occupants and installers remain skeptical about the reliability and performance of low-flow showerheads and toilets. To overcome this perception, specify fixtures that have been tested or evaluated for their performance. Low-flow faucets and showerheads save energy by reducing the amount of hot water used, resulting in a cost savings on energy and water bills.



## WATERSENSE

One result of performance testing of water efficient appliances has been the development of WaterSense-labeled products, which meet EPA's specifications for water efficiency and performance, and are backed by independent, third-party certification. Products bearing the WaterSense label:

- **Perform as well or better than their less efficient counterparts.**
- **Are 20 percent more water efficient than average products in that category.**

Use the WaterSense Product Search Tool to find WaterSense-labeled products featuring a wide variety of price points and a broad range of styles.

## OPPORTUNITIES TO SAVE WATER

### FAUCETS

Water flow in faucets can be reduced in two ways: inside the faucet itself (flow limiters), or at the water supply line under the faucet. Low-flow faucet adapters, such as screw-on aerators or laminar flow heads are considered flow limiters. Aeration injects air into the stream of water, thus displacing much of the water content. Laminar flow uses multiple small diameter parallel streams of water that are not aerated. Both of these methods can work well, but if not tamper-proof, have a tendency to be damaged or removed during their service life.



A tamper-resistant solution is to install permanent flow-control valves. These are installed underneath the sink/faucet and restrict the amount of water entering the faucet. A small hole in the valve controls the amount of water passing through the line, regardless of aeration or how much water pressure is at the faucet. Manufacturers size the flow control valves based on desired flow rates.

Automatic water control systems like self-closing or electronic sensor-operated faucets can also reduce potable water loss, particularly in high use areas where faucets may be left running.

WaterSense labeled bathroom sink faucets and accessories that use a maximum of 1.5 gallons per minute can reduce a sink's water flow by 30% or more from the standard flow of 2.2 gallons per minute.

## SHOWERHEADS

Flow rate is typically reduced by flow restriction or aeration. Cheaper showerheads usually restrict the water flow. Aeration with multiple flow settings provides better performance.

## TOILETS

Today's standards call for High Efficiency Toilets (HET) that use less than 1.3 gpf. HET products include:

- **Pressure-assist models** that use compressed air to aid flush performance.
- **Models with dual-flush mechanisms.** Users can choose between a 0.8-1.0 gallon flush for urine and between 1.28 - 1.6 gallon flush for solids. In actual operation, dual-flush models average about 1.0-1.4 gpf.
- **EPA WaterSense labeled flushometer-valve toilets**, whether single- or dual-flush, use no more than 1.28 gpf, which is a 20 percent savings over the federal standard of 1.6 gpf. WaterSense has also included a minimum flush volume of 1.0 gpf to ensure plumbing systems have adequate flow to function effectively.



## URINALS

Traditional flush-operated urinals consume large amounts of water. A single waterless urinal can save 45,000 gallons of water (and the resulting wastewater processing) per year over standard urinals. Water free fixtures also have the added benefit of reduced installation and maintenance costs because there are no valves to install or service. Maintenance staff will need to be re-trained to make sure they know how to change the cartridges, but most come to appreciate the simplicity of the urinals.

Urinals can account for a significant portion of indoor water usage in commercial and institutional settings. A typical office building could reduce its water use from old, inefficient urinals by 26,000 gallons per year or more. While the current federal standard for commercial urinals is 1.0 gallon per flush (gpf), some older urinals use as much as five times that amount.

While non-water urinals offer the complete elimination of flush valves and water use, other high-efficiency technologies are now commonplace. Today, manufacturers have developed and refined urinal models that flush one pint of water (0.5-liters).



## ACTION ITEMS AND PURCHASING STRATEGIES

1. **Install flow reduction devices and automatic controls** that meet standards of less than 0.5 gallons per minute (gpm) on faucets and less than 2.0 gpm on showerheads.
2. **Install high-efficiency toilets** that use less than 1.3 gallons per flush (gpf) such as those with dual-flush mechanisms or pressure-assist models. Consider 1.0 gallon toilets.
3. **Install high efficiency urinals** that use less than 0.125 gpf or are water free.

## WATER EFFICIENT PRODUCTS RESOURCES

- 🌐 [East Bay Municipal Utility District](#) (EBMUD) offers a range of water conservation services and programs for commercial customers in their service area. Includes information on rebates, free water conservation devices like low-flow showerheads and faucet aerators, and lists of retailers and low-flow toilets qualifying for rebates.
- 🌐 [The California Urban Water Conservation Council](#) has a wealth of resources on water efficiency and water efficient products. They also have a listing of [High Efficiency Toilets and the MaP and UNAR reports](#).
- 🌐 [The Dublin San Ramon Services District](#), [Zone 7 Water Agency](#), and [Alameda County Water District](#) provide water conservation services and programs for their respective service areas in parts of Alameda County, including rebates for purchasing ultra low flow toilets, high efficiency clothes washers and certain landscaping equipment.
- 🌐 [WaterSense](#) offers a variety of resources and initiatives to help save water and reduce water costs. See [WaterSense Guide for Commercial Buildings](#) and WaterSense at Work; and WaterSense Commercial Factsheets to help facility managers and building owners manage their facilities to save water, energy and operating costs.
- 🌐 The [WaterSense Simple Water Assessment Checklist](#) may also be useful for Commercial and Institutional Facilities.

# MECHANICAL SYSTEMS

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## OPPORTUNITIES TO INCREASE EFFICIENCY

Most existing buildings have opportunities for cost-effective improvements to their mechanical systems. Energy- and water-efficiency measures can be implemented throughout the facility's mechanical systems to decrease heating and cooling loads and save significant energy, water and operating costs. These upgrades have multiple objectives (from the California Energy Efficiency Standards section 4):

1. **Maximize equipment efficiency, both at design conditions and during part load operation**
2. **Minimize distribution losses of heating and cooling energy**
3. **Optimize system control to minimize unnecessary operation and simultaneous use of heating and cooling energy**
4. **Meet requirements for outdoor air ventilation during all operating conditions in recognition of the importance of indoor air quality for occupant comfort and health**

The strategies and actions presented below are intended to help meet these goals when remodeling or replacing equipment in smaller commercial and institutional buildings.



## HVAC MAINTENANCE

Field studies of commercial heating, ventilating and air-conditioning (HVAC) equipment reveal that “common” problems with equipment and controls including leaky ducts and dirty air filters can increase a building’s energy consumption by 15 to 30 percent and affect indoor air quality and occupant satisfaction. Often, these problems can be eliminated by better maintenance and inspection practices. Also make sure to review recommendations from equipment manufacturers.

## COMMISSIONING AND RETRO-COMMISSIONING

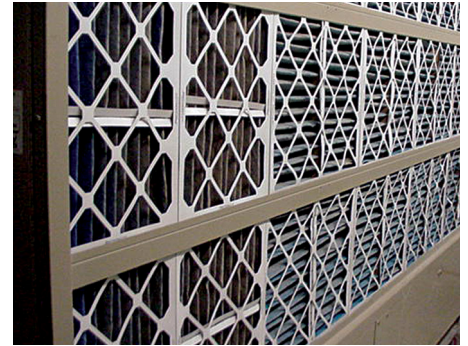
It is important to ensure that equipment is actually operating at intended efficiency levels. Commissioning systems in new construction is now required by CALGreen and LEED. Over time, equipment can begin performing at lower levels of efficiency. Retro-commissioning (RCx) can identify problem areas to correct and improve efficiency. As of 2018, PG&E offers a [Commercial RCx Program](#).



## ACTION ITEMS

### HVAC SYSTEMS

1. **Increase HVAC cooling space temperature set-points from the design values**
2. **Decrease HVAC heating space temperature set-points**
3. **Set up a regular preventative maintenance, cleaning and inspection schedule** for filters, ducts, economizers, dampers, and intake and exhaust fans based on manufacturer suggested procedures. If an inspection plan does not exist, consider contacting a HVAC contractor for help.
4. **Optimize the start/stop control for the building HVAC building automation system.**
5. **When remodeling, have a written plan for controlling and minimizing the introduction of dust particles and chemical fumes into building air systems.**



### WATER-USING SYSTEMS

To reduce mechanical system water use, facilities should first eliminate single-pass cooling systems if present (air conditioners or other equipment) or retrofit single-pass systems to reuse or recycle water. Cooling towers, chilled water systems, and water-using heating systems should be evaluated for opportunities to maximize efficiency.

1. **Inspect all valves and coils for leaks**
2. **Consider non-chemical water treatment systems** and retrofit solutions to minimize environmental impacts
3. **Active water treatment systems can lower cycles thereby reducing energy and water costs**
4. **Ensure that chilled water systems are properly maintained** and will minimize the amount of cold water needed to remove heat from equipment.
5. **Inspect all hot water heaters, hot water piping and chilled water piping to make sure it has been insulated**

Set up a regular preventative maintenance schedule for water-using systems. If an inspection plan does not exist, consider contacting a contractor for help.

### FILTERS

1. **Choose a reusable filter medium** such as bag or wet filters where possible to minimize waste.

### BOILERS

1. **Replace inefficient commercial boilers with an energy efficient product.** See the [Federal Energy Management Program's Guidelines](#) for finding and purchasing energy efficient commercial boilers.

## 2. When servicing or replacing a boiler, consider specifying a preference for\*:

- Chemical-free boiler systems
- Product that can be configured to operate as a closed-loop system
- Product installed with a tempering device for blow down water
- Permanently installed assessment equipment on the boiler steam trap

## WATER HEATERS

Many energy efficient water - heating products are available. To obtain the most efficient water heating equipment, select water heaters with the highest uniform energy factor (UEF) as possible. Tank types require maintenance every few years; tankless should be serviced annually.

Storage water heaters: for gas water heaters, choose an energy factor (EF) of at least 0.65, which equates to roughly 65% efficiency over the year. Condensing gas water heaters with energy factors as high as 0.86 are available, but may be cost-prohibitive in the short-term. Or consider switching from gas to electric heat pump water heaters (HPWH), which have UEF of over 3.5 (or 350% efficiency!)

Tankless or “instantaneous” water heaters: are generally more efficient than standard gas tank systems since they only heat water when it is needed; there is no tank of hot water slowly losing heat 24 hours a day. Gas-fueled tankless systems with electric ignition use even less fuel than systems with a pilot light. Tankless water heaters have a UEF of 0.82-0.99.

## HEAT PUMP TECHNOLOGIES

Heat pumps take the latent energy from sources like the ground, body of water, or ambient air, and convert it into usable heat pumped into the interior of a room or water heater. Because the energy used is only for moving heat instead of generating heat, these systems are extremely efficient. They work in all locations, but also have added benefits in hotter conditions – like a restaurant kitchen or a laundry where the processes use a lot of heat and they can help cool and dehumidify the space. Learn more at Energy.gov’s [Energy Saver Guide to Heat Pump Systems](#).



## CONTROLS AND SENSORS

Energy Management Control Systems (EMCS) control the operation of heating, ventilation, and air conditioning equipment. Controls provide increased comfort, improve working environments, decrease operating costs, minimize risks, can be used to curtail energy use during peak periods (aka “demand response”), and include non-energy benefits such as maintenance scheduling, troubleshooting, and

extending equipment useful life. The specific strategies for controls and sensors will depend on the system type, complexity, and building characteristics, but the following tips are helpful for most buildings:

1. **Review and optimize current control set points and schedules** to original design and make corrections as necessary to reduce unnecessary equipment runtime
2. **Consider “smart” thermostats** that can learn system and usage patterns to save energy
3. **Thermostats should include an optimized dead band width to eliminate mechanical heating and cooling**
4. **Track energy management performance**
5. **Consider remote monitoring of equipment to reduce O&M costs**
6. **For both pneumatic and DDC, check linkages, range, calibration of sensors and ancillary equipment (pneumatic leaks)**
7. **Consider adding functionality to control systems that allow alerts/alarms when systems are not operating as intended.** These systems can also help with tracking and reporting for ENERGY STAR, LEED, and other certification or recognition programs.

## ADDITIONAL ENERGY EFFICIENCY OPPORTUNITIES

1. **Install variable frequency drives (VFDs)** on all applicable motors and pumps
2. **Use economizers to reduce the operation of the cooling systems** and check that they operate effectively
3. **Install adjustable blinds or heat-blocking film on windows** to control solar heat build-up and daylight glare

## MECHANICAL RESOURCES

- 🌐 The [Energy Code Ace website](#) offers user-friendly insight into California’s Energy Code (Title 24, Part 6).
- 🌐 The [GreenPointRated website](#) provides heating and cooling product purchasing information, including product criteria and specifications.
- 🌐 The [ENERGY STAR Portfolio Manager program](#) is a free resource for tracking energy, water and waste consumption. Energy data can be conveniently automated for most utilities in California.
- 🌐 The [US EPA’s WaterSense at Work](#) program offers recommendations for mechanical systems, and the [California Energy Standards 2016 Nonresidential Compliance Manual](#) has an informative section on mechanical system requirements.
- 🌐 The CA.gov’s [Appliance Efficiency Database](#) is a CEC maintained database listing certified equipment. Manufacturers must certify to the CEC that their equipment meets or exceeds minimum standards.
- 🌐 The Energy Commission’s website includes [listings of energy efficient appliances](#) for several appliance types.

# JANITORIAL CLEANING & SUPPLY PRODUCTS

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## INTRODUCTION: GREEN CLEANING PRODUCTS

Many industrial and institutional facility managers view switching to “green” cleaning products as a necessity to eliminate workplace health and safety issues, reduce worker dissatisfaction and complaints, as well as associated costs. According to the Western Sustainability and Pollution Prevention Network, nearly one third of all janitorial cleaning products have ingredients that can cause harm to humans. Six out of every hundred professional janitors are injured each year by the cleaners they use. Additional studies such as this one reported in [Fortune Magazine in 2018](#) continue to demonstrate strong connections between cleaning products and human health concerns.

Alternatives exist to reduce exposure, minimize risk and increase comfort.

Types of environmentally preferable cleaning products available include:

- **General Purpose Cleaners**
- **Glass Cleaners**
- **Bathroom Cleaners**
- **Carpet and Upholstery Cleaners**
- **Floor Cleaners** (maintenance, strippers, finishes)
- **Cleaning and Degreasing Agents**
- **Hand Soaps** (liquid, foam)
- **Specialty Cleaners**

Proper training of maintenance personnel about the hazards, proper use, maintenance and disposal of cleaning chemicals and dispensing equipment, reduces adverse impacts to air quality, health, building finishes, building systems and the environment.

Isolating janitorial closets reduces exposure to building occupants and maintenance personnel from potentially hazardous chemicals, and biological and particle contaminants from rooms where janitorial equipment and supplies are stored.

From a green purchasing perspective, hand soaps are preferred that are free of antimicrobials. The use of antimicrobials in a wide variety of consumer and institutional products has not been proven to be effective at reducing infection<sup>1</sup>.

San Francisco Bay Area governments and businesses have reported no increase in costs after switching to environmentally preferable cleaners.



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1 The Centers for Disease Control and Prevention (CDC) 2003 [study of infection control practices](#) concluded “No evidence is available to suggest that use of these [antimicrobial-impregnated] products will make consumers and patients any healthier or prevent disease.”



## JANITORIAL PAPER PRODUCTS AND TRASH BAGS

When selecting janitorial paper products, consideration should be given to several environmental attributes:

- **Recycled content**
- **Resource conservation**
- **Sustainable forestry practices**
- **Chlorine free bleaching**



## RECYCLED CONTENT

Based on comparable quality, organizations, including cities, have found cost savings by switching to recycled paper products.

The U.S. Environmental Protection Agency (EPA) recommends recycled content levels through the Comprehensive Procurement Guide (CPG).

Type of Janitorial Paper	EPA CPG Minimum Postconsumer Content (%)
Paper Towels	40%
Bathroom Tissue	20%
Paper Napkins	30%
Facial Tissue	10%

The [State of California Public Resources Code](#) requires manufacturers of plastic trash bags sold in CA to contain a minimum postconsumer recycled content of 10% by weight, and bags with a higher postconsumer content are available. U.S. EPA CPG recommends a range of 10-100% postconsumer recycled content.

## RESOURCE CONSERVATION

The size and style of janitorial paper products and their dispensers can impact paper use. Jumbo rolls generally use less paper. Try to select paper products and dispensers proven to conserve paper as well as minimize time to refill. Ask vendors to provide product information that demonstrates the products and/or the dispensers conserve paper as well as minimize time to refill.

## CHLORINE-FREE PROCESSING

Paper processed without the use of chlorine in the manufacturing process is environmentally preferable. Chlorine and its derivatives (chlorine dioxide) are used to whiten paper yet are harmful to the environment, particularly aquatic resources. Chlorine bonds to carbon-based compounds to create dioxins which are persistent, bio-accumulative and toxic.

Specify janitorial paper that is either unbleached, Processed Chlorine Free (PCF) or Totally Chlorine Free (TCF). Avoid elemental chlorine free (ECF) processes that use chlorine dioxide.

## THIRD-PARTY CERTIFICATIONS

### CLEANERS

Reputable third party standards identify environmental and performance-based criteria for environmentally preferable cleaners and certify products that meet those standards. Green Seal's standard for Cleaning Products for Industrial and Institutional Use, GS-37, addresses toxicity of chemicals, volatile organic compounds, skin and eye irritants, inhalation toxicity, and performance criteria, to name a few. Green Seal has also set standards for Cleaning and Degreasing Agents (GS-34), Floor-Care Products for Industrial and Institutional Use (GS-40), Hand Cleaners for Industrial and Institutional Use (GS-41), and Specialty Cleaning Products for Industrial and Institutional Use (GS-53). Aside from products, services include a standard for Industrial and Institutional Janitorial Cleaning Services (GS-42).

A parallel program by UL, called UL ECOLOGO Certification Program, offers similar product standards and product certifications and is considered equally acceptable in the U.S. UL has a Sustainability standard for Hand Cleaners (UL 2784), Hard Surface Cleaners (UL 2759), and Carpet and Upholstery Care (UL 2795).

### JANITORIAL PAPER PRODUCTS

The Forest Stewardship Council (FSC) certifies paper products that are sourced from sustainably managed forests and/or credible recycling programs. With any virgin tree fibers, look for fibers that are FSC certified.

## ACTION ITEMS AND PURCHASING STRATEGIES

### CLEANING PRODUCTS AND SUPPLIES

1. **Isolate janitorial supplies** to dedicated closets to reduce occupants' exposure.
2. **Consider product testing on-site** to gain support from janitorial staff.
3. **Specify cleaning products and supplies that are certified to Green Seal** (GS-34, GS-37, GS-40, GS-41 or GS-53.) or UL ECOLOGO (UL 2759, UL 2795, or UL 2784)
4. **Consider adopting applicable procedures and practices in the Green Seal Commercial and Industrial Cleaning Services Standard (GS-42).**
5. **Specify recyclable, recycled content and/or reusable packaging for cleaning products.**
6. **Consider eliminating or reducing the use of trash can liners** to the greatest extent practicable.
7. **Request on-site training** in proper use from product manufacturers or distributors in bids and contracts consistent with Green Seal and/or UL standards.
8. **Consider reducing the total number of stocked cleaning products** by using multi-use cleaners in concentrated formulas. Reducing the total number of cleaners allows for greater control over which chemicals are used in the building and simplifies purchasing.



## PAPER PRODUCTS

1. **Specify paper products and trash bags containing at least the minimum amount of postconsumer recycled content materials** according to the U.S. Environmental Protection Agency's Comprehensive Procurement Guidelines (CPG).
2. **Minimize paper use** by selecting jumbo paper rolls.
3. **Look for FSC certified products** that source fibers from sustainably managed forests.
4. **Consider paper products that are not bleached with chlorine or its derivatives.** Prefer Processed Chlorine Free (PCF) or Totally Chlorine Free (TCF).



## JANITORIAL SUPPLY PRODUCTS RESOURCES

- 🌐 For more information, sample specifications, and lists of local vendors, see StopWaste's Fact Sheets on "Environmentally Preferable Janitorial Cleaning Products for Commercial Applications" and "Environmentally Preferable Janitorial Paper Supplies in Alameda County" at [StopWaste.org/EPP](https://www.stopwaste.org/EPP).
- 🌐 The EPA's [Comprehensive Procurement Guidelines for Paper and Paper Products](#) lists the EPA's CPG minimum recycled content requirements for commercial/ industrial sanitary tissues.
- 🌐 The [CalRecycle Recycled-Content Trash Bag Program](#) outlines the requirements and offers a list of companies complying with the State of California's recycled content requirements for plastic trash bags.
- 🌐 The [DGS Purchasing Standards](#) provides the [State of California's purchasing standard for janitorial products](#).
- 🌐 The [Alameda County GSA website](#) lists the specifications for [environmentally preferable janitorial products](#).
- 🌐 [Directory of approved cleaning products](#) from GreenSeal.
- 🌐 A list of approved products meeting the [UL ECOLOGO environmental criteria](#).
- 🌐 For environmentally preferable janitorial paper product listings, refer to [Conservatree's Paper Guide](#) and [Canopy's Ecopaper Database](#).
- 🌐 The [Western Sustainability and Pollution Prevention Network](#) provides valuable cleaning information and case studies.
- 🌐 To estimate the environmental impacts of increasing recycled content in your paper, visit the [Paper Calculator](#).

# LANDSCAPE MAINTENANCE

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## INTRODUCTION

Commercial landscapes are a benefit to the owner and the community, but they can also consume high inputs of water and energy and generate an abundance of plant debris. Increasing the resource efficiency of a landscape starts with building healthy soil, selecting plants that are compatible with the climate, exposure and topography of the site, and not over-planting. Trees and shrubs can also be planted to increase a building's cooling or energy retention.

## REQUIREMENTS

While laws require low-water consuming landscapes (as of 2015, all permitted landscapes over 500 square feet are required to meet a water budget), maintaining a “Bay-Friendly” landscape requires minimizing the use of chemical pesticides and synthetic fertilizers, mulching regularly, installing watering systems to conserve water, and selecting appropriate plants and shrubs when replanting.



## ACTION ITEMS AND PURCHASING STRATEGIES

1. **Encourage or require staff/contractors to become Bay-Friendly Qualified.** [ReScape California](#) offers the Bay-Friendly Training and Qualification for the Maintenance of Existing Landscapes throughout the Bay Area.
2. **Amend soil as needed based on a soil test, and use local, recycled quality compost.** Use the [Bay-Friendly Model Planting Specification](#) to ensure you are getting quality compost that is mature and free of weeds and contamination. Procuring regionally helps the markets for local plant debris and food scraps collection and composting programs. Require that compost be [OMRI-certified](#) or [CDFA-registered](#) as an [Organic Input Material](#) and that the compost producer be a participant in the US Composting Council's [Seal of Testing Assurance](#) (STA) Program.
3. **Mulch regularly.** Mulch conserves water, enhances the growth of plants and improves the appearance of the landscape. It can also simplify your operations by suppressing weed growth. Avoid virgin materials, such as bark mulch and gravel mulch. Refer to the [Bay-Friendly Model Planting Specification](#) for guidance on selecting recycled mulches, such as arbor mulch, palette mulch, and composted mulch or coarse compost.



4. **When replanting, select non-invasive drought-tolerant plants appropriate to the site and adapted to the region.** Group plants in hydrozones—areas of plants with similar water needs based on the plants' needs, soils, sun exposure, and other conditions. California native plants are well adapted to California's summer-dry climate and native soils.

5. **Minimize the use of chemical pesticides to reduce water pollution, support soil life, and promote resistance to plant disease.** Costs may then be reduced in the long run. For weed control in shrub areas or to remove lawn, use sheet mulching: cardboard, compost, and mulch layered directly on top of the soil, or lawn.

6. **Avoid synthetic quick-release fertilizers.** Organic, slow-release fertilizers make nutrients available to the plants when they are needed, so their efficiency increases and they are therefore often a better value. Quick-release fertilizers can make plants grow too quickly, weakening cell walls, and making plants more susceptible to disease.

7. **Manage to water budget.** Tips to save water in an existing landscape include: getting an irrigation audit, finding and repairing leaks, replacing old equipment with new, such as weather-based controllers, and using low-volume irrigation where possible. Contact your local water agency to ask about getting an audit to identify potential water savings. If a major renovation is planned, is over 2,500 sf, and requires a permit, make sure that the design complies with the [California Model Water Efficient Landscape Ordinance](#).

8. **Compost plant debris.** Separate plant debris for delivery to a composting or processing facility. Alameda County law requires that all plant debris be separated and recycled. Make sure to keep green waste free of garbage like irrigation equipment and other debris because the material is processed into useful mulch or compost for you or someone else to use. Alternatively, composting on-site reduces pollution associated with transporting waste, disposal costs and costs for purchasing mulch or compost.

9. **Use [Integrated Pest Management](#) (IPM).** Preventing pests in the first place is critical to eliminating the need for pesticides, thereby reducing pollution and protecting the Bay. Control pest problems with physical and biological methods. Insects and other pests can be an integral part of your landscape's ecosystem and low levels of pests provide food for beneficial insects. If pests cause an unacceptable level of damage, beneficial organisms can be used to feed on them, reducing the need for pesticides. As a last resort, use the least amount of toxic pesticide to control pest problems.



- 10. Avoid the use of cleaning chemicals outdoors.** Instead, use non-toxic alternatives for pressure washing, painting, moss removal, cleaning up minor oil leaks and car washing, for example. Limit lawns to areas that require it, like sports fields or play areas. Use sheet mulching to replace decorative lawn with drought-tolerant planting. Lawns take a lot of water, produce a lot of debris that is transported to a composting facility, and mowing consumes fossil fuel. Sheet mulching on top of the existing lawn converts the turf to valuable organic matter and avoids sending 87 tons of sod/acre to landfill. (Sod can not be processed at composting facilities because the grit of the soil can break processing equipment.)
- 11. Limit impervious surfaces.** Install permeable substitutes for walkways, gathering spaces and common areas because of their ability to help control storm water drainage and retain less heat.

## LANDSCAPE MAINTENANCE RESOURCES

- 🌐 Bay-Friendly Resources: Visit [ReScape California](#) for the Bay-Friendly Landscape Guidelines, model specifications, trainings for landscape professionals, and information on hiring Bay-Friendly Qualified Professionals.
- 🌐 Compost and Mulch: Visit [Lawn to Garden](#) for information on sheet mulching, maintaining drought-tolerant plants, and a directory of where to buy compost and mulch.
- 🌐 [California Model Water Efficient Landscape Ordinance](#) (MWELo) at the California Department of Water Resources.

## ADDITIONAL RESOURCES

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There are many resources available to help identify environmentally preferable products, assess their performance, utilize sample bids and specifications, and read case studies of successful efforts to maintain offices and buildings in a more environmentally sound way.

### STOPWASTE

[StopWaste](#) offers technical assistance to Alameda County public agencies for purchasing environmentally preferable building maintenance products.



Resources for “Green Purchasing” can be found at [StopWaste.Org/EPP](#). Among them are:

- Product-specific Fact Sheets on how and where to buy environmentally preferable products in the greater Alameda County area and beyond.
- Guidelines for Buying Environmentally Preferable Products list various types of products (e.g. paper, office supplies, office furnishings, janitorial cleaning products, etc.), the environmental attributes to consider when purchasing, the source of the associated “green” standard or guideline on which the environmental attribute is based, and notes or links for further information about that specific type of product.
- The [Bay Friendly Landscape Guidelines](#) offer product ideas and sustainable practices for the landscaping professional.
- Visit StopWaste’s [Green Building Overview](#) for construction-related products and information.
- [Build It Green](#) has additional resources on green building materials.
- [GreenPoint Rated](#) provides a [Green Product Directory](#).

### THE U.S. GREEN BUILDING COUNCIL’S LEED RATING SYSTEM

The [US Green Building Council’s LEED system](#) for existing buildings (called “LEED for Operations & Maintenance”) has information on best practices to manage, maintain, and certify high performance buildings.



### CALIFORNIA BUILDING CODE (CALGREEN)

Did you know that many of the aspects of green operations and maintenance recommended in this Guide are actually required by law in California’s building codes? The [California Green Building Standards Code](#) (aka “CALGreen”) and California’s Energy Code require basic green building practices for nearly every permitted project. Things like low-emitting flooring, paints and adhesives; energy efficient lighting and equipment; and water conserving fixtures and landscapes are now required by law in California.



StopWaste’s Green Building Program has compiled several [CALGreen Resources for Alameda County](#), including the CALGreen Comparison to LEED.

## ALAMEDA COUNTY GENERAL SERVICES AGENCY

Alameda County is committed to sharing their resources and experience to promote green purchasing in public agencies throughout Alameda County and beyond. Well-researched policies, success stories, bids, specifications and other resources are available at [ACSustain.org](https://www.acsustain.org). This includes several bid specifications in the building materials and building maintenance areas.



## STATE OF CALIFORNIA, DEPARTMENT OF GENERAL SERVICES

The Department of General Services (DGS) provides state agencies with information and assistance for environmentally preferable purchasing. [DGS Purchasing Standards](#) provide the minimum criteria purchases must meet to be considered Environmentally Preferable (EPP) by the State of California. DGS's [Buying Green Guide](#) provides information, tools and tips for buyers and provides insight to suppliers on how the State views “green” products and businesses.



The Guide also includes specifications, certifications and current contracts for purchasing 11 different categories of products including appliances, building & maintenance, cleaning supplies and grounds maintenance.

## RECYCLING RESOURCES

Recycling cuts waste management costs, reduces greenhouse gas emissions and helps the environment. To find out how and where to recycle any type of recyclable item in Alameda County, check the [Recycling Where?](#) database.



Not only is recycling good for the environment, but it's also the law. Alameda County Waste Management Authority (StopWaste) Mandatory Recycling Ordinance 2012-01 and State laws AB 341 and AB 1826 require most businesses and institutions in Alameda County to recycle and compost. StopWaste offers free resources to Alameda County businesses including on-site assistance, indoor green bins, signs, and stickers to properly label indoor bins. For more information, visit [RecyclingRulesAC.org/resources](https://www.stopwaste.org/resources).

For assistance designing required space for recycling in buildings, see: StopWaste's [Space Guidelines for Recycling, Organics and Refuse Services](#), [Zero Waste Design Guidelines](#), or [California 2016 Green Building Standards](#) (aka “CALGreen”).



**DISCLAIMER:**

The information in this Guide is provided as a public service for public agency and business purchasers who are interested in buying environmentally preferable products. When available, third party standards have been used to provide product guidelines and information, but have not been independently verified by StopWaste. Examples of acceptable third parties include, but are not limited to: the U.S. Environmental Protection Agency, the State of California and other public entities; Green Seal; Energy Star; Scientific Certification Systems; and the U.S. Green Building Council.

Listing in this Guide is not a substitute for the exercise of sound judgment in particular circumstances and is not intended as a recommendation or endorsement for particular products or processes by StopWaste. StopWaste is a public agency governed by the Alameda County Waste Management Authority, the Alameda County Source Reduction and Recycling Board, and the Energy Council.

This Guide was updated in March 2019 by Sustainable Concepts Studio and StopWaste.

[www.StopWaste.org/EPP](http://www.StopWaste.org/EPP)

