



Executive Order 17-20

Efficient Building Equipment Procurement Requirements

by the

**OREGON DEPARTMENTS
OF ADMINISTRATIVE
SERVICES, ENERGY, AND
ENVIRONMENTAL
QUALITY**

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OREGON
DEPARTMENT OF
ENERGY



State of Oregon
Department of
Environmental
Quality

EFFICIENT EQUIPMENT PROCUREMENT REQUIREMENTS

Executive Summary

[Executive Order 17-20](#), issued by Governor Brown in November 2017, included a directive that equipment purchased by the State of Oregon should meet high-efficiency energy and water specifications. After a comprehensive literature review and stakeholder outreach, an interagency workgroup developed specifications for procuring high-efficiency energy and water equipment.

The types of equipment subject to these requirements include equipment used inside of buildings and purchased by the State. The [categories of equipment](#) include:

- Appliances
- Electronics and IT Equipment
- Food Service
- HVAC
- Lighting
- Water and Plumbing

For these equipment types, the interagency group developed a [Procurement Selection Hierarchy](#):

- **Encourage** procurement of equipment with multi-attribute certifications that include high-efficiency energy and water specifications (e.g., Electronic Product Environmental Assessment Tool, TCO Certified, and Underwriters Laboratories ECOLOGO).
- **Require**, at a minimum, procurement of ENERGY STAR and WaterSense certified equipment.
- For equipment where no efficiency standard or certification exists, select the most efficient equipment available.

To ensure that all equipment purchased by the State meets these requirements, DAS has developed [Procurement Requirements](#) and an approach to incorporate high efficiency standards into the procurement process. This includes a combination of guiding policy, amending of price agreements, and guidance and communication.

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Background

In November 2017, Governor Brown issued [Executive Order 17-20](#), which focused on increasing building energy efficiency to reduce the effects of buildings on climate change. Directive 3.D. of the EO states that equipment purchased by the State of Oregon should meet high energy and water efficiency specifications. It directs the Department of Administrative Services, with support from Oregon Department of Energy, to develop procurement requirements in the 2018-2019 fiscal year.

Development Process

Implementation of the EO is coordinated through the [Built Environment Efficiency Working Group](#) (BEEWG), with representatives from several State agencies. Under the BEEWG, a second interagency workgroup – Building Equipment Sustainable Spec Team (BESST) – was formed with staff from the Oregon Departments of Energy, Administrative Services, and Environmental Quality.

BESST reviewed and recommended procurement specifications for energy- and water-efficient equipment, and identified opportunities to incorporate additional sustainability considerations that would further the goals outlined in both EO 17-20 and the [Oregon Sustainability Act](#) (ORS 184.423). This document was written to complement Item 3.C., the [Oregon's Statewide Plug-Load Strategy](#), as well as DAS updates to policies for behavior-based efficiency (January 1, 2020).

Stakeholder Engagement

During the development of strategies and recommended requirements to procure high efficiency building equipment, BESST engaged with multiple stakeholders across Oregon state government to ensure recommendations were workable, practical, and informed by current agency operations and practices. Specifically, the team collected input from:

- The Designated Procurement Officers Council
- The Chief Information Officer Council
- DAS building tenants
- The statewide facility managers group
- The Oregon Health Authority/Department of Human Services Joint Facilities Committee
- The Interagency Sustainability Coordinators Network
- Other interested individuals

Defining Building Equipment

What's Included?

The BEEWG provided guidance that EO 17-20 item 3.D. would apply to equipment used inside of buildings, and that the focus of the requirements should be on equipment that has energy and water efficiency characteristics identified by a recognized certifying organization. A list of building equipment was developed, based primarily on two federal programs, the Green Purchasing Compilation¹ and the Federal Energy Management Program,² with inputs from facility managers from different State agencies. This list was pared down further to include equipment for which energy- or water-efficient certifications are generally available in the U.S. market.

[Appendix A](#) lists building equipment categories and examples of equipment types within each category

What's Excluded?

The BESST recommended certain items be excluded from the requirements due to research, existing standards, or limited applicability. These exclusions are as follows:

- **Personal items** (brought in by staff and not purchased by the state), many of which are already prohibited in statewide policy; and
- **Equipment used outside**, such as landscape equipment or irrigation.

For some highly specialized equipment such as certain laboratory equipment (excluding refrigerators and freezers) or vehicle maintenance equipment, efficiency standards may not have been developed or equipment options are limited. In these situations, agencies are encouraged to identify efficient options as available and are encouraged to use this strategy to evaluate specialized equipment, identify where choices are possible, and provide intervention points to promote energy and water efficiency.

¹ www.gsa.gov/tools/supply-procurement-ertools/green-procurement-compilation

² <https://www.energy.gov/eere/femp/federal-energy-management-program>

Energy and Water Efficiency

Energy

Purchasing energy-efficient products that operate as effectively as conventional ones can reduce energy costs at government facilities by about five to 10 percent.³ In addition to reducing energy costs, energy-efficient products can lower maintenance costs (requiring less frequent replacement), reduce greenhouse gas emissions, and enhance resource conservation activities. Because energy-efficient products reduce energy consumption, they can also increase the cost-effectiveness of other energy efficiency activities, such as facility upgrades (see [Appendix B](#)). Relative to conventional products, ENERGY STAR⁴ qualified products typically use 10 to 75 percent less energy and can offer as much as 75 percent savings on consumer energy costs.⁵

Energy-efficient product procurement policies often include specifications for energy-efficient computers, scanners, copiers, printers, and water coolers, many of which use up to 60 percent less energy than conventional products. ENERGY STAR qualified computer monitors and displays use 25 to 60 percent less electricity than standard models, depending on how they are used.⁵ Energy-efficient light commercial HVAC equipment can use up to 10 percent less energy than conventional equipment, translating into savings of approximately \$3 to \$4 per square foot over the lifetime of the equipment.⁵

Water

Purchasing water-efficient products that operate as effectively as conventional ones can reduce water and energy costs in a building. For example, WaterSense products are certified to use at least 20 percent less water, save energy, and perform as well as or better than regular models.⁶

WaterSense faucets or aerators for bathroom faucets are about 30 percent more efficient than standard faucets. Traditional washing machines can use more than 50 gallons of water per load, but newer, efficient models use less than 27 gallons per load. Older toilets use 3.5 to seven gallons of water per flush, whereas WaterSense toilets use at least 60 percent less water.⁷ Replacing inefficient fixtures with WaterSense urinals can save between 0.5 and 4.5 gallons per flush, without sacrificing performance.⁸

³ *Potential Energy, Cost, and CO₂ Saving from Energy-Efficient Government Purchasing*, LBNL. 2002.

⁴ ENERGY STAR is a US EPA supported energy efficiency certification program

⁵ <https://www.epa.gov/sites/production/files/2015-08/documents/energyefficientpurchasing.pdf>

⁶ <https://www.epa.gov/watersense/about-watersense>

⁷ <https://www.epa.gov/sites/production/files/2017-03/documents/ws-facthseet-indoor-water-use-in-the-us.pdf>

⁸ <https://www.epa.gov/watersense/learn-more>

Identifying Standards and Certifications

Various energy and water efficiency standards for equipment have been established by the federal government, State of Oregon, professional industry organizations, and independent certification organizations. These standards are not always independent of each other, and often reference one another.

Certifications and standards, while related, are not the same.

Certifications are verifications of compliance with standards or specifications.

The BESST considered a broad array of efficiency criteria, and initially identified a wide range of potentially applicable standards and certifications used nationally and globally that address energy and water efficiency, as well as other sustainability attributes. Federal, state, and industry standards appropriate for building equipment were considered, along with energy efficiency incentive programs (such as Energy Trust of Oregon). Numerous sustainability certifications that contained energy or water conservation criteria were reviewed, then subsequently screened for those used or available in the United States.

To maintain consistency and high confidence that equipment would perform as claimed, specifications for energy and water efficiencies that were independently verified were given highest priority, as was prioritizing higher efficiency specifications.

A list of more than 20 different certifications, standards, and program recommendations was filtered based on credibility (i.e., verification process), coverage of building equipment categories, and efficiency specifications (to reduce duplication). The standards and certifications most widely applicable and relevant to building equipment are described below.

Standards

Federal

The U.S. Department of Energy establishes legal (minimum) limits for energy and water consumption for more than 60 consumer and commercial product lines under three categories: residential, commercial/industrial, and lighting.⁹ The standards (Code of Federal Regulations, Title 10, part 429) are developed to achieve maximum improvement in efficiency based on technical feasibility and cost effectiveness, and are reviewed at least every six years. The Federal Energy Management Program (FEMP), administered by U.S. DOE, implements energy and water conservation practices in federal buildings based on federal requirements and ENERGY STAR and WaterSense specifications (described below), and is referenced in industry sector-based efficiency specifications.

⁹ <https://www.energy.gov/eere/buildings/standards-and-test-procedures>

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State of Oregon

The Oregon Department of Energy coordinates with other states and industry experts to evaluate and develop energy efficiency standards for appliances that are not preempted by federal requirements. Currently, [Oregon has minimum efficiency standards \(ORS 469.233\)](#) for seven products: televisions, DVD electronics, commercial hot food cabinets, compact audio products, water dispensers, commercial battery charging systems, portable electric spas, and halogen lamps.¹⁰

ODOE's [State Energy Efficient Design \(SEED\) program](#) requires state facilities be designed, constructed, renovated and operated to minimize the use of energy, and includes evaluation and use of high-efficiency building equipment. Statue and Administrative Rule requires compliance with SEED program specifications ([ORS 276.900](#)) so eligible buildings exceed the energy conservation provisions of the state building code by 20 percent or more.

Industry

Industry sector-based efficiency standards have also been developed. ASHRAE, the American Society of Heating, Refrigeration and Air Conditioning Engineers, develops operating and performance standards for heating, ventilation, air conditioning, and refrigeration equipment. In partnerships with other industry organizations (ANSI, IES, ICC and USGBC)¹¹, ASHRAE has published standards for buildings systems and equipment, which can be found in [Standard 90.1-2016](#), Energy Standard for Buildings Except Low-Rise Residential Building.

The Consortium for Energy Efficiency (CEE) is an organization comprised of energy efficiency administrators, primarily from the utility sector, that promotes and advances energy efficiency. They have developed energy and water efficiency specifications for products and a searchable product database.

Certifications

Some efficiency standards for materials and products often exceed federal and state requirements, as well as industry specifications. Furthermore, specifications that address other sustainability issues have also been developed to encompass three broad categories: environmental/health, social, and economic. Sustainability standards have been developed to address each of these categories with the criteria being defined and administered by various organizations.

Manufacturers often promote the sustainability of their products, claiming the products conform to certain sustainability criteria. To confirm manufacturer claims, organizations that administer these sustainability specifications have developed verification programs.

¹⁰ <https://appliance-standards.org/states>

¹¹ ANSI (American National Standards Institute); IES (Illuminating Engineering Society); ICC (International Code Council); USGBC (U.S. Green Building Council)

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Substantiation of standards and criteria compliance can be performed by first, second, or third parties. Third-party verification is typically preferred due to the independence of the practitioner. Sustainability certifications may target only one characteristic, called single attribute, or multiple characteristics, called multi-attribute. Multi-attribute certifications may include different sustainability categories. Therefore, the most reliable and expedient means of identifying energy- and water-efficient equipment, as well as equipment that may also comply with other sustainability characteristics, is by using certification standards that are independently, third-party verified. In most, if not all cases, materials/products that comply with third-party verified (and often second-party) sustainability certifications are identified with labels, often called “ecolabels.” Ecolabelling is regulated by international specifications, though compliance is voluntary. The international standard for environmental ecolabels, ISO 14024, prescribes rules for multi-criteria, third-party verified, life cycle-based logos.

First party: organization self-certifies compliance

Second party: compliance performed by a person/organization that has a direct or indirect relationship to the claimant and may benefit from the outcome

Third party: compliance performed by a person or organization that is independent of the claimant and does not benefit from the outcome of the assessment.

ENERGY STAR

ENERGY STAR is a U.S. Environmental Protection Agency certification program for energy efficiency that is independently verified. The energy efficiency criteria exceed the minimum federal requirements. In addition to energy efficiency specifications, ENERGY STAR also includes product performance criteria, toxic chemical thresholds, and water efficiency requirements. Furthermore, for certain products, such as clothes dryers, two levels of efficiency are specified, with the higher efficiency products classified as “Most Efficient.” The ENERGY STAR ecolabel was launched in 1992 and is well recognized. It covers 75 product categories and more than 60,000 product models.

WaterSense

WaterSense is an EPA certification program for water use efficiency that is independently verified. Compliance criteria include water efficiency and performance specifications for seven product categories: tank-type and flushometer-valve toilets, faucets, urinals, showerheads, irrigation controllers, and spray sprinklers (commercial pre-rinse spray valves certification sunset on January 1, 2019). Products bearing the WaterSense label are generally 20 percent more water-efficient than similar products in the marketplace. ENERGY STAR contains water efficiency criteria for some products not certified by WaterSense.

ENERGY STAR and WaterSense are being used as the minimum requirements for procurement of high-efficiency building equipment as defined in this report.

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EPEAT

Electronic Product Environmental Assessment Tool is a sustainability certification for IT products or IT containing products, and is administered by the Green Electronics Council, a nonprofit organization that provides third party certification. Five product categories are covered by EPEAT: servers, computers/displays, imaging equipment, televisions, and mobile phones. EPEAT is a multi-attribute certification that includes requirements for materials selection, design for product longevity, reuse/recycling, energy conservation, end-of-life management, and corporate performance. The energy efficiency criteria are based on ENERGY STAR requirements. Furthermore, three sustainability levels are available, ranging from bronze to silver to gold, for products' adherence to different sustainability criteria.

DLC

DesignLights Consortium certifies high efficiency lighting. It is a nonprofit group that collaborates with the lighting industry to advance high efficiency lighting, and therefore the verification is classified as second party. The certification, DLC, focuses on high efficiency lighting for commercial uses in three categories: solid state and horticultural lighting, and lighting controls (under development). The solid state and horticultural lighting must be LED fixtures (luminaires) and lamps. DLC requirements include product performance, in addition to energy efficiency. For all products, two levels of efficiency are available: DLC Standard and Premium, with the latter being more efficient. Compared to DLC Standard, Premium is at least 28 percent more efficient, on average, across product groups.¹²

TCO Certified

TCO Certified is a sustainability certification program for IT products and peripherals, administered by a nonprofit organization, TCO, based in Sweden. TCO Certified is a multi-attribute, third party verified certification that covers eight product categories: displays, notebooks, tablets, smartphones, desktops, all-in-one PCs, projectors, and headsets. Compliance covers environmental and social criteria throughout the product's life cycle; the energy efficiency standards are based on ENERGY STAR criteria. TCO certifies to two sustainability levels, Certified and Certified Edge, with the latter adhering to additional sustainability criteria.

UL ECOLOGO/UL Certified

Underwriters Laboratory is a nonprofit organization that certifies products, services, and systems to a variety of health, environmental, and safety standards. For building equipment, UL ECOLOGO and UL Certified labels are applicable. Both are based on life cycle impacts, are multi-attribute and third party verified. Energy efficiencies are referenced to ENERGY STAR requirements when ENERGY STAR certifies those products.

Green Seal

Green Seal is a nonprofit that administers an environmental certification program, Green Seal, which is a multi-attribute, third party verified certification for both products and services. The

¹² Personal communication between Jonathan Rivin and DesignLights Consortium

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life cycle-based compliance criteria include six categories for reducing harmful effects on human health and the environment: toxicity limits, indoor air quality, chemicals of concern, waste reduction, manufacturing processes, and water and energy usage. Related to building equipment, Green Seal certifies electric, water-cooled chillers. Neither ENERGY STAR nor WaterSense certify chillers.

Consortium for Energy Efficiency

CEE has developed energy and water efficiency standards (Tiers) based primarily on ENERGY STAR and WaterSense listed products, which are third party verified certifications. However, other non-third party verified items are also included: products in the Air Conditioning, Heating and Refrigeration Institute database, which have been certified for certain performance characteristics (second party verification); the California Energy Commission qualified products database (listing products complying with California efficiency standards); and manufacturers' own submissions. CEE does not verify information and is not a certification. Using this information, CEE has created Tiers that are related to ENERGY STAR or WaterSense efficiencies. Tier 1 is equivalent to ENERGY STAR, Tiers 2-4 indicate greater energy/water efficiencies than ENERGY STAR or WaterSense, and Advanced Tier is equivalent to ENERGY STAR's Most Efficient category.

Incorporation of Standards and Certifications

The BESST used a holistic approach to provide high efficiency procurement requirements, while also highlighting an opportunity to address sustainability throughout a product's lifecycle and in sustainable procurement practices. Table 1 shows the standards and certifications that were selected to identify efficient building equipment.

Table 1: Standards and Certifications

| Name | Single (S)/Multi (M) Attribute | ISO 14024 Compliant |
|-------------------------|---------------------------------------|----------------------------|
| Standards | | |
| ASHRAE | M | - |
| CEE | - | - |
| FEMP | S/M* | - |
| State of Oregon | S | - |
| Certifications | | |
| DesignLights Consortium | M | N |
| ENERGY STAR | S/M* | N |
| EPEAT | M | Y |
| Green Seal | M | Y |
| TCO | M | Y |
| UL Certified/ECOLOGO | M | Y |
| WaterSense | S | N |

* S/M, means the Single or Multi attribute is product specific

Applying High Efficiency Requirements

To procure high efficiency building equipment while also minimizing the products' life cycle impacts requires consideration of both standards and certifications. While standards are often the basis of efficiency specifications, sustainability certifications often contain requirements that exceed standard specs. Furthermore, efficiency standards rarely contain requirements that address life cycle impacts, whereas sustainability certifications usually have been created for that specific purpose. Multi-attribute certifications, containing efficiency specifications and sustainability criteria, can often optimize high efficiency and lower environmental footprint.

In evaluating the various standards and certifications, the BESST recommends an approach that applies a [Procurement Selection Hierarchy](#) in Appendix C:

- **Encourage** procurement of equipment with multi-attribute certifications that include high-efficiency energy and water specifications (e.g., Electronic Product Environmental Assessment Tool, TCO Certified, and Underwriters Laboratories ECOLOGO).
- **Require**, at a minimum, procurement of ENERGY STAR and WaterSense certified equipment.
- For equipment where no efficiency standard or certification exists, select the most efficient equipment available.

When procuring high efficiency building equipment, certain standards and certifications are preferred over others, due to efficiency specifications and sustainability criteria. The following describes the preferences:

- ENERGY STAR is preferable to U.S. DOE's energy efficiency requirements since ENERGY STAR specifications meet or exceed the federal standards. Furthermore, U.S. DOE/FEMP specifications are focused on energy efficiency (in usage) whereas ENERGY STAR also considers other life cycle impacts.
- EPEAT, TCO Certified, and UL ECOLOGO/Certified include ENERGY STAR requirements in their certification criteria, but also contain specifications that affect different aspects of a product's life cycle, such as manufacturing and end-of-life treatment. The expanded sustainability criteria of these certifications support the goals of Oregon's Sustainability Act (ORS 184.421-435¹³) and Green Chemistry Procurement Guidelines (DAS Policy 107-009-0080¹⁴). EPEAT and TCO Certified certifications also support Oregon Administrative Rule (OAR) 125-247-0165, Practices Regarding Electronic Goods Procurement, and the goals of Sustainable Acquisition and Disposal of Electronic Equipment (DAS Policy 107-011-050¹⁵). Furthermore, OAR 107-011-140, Sustainable Procurement and Internal Operations, explicitly states, "*State government purchases items with the highest level of sustainable attributes possible...*," which supports the preference for multi-attribute

¹³ https://www.oregonlegislature.gov/bills_laws/ors/ors184.html

¹⁴ <https://www.oregon.gov/das/policies/107-009-0080.pdf>

¹⁵ https://www.oregon.gov/das/Policies/107-011-050_PR.pdf

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certifications. EPEAT, TCO Certified, and UL ECOLOGO/Certified specifications include more life cycle stages than ENERGY STAR, and therefore are preferred.¹⁶

- Regarding energy efficient lighting, the objective is to replace incandescent and fluorescent lamps with LEDs, as LEDs are more energy efficient.¹⁷ Both DLC and ENERGY STAR certify energy efficient lighting. While the preference is for third party verifications when available, DLC focuses on commercial products and the ENERGY STAR product line of lighting is primarily for residential use. Because of the different uses, the efficiency and performance requirements may not be the same. Both ENERGY STAR and DLC will be used to identify high-energy efficiency lighting.
- When identifying high-efficiency water equipment, for products that are not certified to WaterSense standards, ENERGY STAR water efficiency specifications will be applied when available.
- Oregon's appliance standards are minimum efficiencies. Therefore, when both exist for a product, ENERGY STAR is preferred.
- For chillers, within the HVACR category, FEMP or ASHRAE specifications are at least as efficient as Green Seal and should be preferred. However, as Green Seal is a multi-attribute, third party verified certification, when equivalent efficiencies are available for the same product and performance is not compromised, Green Seal is preferred.
- CEE has created a searchable product database that contains a tiered system based on primarily ENERGY STAR and WaterSense certified products, with the higher tiers preferred.

Selection Protocol for Building Equipment

Selecting building equipment with high energy and water efficiencies is the primary requirement in fulfilling the directive of EO 17-20. ENERGY STAR and WaterSense certifications are the basis for these efficiencies.

[Appendix C](#) shows the selection pathways for identifying high efficiency building equipment.

If available, all building equipment must have, at a minimum, efficiencies specified by either ENERGY STAR or WaterSense. However, other certifications are preferred over ENERGY STAR, as follows:

- EPEAT, TCO, and UL ECOLOGO certified equipment (except for boilers and water heaters) are preferred over ENERGY STAR certifications. For EPEAT, level gold is preferred over silver, which is preferred over bronze. For TCO, TCO Edge Certified is preferred over TCO Certified.

¹⁶ For phones, UL does not include ENERGY STAR energy efficiency specifications.

¹⁷ 2015 US Lighting Market Characterization. Office of Energy Efficiency and Renewable Energy, US Department of Energy. 2017

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- For lighting, ENERGY STAR or DLC certifications are required when available. DLC Premium is preferred over DLC Standard.
- CEE has created Tiers of efficiency with the higher Tiers preferred over lower Tiers: Advanced is highest Tier and Tier 1 (equivalent to ENERGY STAR or WaterSense) the lowest. The higher tiers, Tier 2 and greater, are preferred over ENERGY STAR or WaterSense only if the product is ENERGY STAR or WaterSense certified, AHRI¹⁸ certified, or California Energy Commission listed.¹⁹

Justification for not following this requirement should include analysis showing unacceptable costs, lack of availability, or building design/equipment requirements.

Alternative Refrigerants

Refrigerants are used in many systems that require cooling or refrigeration operations. Certain refrigerants with improved thermodynamic properties can increase equipment efficiency. Fluorinated refrigerants are used in many types of building equipment, including commercial refrigeration, air conditioning, heat pumps, and chillers. Hydrofluorocarbon refrigerants are the most commonly used; however, because of concerns about climate change effects, alternatives have become commercially available or are expected to be available soon, such as natural refrigerants, including CO₂, ammonia, hydrocarbons, and hydrofluoroolefins (HFOs). Climate change-friendly natural refrigerants have also been found to have better thermodynamic properties compared to standard synthetic refrigerants, which means that their use may also increase energy efficiency.²⁰

Cost Considerations

True Cost – Total Cost of Ownership

Products deemed “sustainable” may have greater up-front costs compared to similar conventional products. There are multiple reasons for this, including higher production costs, less competition, the product not being as valuable to the manufacturer as their other better-selling products, and manufacturers taking advantage of product trends. These higher prices are often obstacles for procuring sustainable products since original purchase price has traditionally been used to identify “best value.” However, initial cost is only one component of the total cost of a product.

¹⁸ Air-Conditioning, Heating and Refrigeration Institute, <https://www.ahridirectory.org>

¹⁹ <https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx>

²⁰ Biennial Energy Report. Oregon Department of Energy. <https://www.oregon.gov/energy/Data-and-Reports/Documents/BER-Chapter-2-Climate-Change.pdf>

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Total cost of ownership (TCO) is a more reliable indicator of the true cost of purchases and is a practical calculation that can be readily determined with a little effort. TCO goes beyond the original price and includes all costs associated with acquisition, operation, maintenance, and end-of-life treatment. **Consequently, the lowest initial price may not indicate the least cost asset when considering TCO.**

For example, the municipality of Loiret in France calculated the total cost of ownership of its IT equipment, which included servers, desktop and laptop computers, printers, and multifunction copiers. The audit revealed that initial procurement costs (hardware and software) represented 17 percent of TCO, operating costs were 20 percent, and 63 percent were indirect costs (maintenance, consumables, etc.).²¹

Case Studies: Procuring High Efficiency Building Equipment

Purchasing more sustainable products can save money, reduce resource use, and lower the environmental footprint over the long run, if not the short term.

DLC Certified Lighting: Oregon Department of Corrections

The Oregon Department of Corrections upgraded the lighting at its Central Distribution Center in Salem in 2017.²² A total of 126 light fixtures were changed to DLC-certified LEDs with the objectives of reducing energy usage and increasing energy savings; 121 were interior fixtures, five were exterior. Calculations were performed by the contractor, North Coast Electric Company (Portland, Oregon). Table 2 breaks down the project costs.

Table 2: Oregon DOC Lighting Upgrade Project

| Existing System Operational Expense | |
|---------------------------------------|----------------|
| Annual cost of electricity | \$3,965 |
| Annual cost of maintenance | \$2,978 |
| Existing: Total Cost | \$6,942 |
| Proposed System Operational Expense | |
| Annual cost of electricity | \$835 |
| Annual cost of maintenance | \$157 |
| Proposed: Total Cost | \$992 |
| Projected Annual Cost Savings | |
| Annual cost savings of electricity | \$3,130 |
| Annual cost of savings of maintenance | \$2,820 |
| Total Cost Savings | \$5,950 |

²¹ Life Cycle Costing: State of the Art Report. ICLEI. 2017

²² Information provided by Chad Naugle, Sustainability Program Manager, Oregon Department of Corrections

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| Project Summary* | |
|-------------------------------|------------------|
| Total material project cost | \$22,044 |
| Projected annual cost savings | \$5,950 |
| Simple Payback | 3.7 years |

May not be exact due to rounding

*Excluding ETO utility incentive (\$7,737)

EPEAT Certified IT Equipment: Kaiser Permanente

Kaiser Permanente has been using the EPEAT certification for procuring IT equipment since 2006. Using multi-attribute certifications that include efficiency specifications, such as EPEAT, will result in savings and a lower environmental footprint. Compared to products that do not meet EPEAT criteria, lifetime benefits were calculated for 989,561 IT purchases (PCs, monitors, imaging equipment) from 2006 to 2014, as shown in Table 3.²³

Table 3: Kaiser Permanente IT Purchase Benefits

| Metric | Reduction | Equivalents |
|---|---------------------|---|
| Electricity | 634 kWh | 28,111 households |
| GHG emissions | 107,042 metric tons | 43,768 cars for one year |
| Water consumption | 1 million kg | 2.5 Olympic size pools |
| Primary (virgin) materials | 221,202 metric tons | Weight of 3,460 18-wheel tractor trailers |
| Toxic materials | 46.8 metric tons | Enough mercury to fill 7,408 fever thermometers |
| Energy Cost Savings²⁴ | \$36,591,427 | |

Tools and Resources

Several online tools are available to calculate energy, water, and cost savings for procuring high efficiency building equipment. Some calculators also determine other environmental benefits. Searchable product databases can help easily find high efficiency equipment.

Table 4: Efficiency and Savings Calculators

| | |
|--------------------------------|--|
| ENERGY STAR Calculator | www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/save-energy/purchase-energy-saving-products |
| EPEAT Environmental Calculator | https://greenelectronicscouncil.org/epeat/purchasers/#benefits |

²³ Based on Kaiser Permanente EPEAT Case Study. https://greenelectronicscouncil.org/wp-content/uploads/2018/11/Kaiser_Permanente_EPEAT_case_study.pdf

²⁴ Personal communication with Andrea Desimone, Green Electronics Council.

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| | |
|--|---|
| Federal Energy Management Program Calculator | https://www.energy.gov/eere/femp/energy-and-cost-savings-calculators-energy-efficient-products |
| Ecomedes | www.ecomedes.com |
| Greenhealth Cost of Ownership Calculator | https://practicegreenhealth.org/gco |
| US EPA | https://www.epa.gov/greenerproducts/electronic-product-environmental-assessment-tool-epeat |

Table 5: Product Finder Databases

| | |
|-------------------------|---|
| CEE | http://www.cee1.org/content/cee-program-resources |
| DesignLights Consortium | https://www.designlights.org/ |
| ENERGY STAR | https://www.energystar.gov/productfinder |
| EPEAT | https://www.epeat.net/ |
| Ecomedes | www.ecomedes.com |
| TCO Certified | https://tcocertified.com/product-finder/ |
| UL SPOT | https://spot.ul.com/main-app/products/catalog |
| US Dept of Energy | https://www.regulations.doe.gov/eecompass |
| Water Sense | https://www.epa.gov/watersense/watersense-products |

DAS Procurement Requirements

To ensure that all equipment purchased by the State (e.g., by agencies) meets high efficiency energy and water use specifications, DAS has developed requirements to incorporate efficiency standards into the procurement process. This includes a combination of guiding policy, amending of price agreements, and guidance and communication (e.g., procurement manual, communication to procurement officers, and staff training).

In addition to EO 17-20, Oregon statutes and administrative rules guide sustainability in procurement, DAS Procurement Services and, more specifically, procurement of efficient equipment.

Oregon Sustainability Act (ORS 184.423)

In conducting internal operations, agencies shall, in cooperation with the Oregon Department of Administrative Services, seek to achieve the following objectives:

- (a) State purchases should be made so as to serve the broad, long term financial interests of Oregonians, including ensuring that environmental, economic and societal improvements are made so as to enhance environmental, economic and societal well-being.
- (b) Investments in facilities, equipment and durable goods should reflect the highest feasible efficiency and lowest life cycle costs.

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- (c) Investments and expenditures should help promote improvements in the efficient use of energy, water and resources.
- (i) State operations should be conducted in ways that significantly increase the efficient use of energy, water and resources.
- (j) State operations and purchases should reflect the efficient use and reuse of resources and reduction of contaminants released into the environment.

OAR 125-246-0120: General provisions for public contracting state that agencies must, in cooperation with the Department (DAS), seek to achieve the same objectives stated in ORS 184.423.

Sustainable Procurement Policy

Currently, DAS has statewide policies that guide sustainable procurements and pertain to building equipment. The statewide Resource Conservation Management Policy (proposed to be renamed the Energy and Resource Conservation Policy) guides energy and water efficiency efforts in state equipment. The Green Chemistry Procurement Guidelines (107-009-0080-PO) contains requirements for procuring less-toxic products, but also encourages inclusion of other sustainability criteria such as energy and water conservation. The Sustainable Acquisition and Disposal of Electronic Equipment policy (107-011-050-PR), adopts EPEAT's end-of-life management standards for electronic equipment. The Sustainable Procurement and Internal Operations policy (107- 011-140) includes general guidelines for procuring certain products with more sustainable characteristics.

DAS Procurement Services proposes to substantially revise Policy 107- 011-140 and create a comprehensive, updated Statewide Sustainable Procurement Policy. This policy will create an umbrella of guiding principles and practices for sustainable procurement, under which more specific requirements by topic area will be placed.

DAS Procurement Services will create specific requirements for procurements of energy and water efficient equipment for inclusion in the policy. Following the recommendations in this report, these requirements will:

- Define applicable equipment subject to EO 17-20 Part 3.D.
- Advise and recommend that equipment with multiple attribute certifications, as identified in this report, be considered first in procurements of energy and water efficient equipment, using the [Procurement Selection Hierarchy](#) in this report.
- Specify that, at a minimum, procured applicable equipment must be certified under ENERGY STAR, WaterSense, or equivalent efficiency standards.
- Document, including justification, circumstances under which agencies are unable to comply with the requirement due to:
 - Lack of availability of certified equipment to adequately service proposed need;
 - High costs when evaluating total cost of ownership; or
 - Unique circumstances related to equipment operations or building design

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Work on these policy revisions started in 2019 with identification of potential substantial revisions to DAS Policy 107-011-140. These revisions would provide guiding principles for sustainable procurement, with more specific guidance and requirements on energy- and water-efficient equipment. It is anticipated that policy revisions will be completed in 2020.

As new topic areas, price agreements, equipment specifications, applicable certifications, or other new information emerge, this policy structure will provide flexibility for section-by-section updates without the need to revise the entire policy.

Procurement Process and Requirements

DAS Procurement Services currently maintains more than 350 active price agreements and contracts that State agencies and other public entities in Oregon use to procure goods and services. Many of these include equipment, as defined in this report, that use energy or water.

DAS Procurement Services managers and staff will identify all current price agreements under which energy and water efficient building equipment is available. **Either each applicable price agreement will be amended, or new contracts revised, to include language in the buyer's guide requiring the procurement of certified energy and water efficient equipment.**

Buyer's guides will also be structured so that, for applicable equipment, certified equipment is the default option, with additional steps needed to select non-certified equipment. This includes the procurement selection hierarchy, with multi-attribute certifications as the preferred choice, ENERGY STAR and/or WaterSense or equivalent as the minimum required choice, and non-certified equipment as the last choice where the purchaser can demonstrate justification to do so.

Once all price agreements have been reviewed for their applicability and contract expiration date, DAS Procurement Services will propose a final date by which all applicable price agreements will be amended.

As part of DAS Procurement Services sustainability efforts, all new price agreements will be subject to review for opportunities to integrate resource conservation and sustainability and to ensure that the requirements of executive orders (including EO 17-20) and statewide policy are included in new agreements.

DAS Procurement Services will also update the [Oregon Procurement Manual](#) to enhance the sustainable procurement sections. For all procurement methods, from small procurement to special procurement, DAS will add requirements and guidance for compliance with EO 17-20 3.D. **Language will also be developed for request for proposals (RFPs) and invitations to bid (ITBs) to comply with the revised Sustainable Procurement Policy and EO 17-20.**

Finally, the planned transition from the Oregon Procurement Information Network (ORPIN) to a new Oregon Buys online procurement platform will allow for greater functionality in searching

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for and prioritizing more energy- and water-efficient products. This will aid in the ease of implementation for both DAS and buyers using the platform.

See [Appendix D](#) for additional procurement considerations.

Training and Education

DAS Procurement Services will complement procurement requirements and guidance with communications and staff training. This will include:

- Presentations of implementation plans to the Designated Procurement Officers Council
- Communications through the Buyerlink listserv to inform state procurement staff of the implementation plan
- Adding training slides on EO 17-20 and DAS requirements to the following DAS Procurement-accredited trainings:
 - DAS Sustainable Procurement Class
 - Fundamentals of Procurement
 - Contract Administration training

Metrics and Reporting

For applicable price agreements, DAS Procurement Services will periodically monitor and collect spend data on certified energy- and water-efficient equipment. Using benchmarks and comparisons to non-certified equipment, DAS will be able to calculate estimated energy, water, and utility cost savings from procurement of specific categories of equipment. As DAS formally develops its sustainable procurements efforts, it anticipates developing an annual report documenting sustainable procurement efforts, along with outputs and outcomes.

Appendix A: Equipment Included in the Requirements

The certifications listed under these requirements have developed databases that contain products certified under their label. This list shows the scope and categories of building equipment, though is not necessarily inclusive of all individual equipment types.

Appliances

- Air purifiers and cleaners
- Clothes dryer, (residential and commercial)
- Clothes washers (residential and commercial)
- Vending machines
- Coffee brewers (commercial)
- Dehumidifiers
- Dishwashers (residential)
- Freezers (residential)
- Refrigerators (residential)

Electronics/IT Equipment

- Audio/video equipment
- Computers: desktop, integrated, notebook, tablet
- Computers: workstation and thin client
- Computers: small-scale server
- Data center storage
- Digital signage
- Displays and monitors
- Enterprise servers
- Game consoles
- Imaging equipment
- Large network equipment
- Mailing machines
- Telephones (all types)
- Set-top and cable boxes
- Small network equipment
- Televisions
- Uninterruptible power supplies

Food Service

- Dishwashers (commercial)
- Fryers (commercial)
- Griddles (commercial)
- Hot food holding cabinets
- Ice machines, air-cooled
- Ice machines, water-cooled
- Steam cookers
- Ovens, convection, combination, rack (commercial)
- Refrigerated beverage vending machines
- Refrigerators and freezers (commercial)
- Water coolers

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HVAC

- Air conditioner (residential and commercial)
- Boilers (residential and commercial)
- Ceiling fans (residential)
- Central air conditioners (residential)
- Electric chillers, air-cooled (commercial)
- Electric chillers, water-cooled (commercial)
- Gas furnaces (residential)
- Heat pumps, air source
- Heat pumps, geothermal (residential)
- Heat pumps, water source
- Industrial process refrigeration
- Light heating and cooling equipment (commercial)
- Solar thermal collector, honeycomb
- Thermostats smart/wireless
- Ventilation fans (residential)
- Water heaters, electric storage/HP (residential)
- Water heaters, gas (commercial)
- Water heaters, gas storage (residential)
- Water heater, solar (residential)
- Water heater, tankless gas (residential and commercial)
- Water heater, tankless electric

Lighting

- Decorative light string
- Exit signs
- Exterior lighting
- Fluorescent ballasts
- Fluorescent lamps, general service
- Fluorescent luminaires, ceiling-mounted
- Fluorescent luminaires, suspended
- LED downlight lamps for CFL fixtures
- LED fixtures w/integrated controls
- LED luminaires (commercial and industrial)
- Light bulbs (CFL/LED)
- Light fixtures (residential)
- Light fixtures, luminaires (commercial)
- Wireless advanced lighting controls

Water and Plumbing

- Faucets (residential)
- Pool pumps
- Showerheads
- Toilets
- Urinals
- Pre-rinse spray valves

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Appendix B: ENERGY STAR Specifications Overview: Energy Savings and Payback Period

| Product Category | Percent Energy Savings Compared to Conventional Product | Payback Period |
|--|---|--|
| Dishwashers | 30% | 2 years |
| Refrigerators and freezers | 20% (refrigerators) 10% (freezers) | 3 years |
| Computers | 30% | 0 years (typically no retail cost premium) |
| Copiers | 10% | 0 years (typically no retail cost premium) |
| Monitors | 20% | 0 years (typically no retail cost premium) |
| Multifunction devices | 15–30% (laser v. inkjet) | 0 years (typically no retail cost premium) |
| Printers, fax machines, and mailing machines | 10% | 0 years (typically no retail cost premium) |
| Scanners | 10% | 0 years (typically no retail cost premium) |
| Boilers | 5% | <5 year |
| Light commercial HVAC | 5% | Varies Regionally |
| Ventilating fans | 70% | 0 years (typically no retail cost premium) |
| Commercial hot food holding cabinets | 30% (gas) | <5 years |
| Commercial ice makers | 65% | <3 years |
| Commercial refrigerators and freezers—solid door | 15% | <2 years (preliminary assessment) |
| Water coolers | 35% (gas) | 0 years (typically no retail cost premium) |
| Vending machines | Other | 0 years (typically no retail cost premium) |

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ENERGY STAR develops performance-based specifications to determine the most energy-efficient products in a particular product category. These specifications, which are used as the basis for ENERGY STAR qualification, are developed using a systematic process that relies on market, engineering, and pollution savings research and input from industry stakeholders. Specifications are revised periodically to be more stringent, which has the effect of increasing overall market energy efficiency (U.S. EPA, 2007h). EPA and DOE screen all the specifications annually to determine if any require reassessment. These assessments may lead to a specification revision, a specification being sunset, or no action being taken depending on market readiness for the next level.

To view current ENERGY STAR criteria, please visit http://www.energystar.gov/index.cfm?c=product_specs.pt_product_specs.

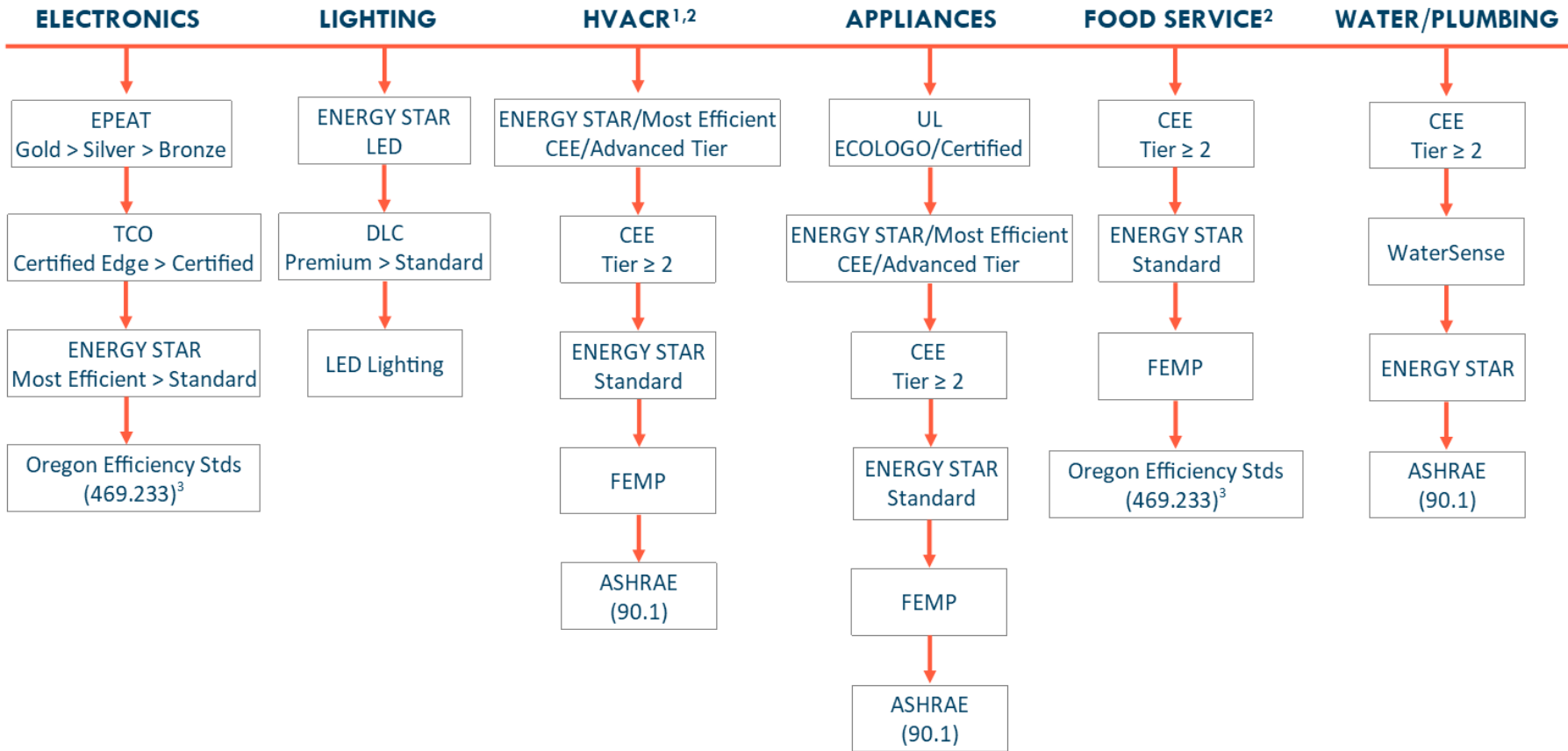
To view specifications that are under review or revision, please visit

http://www.energystar.gov/index.cfm?c=prod_development.prod_development_index.

Source: U.S. DOE, 2009; U.S. EPA, 2009b.

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Appendix C: Procurement Selection Hierarchy



¹ For chillers, see section *Applying High Efficiency Requirements*

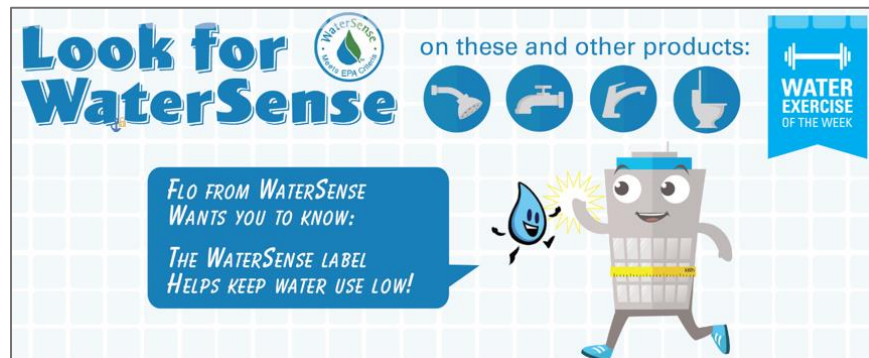
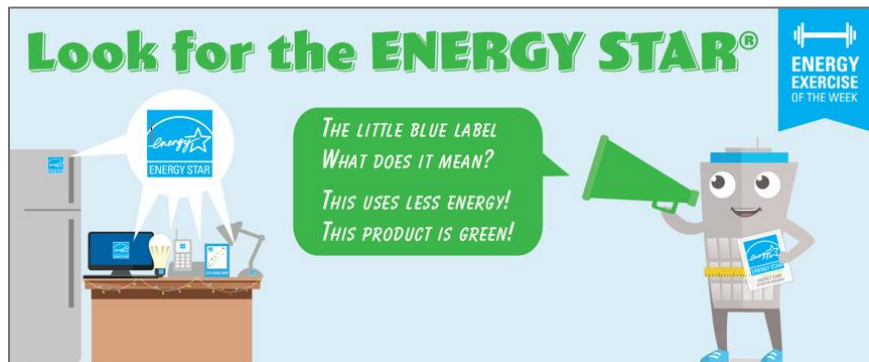
² See section *Alternative Refrigerants*

³ Already mandatory in Oregon for some equipment categories

Appendix D: Additional Considerations for Procurement

The choice to not buy or to reduce the amount purchased should be incorporated into a long-term procurement and portfolio optimization plan.

- **Consolidate and centralize first.** Eliminate equipment that is not being used and consolidate equipment so it is being used more efficiently. This can mean replacing equipment with a centralized solution and system.
- **Choose the right size and quantity.** When choosing equipment, select devices that match user need and use patterns, working toward “best fit.” This includes assessing current use patterns and not buying oversized equipment to meet infrequent peak events or “worst case” scenarios.
- **Upgrade.** Upgrade equipment to more efficient models. Consider replacing equipment when new models offer enough improved efficiency to be cost-effective for early or immediate replacement. With efficiencies and availability rapidly changing, periodically review equipment for upgrades.
- **Run a pilot or demonstration project.** Testing out new equipment can identify potential issues or needs, while also building champions who can help support rollout.
- **Outreach and engagement.** A variety of communication strategies and tactics can build awareness and understanding of efficiency requirements. Tailor activities to the specific audience and desired outcomes. [ENERGY STAR](#) offers templates for outreach.



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For More Information

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