

Appendix B: Background Information Concerning Products and Proposed Standards

This describes products identified as good candidates for new efficiency standards and the basis for and source of the proposed standard. We identify states that already adopted standards for the listed products. We adapted this from “Opportunities for New Appliance and Equipment Standards: Energy and Economic Savings Beyond Current Standards Programs,” by the American Council for an Energy-Efficient Economy (ACEEE), September 2001. The full ACEEE document provides extensive background and technical detail for each product and proposed standard. You can download it from <http://www.aceee.org/energy/reports.htm>.

Dry-type distribution transformers. Many commercial and industrial buildings use distribution transformers to step down from line voltage to the voltages used to power building systems. Purchasers select these systems on the basis of first costs, leaving significant opportunities for cost-effective energy savings. The National Electrical Manufacturers Association (NEMA) developed a recommended standard (NEMA standard TP-1) that reduces the energy losses associated with this equipment by an average of about one-third, with the added cost of the more efficient equipment paid back in about three years. Massachusetts and Minnesota adopted the NEMA standard as a mandatory standard and California and New York are in similar processes. The Energy Policy Act of 1992 instructed the Department of Energy (DOE) to develop standards for these products, but it has not done so.

Consumer electronics (standby power). Many types of electronic equipment used in homes continuously use small amounts of power, even when they are *off*. Examples include TVs, VCRs, set-top boxes, microwave ovens and many rechargeable products. Aggregated over the many hours in a year and over the number of such products in a typical home, *standby* power use amounts to about 5 percent of electricity use in that home, according to analyses by Lawrence Berkeley National Laboratory. More efficient power supplies and other technical improvements can reduce this standby power use by an average of about 75 percent in the vast majority of cases, at a typical cost of no more than a couple of dollars per product. For some of these products, the Environmental Protection Agency’s ENERGY STAR® program awards special labels to identify low power designs. Set-top boxes are an especially wasteful type of consumer electronic equipment. Typically, a cable or satellite TV company purchases the box for the consumer who pays the energy bill. The companies have no incentive to purchase more efficient boxes. The ENERGY STAR® specification for set-top boxes cuts their typical electricity use by about 75 percent.

Torchiere lighting fixtures. Torchieres are portable lighting fixtures that aim light upward, bouncing it off the ceiling to provide indirect lighting. In recent years they have become ubiquitous in American homes and apartments due to their high light levels and low costs. However, these products are major energy hogs, and can be fire hazards as well (more than 400 fires have been traced to halogen-bulb torchieres). The typical product consumes 300 Watts or more of power. Much more efficient torchieres based on high-output compact fluorescent designs use less than 100 Watts and provide the same light output without creating a fire hazard. The simple payback for these more efficient units is typically less than two years. The California Energy Commission (CEC) developed minimum efficiency standards for these products that cap energy use at 190 Watts and include other important technical details.

Commercial unit and duct heaters. Unit heaters provide heating in open commercial and industrial spaces. The typical system has a seasonal efficiency of about 63 percent, whereas systems with power or induced-draft burners typically have seasonal efficiencies of about 82 percent. The more efficient systems reduce energy use an average of 23 percent and have a simple payback of about two years.

Due to the impact of federal standards, most residential heating systems use power or induced-draft burners, and DOE recently adopted new regulations for commercial furnaces, requiring similar improvements.

Traffic signals. Like exit signs, most traffic lights use incandescent bulbs, but available LED lights reduce energy use about 90 percent and have additional maintenance and safety benefits. Unlike incandescent lamps, LED lights operate for many years. When LEDs age, they just get dimmer until replaced, thus preventing the safety problems that develop when a lamp in a traffic light burns out. As with exit signs, there is an ENERGY STAR® specification. California is making it a mandatory state standard. Such a standard should apply to red and green lights, since these account for the vast majority of traffic light energy use, and have the most favorable economics (typically simple payback periods of 1-4 years, depending on the application).

Exit signs. Many exit signs use incandescent bulbs (40 Watts is typical), and since they are continuously illuminated, typically cost around \$30 per year to operate. New designs use *light emitting diodes* (LEDs) and consume on the order of three Watts, reducing energy use by more than 90 percent relative to an incandescent sign. The simple payback for using LED signs instead of incandescent signs is generally less than two years. In addition, the LED signs require less frequent bulb changes, resulting in substantial maintenance cost savings. The ENERGY STAR® program has established an energy and safety performance specification for the more-efficient signs. California is adopting this specification as a mandatory minimum performance standard.

Commercial refrigerators and freezers. Federal standards address residential refrigerators and freezers but do not address the larger commercial units used in restaurants, hotels, hospitals and other commercial applications. Research by Arthur D. Little Company for DOE found that the energy use of typical commercial refrigerators and freezers could be reduced by 45-55 percent using improvements with an average simple payback to the user of just over two years. The California Energy Commission (CEC) developed minimum efficiency standards for these products based on the energy use of the average product on the market today.

Icemakers. Many hotels, motels, restaurants and hospitals use ice makers to produce ice in large quantities. Icemakers use a substantial amount of energy in order to freeze water and maintain the ice as separate cubes. Products on the market vary substantially in efficiency, with the most efficient products typically using about 30 percent less energy than the least efficient. The most efficient ones typically have a simple payback of one year or less. The Federal Energy Management Program (FEMP) developed a specification that identifies the top performing units on the market today for each product category (features and size).

Furnace and heat pump fans. Federal standards address the efficiency of residential furnaces and heat pumps, but they don't include the energy consumed by the blower used to circulate conditioned air around the home. The typical furnace fan uses 800-1000 kWh per year, but more efficient fans on the market use less than 300 kWh, saving more than 60 percent. In mass production the more efficient fans cost on the order of \$100 more than a conventional fan, producing a simple payback to the homeowner of less than three years. Setting an optimal fan power limit requires additional technical work (i.e., these limits need to take account of the heating capacity and airflow of the system).

Ceiling fans. Many homes use large *Casablanca-style* ceiling fans to circulate air around a room and help occupants feel more comfortable. However, most of the fans have inefficient motors and blade designs, not to mention inefficient lighting systems (many of the units also include lights). A major manufacturer recently introduced a more optimized design that reduces energy use by 40 percent. The incremental cost of this efficient model relative to standard models with similar features is about

\$20, resulting in a simple payback to the consumer of about 3.5 years. ENERGY STAR® launched a program for residential ceiling fans that will require better blade/motor designs and more efficient lighting.

Vending machines. Beverage distributors purchase most vending machines and place them in a variety of locations at no cost to property owners. However, the property owner does pay for the electricity to operate these machines. Since the purchaser does not pay operating costs, there is little incentive to purchase efficient machines; most vending machines are inefficient as a result. A study by Arthur D. Little Company for DOE estimated that the energy use of vending machines could be reduced by 44-51 percent using measures with an average simple payback of 2.4-3.2 years. However, there is insufficient information on the energy use of the full range of machines sold today, so further data collection is needed before performance standards can be set. The CEC plans to collect this data. However, a simple standard requiring efficient lighting can save about 11 percent. The CEC is adopting a standard requiring T-8 lamps and electronic ballasts or lighting systems with equivalent efficacy.