

EXECUTIVE SUMMARY

At both the state and national levels, energy-related problems are as severe in 2006 as they have ever been. Energy prices have increased sharply over the past several years, placing an ever greater burden on consumers and businesses. For example, natural gas prices have skyrocketed, with average residential prices reaching \$13.30 per million Btu over the first 10 months of 2005, up 53% relative to the same period in 2002. Low- and middle-income families are especially hard hit. Meanwhile, energy-related environmental problems, most notably global warming, continue to dot the news headlines. From a national security perspective, observers of all political stripes raise concerns about U.S. dependence on imported energy—especially oil, but increasingly natural gas. The interconnectedness of energy markets means that price increases for any one resource often ripple through all energy markets. Power system reliability presents yet another challenge. The catastrophic Northeast blackout of August 2003 remains a fresh reminder of the economic costs imposed by electric grid reliability problems. Growing demand for power continues to strain electric systems in some parts of the country.

Given these energy-related problems, policymakers increasingly are turning to efforts to use energy resources more efficiently. This report describes sensible and up-to-date opportunities to advance one specific energy-saving policy: appliance and equipment efficiency standards. Efficiency standards stand out as one of the most effective and successful policies used by both state and federal government to save energy. These standards help reduce unnecessary energy waste by requiring that certain energy-consuming products meet minimum energy-savings performance levels. By saving energy, these standards save consumers and businesses significant amounts of money over the life of the affected equipment, reduce pollution, and improve electric system reliability.

In addition, by easing demand for energy, efficiency standards and other energy-saving policies can help lower natural gas and electricity prices. In 2005, ACEEE researchers found that natural gas markets are so tight that just a modest 2–4% reduction in national gas use can reduce natural gas prices by 20% or more. Such savings can be achieved with more efficient gas-fired appliances as well as through reduced electricity use, since in many regions of the United States, natural gas is the marginal fuel used for power generation.

State Appliance and Equipment Efficiency Standards

Individual states initiated the first efficiency standards for appliances and other equipment in the 1970s and 1980s. California adopted the first appliance standards law in 1974 and in the late 1970s and early to mid-1980s, other states (including Florida, Kansas, and New York) established state standards for various products. These state standards led to broad support for national standards, which Congress enacted in 1987, 1988, and 1992 and Presidents Reagan and George H.W. Bush signed into law to save energy and replace a patchwork of state standards. These initial efficiency standards covered major residential appliances (e.g., refrigerators, air conditioners, water heaters, washers and dryers, etc.) as well as the most common commercial equipment (e.g., fluorescent lamps, motors, furnaces, etc.). Their success has been well-documented. For example, as a result of several rounds of state and

federal standards, a typical new refrigerator today uses less than one-third as much energy as a typical one sold in the early 1970s. Overall, these existing standards will net consumers and businesses nearly \$200 billion in savings by 2020.

Since 2001, states have again been turning to efficiency standards to help reduce energy waste. California adopted new standards for several products in 2001 and for more products in 2004. Maryland and Connecticut enacted state standards laws in 2004, followed by New Jersey, Arizona, Washington, Oregon, Rhode Island, New York, and Massachusetts in 2005. As in the 1980s and 1990s, this round of state standards prompted broad support for strong federal standards, resulting in Congress enacting 16 new standards as part of the Energy Policy Act of 2005, signed into law by President George W. Bush in August 2005. These latest national standards will save energy users another \$50 billion net by 2020.

This report examines opportunities for new equipment and appliance standards beyond those enacted by Congress in 2005. We find that near-term standards make sense for 15 products evaluated in this report and that such standards would achieve considerable energy savings, economic benefits, and pollution reductions. These standards could be set at the national or state level, but, given the historical approach to efficiency standards, we recommend that states act first to set such standards. Details on each of these products, including recommended standards and information on product availability and economics, are provided in the body of the report.

Key Recommendation

The 15 products for which we recommend near-term state standards are:

- bottle-type water dispensers
- commercial boilers
- commercial hot food holding cabinets
- compact audio products
- DVD players and recorders
- liquid-immersed distribution transformers
- medium-voltage dry-type distribution transformers
- metal halide lamp fixtures
- pool heaters
- portable electric spas (hot tubs)
- residential furnaces and boilers
- residential pool pumps
- single-voltage external AC to DC power supplies
- state-regulated incandescent reflector lamps
- walk-in refrigerators and freezers

Most of these products are not currently covered by national standards and thus state standards are uninhibited by federal law. For three products included here (commercial boilers, pool heaters, and residential furnaces and boilers), national standards currently exist

but they have become badly outdated. Under federal law, if a state wishes to enforce a standard tougher than federal minimums, it must first establish the standard and then petition the U.S. Department of Energy (DOE) for a waiver from federal preemption.

Key Findings

If adopted on a national basis, the recommended standards would:

- Save consumers and business \$54 billion net for appliances and equipment purchased between 2008 and 2030.
- Save 52 terawatt-hours (TWh)¹ of electricity in 2020, an amount equal to nearly 2% of projected residential and commercial sector U.S. electricity use in that year.
- Save about 340 billion cubic feet (bcf) of direct natural gas in 2020 (100 bcf savings from reduced gas use for boilers, furnaces, and pool heaters and an additional 240 bcf savings in power plants), enough to meet the natural gas heating needs of about 6.3 million typical households.
- Cut national electricity demand levels by about 12 gigawatts (GW)² in the year 2020, an amount roughly equal to the generating capacity of 40 average power plants (i.e., 300 MW each).
- Save 9 billion gallons of water (used for generating steam) at power plants in the year 2020.
- Cut global warming carbon emissions by 12 million metric tons (MMT) in 2020, an amount equal to that emitted by 8 million average passenger cars annually.³
- Reduce significantly emissions of smog-forming nitrogen oxides (NOx), sulfur oxides (SOx—the main component of acid rain), fine particulate matter, and mercury.

Annual savings levels will continue to grow after 2020 as purchasers continue to install appliances that meet the standards (see Table ES.1 for 2030 savings levels). Overall, the recommended standards would have a benefit-cost ratio of 4.5 to 1; for every \$1 consumers or businesses invest in improved efficiency, they'll save \$4.50 on energy bills. Tables ES.1 and ES.2 summarize the energy, economic, and pollution savings potential from adopting national minimum-efficiency standards for the above 15 products.

Achieving the national benefits outlined here will require federal government action. However, as in the past, states can and should act first, both to gain the considerable benefits of state standards for themselves and, eventually, to prompt appropriately strong national standards. To assist states in considering such standards, we have estimated the benefits of adopting the recommended standards for each of the states. We make the state-by-state benefit data available in an online appendix consisting of a table for each state published at www.standardsASAP.org.

¹ One TWh is a billion kWh.

² 12 GW = 12,000 MW.

³ A typical vehicle emits 12,000 lbs. of carbon dioxide each year (about 1,500 kg carbon), based on an average on-road fuel economy of 20 miles per gallon and average vehicle use of 12,000 miles per year.

Table ES.1. Estimated Energy Savings and Economics of Proposed New Standards

Products	Effective Date (year)	National Energy Savings in 2020		National Energy Savings in 2030		Cumulative Savings for Products Purchased Thru 2030 (quads)	NPV for Purchases Thru 2030 (\$ billion)	Benefit-Cost Ratio
		(TWh)	(tril. Btu)	(TWh)	(tril. Btu)			
Bottle-type water dispensers	2008	0.3	3	0.3	3	0.1	0.2	12.9
Commercial boilers	2012	NA	5	0.0	10	0.1	0.5	2.8
Commercial hot food holding cabinets	2008	0.4	4	0.4	5	0.1	0.2	3.7
Compact audio products	2008	1.7	18	1.7	17	0.4	1.7	22.9
DVD players and recorders	2008	0.2	3	0.2	3	0.1	0.2	4.6
Liquid-immersed distribution transformers	2008	8.2	85	14.7	148	1.8	7.3	3.4
Medium-voltage dry-type transformers	2008	0.5	5	0.9	9	0.1	0.5	4.1
Metal halide lamp fixtures	2008	9.0	94	14.4	145	1.9	8.6	11.5
Pool heaters	2012	NA	8	NA	14	0.2	0.7	2.7
Portable electric spas (hot tubs)	2008	0.2	NA	0.2	2	0.0	0.1	2.0
Residential furnaces and residential boilers	2012	13.1	225	27.7	467	4.8	21.2	4.6
Residential pool pumps	2008	3.1	32	3.1	31	0.6	1.1	1.6
Single-voltage external AC to DC power supplies	2008	4.9	51	4.9	49	1.0	3.7	4.9
State-regulated incandescent reflector lamps	2008	5.8	60	5.8	58	1.4	4.9	6.8
Walk-in refrigerators and freezers	2008	<u>4.7</u>	<u>49</u>	<u>4.7</u>	<u>47</u>	<u>0.8</u>	<u>3.0</u>	<u>6.8</u>
Total		51.9	641	78.9	1007	13.2	54.0	4.5

Note: NPV is the value of energy savings due to standards minus the additional cost of more efficient products expressed in current dollars. A 5% real discount rate is used for these calculations.

Table ES.2. Estimated Summer Peak Load, and Water and Pollutant Reductions from New Standards

	Summer Peak Load Reduction		Water Savings In 2020 (billion gal)	Pollutant Reductions in 2020			
	In 2020 (GW)	In 2030 (GW)		Carbon (MMT)	NOx (1000MT)	SOx (1000MT)	PM10 (1000MT)
	Bottle-type water dispensers	0.04	0.04	0.02	0.1	0.1	0.6
Commercial boilers	NA	NA	NA	0.1	0.2	0.0	0.0
Commercial hot food holding cabinets	0.1	0.1	0.1	0.1	0.2	0.9	0.0
Compact audio products	0.2	0.2	0.1	0.3	1.0	4.1	0.1
DVD players and recorders	0.03	0.03	0.02	0.0	0.1	0.6	0.0
Liquid-immersed distribution transformers	1.1	2.0	1.0	1.6	4.7	19.6	0.3
Medium-voltage dry-type transformers	0.1	0.1	0.1	0.1	0.3	1.2	0.0
Metal halide lamp fixtures	2.9	4.7	2.4	1.7	5.1	21.3	0.3
Pool heaters	NA	NA	NA	0.1	0.3	0.0	0.0
Portable electric spas (hot tubs)	0.04	0.04	0.0	0.0	0.1	0.4	0.0
Residential furnaces and residential boilers	3.1	6.5	3.2	3.8	12.8	34.9	0.8
Residential pool pumps	0.7	0.7	0.4	0.6	2.8	7.3	0.1
Single-voltage external AC to DC power supplies	0.7	0.7	0.3	0.9	2.8	11.7	0.2
State-regulated incandescent reflector lamps	1.4	1.4	0.7	1.1	3.2	13.7	0.2
Walk-in refrigerators and freezers	1.1	1.1	0.5	0.9	2.6	11.2	0.1
Total	11.6	17.7	8.9	11.6	36.3	127.5	2.0

Note: Water savings include direct savings at the point of use as well as reductions in power plant water use.