Appliance Efficiency Standards Lower Utility Bills and Cut Electricity Demand in Every State

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Summary

For decades, national energy and water efficiency standards for products used in homes, businesses, factories, and farms have lowered utility bills and electricity demand while cutting air pollution and water waste. We estimate that absent existing efficiency standards:

- *A typical U.S. household would have paid about **$6,000** more on their utility bills over the past decade; businesses across the country collectively would have spent **$330 billion** more*
- *Total U.S. electricity consumption would have been **14%** higher in 2025; summer peak demand would have been **115 gigawatts** (GW) higher—roughly double the power demand of all data centers in the United States*
- *An additional **143,000 tons** of nitrogen oxides (NOx) would have been emitted across the United States in 2025, which is roughly four times the annual emissions from all the school buses in the country*
- *An additional **1.5 trillion gallons** of water would have been wasted in 2025, which is equivalent to about 16% of total residential water use*

The utility bill savings from more efficient appliances and equipment outweigh increases in purchase price by more than a factor of three. However, appliance standards are now under attack. Any actions that roll back existing standards or threaten DOE's ability to set improved ones would raise costs for American families and increase strain on the electric grid at a time when bills are already unaffordable for many households and utilities are facing projected jumps in peak demand.

Introduction

Efficiency standards ensure that appliances and equipment incorporate up-to-date technology, reducing energy and water waste while maintaining the performance and features that consumers expect. Congress set the first national efficiency standards in 1987 for products including refrigerators, air conditioners, and water heaters. In subsequent laws, including the Energy Policy Act of 1992, the Energy Policy Act of 2005, and the Energy Independence and Security Act of 2007, Congress expanded the scope of national standards to cover additional energy- and water-using products found in homes as well as equipment used in commercial buildings and industry, such as commercial boilers, electric motors, and commercial rooftop air conditioners. The law tasks the U.S. Department of Energy (DOE) with reviewing each standard on an eight-year schedule and—based on a rigorous analysis—determining whether an update is warranted.

Over the past four decades, efficiency standards have helped drive large reductions in energy and water use. For example, compared to products available on the market when the first national efficiency standards were established, new refrigerators today use less than half as much energy, air conditioners use about 40% less energy, and light bulbs use about 85% less energy. And largely due to water efficiency standards for products such as clothes washers and toilets, average per-household indoor water use declined by 22% between 1999 and 2016.[1] Yet big savings opportunities remain. For example, most residential central air conditioners sold today still use outdated single-speed compressor technology, while manufacturers offer much more efficient products, including variable-speed models, that can cut energy use by at least 10–15%. Clothes dryers using heat pump technology can reduce energy use by 20–40% relative to models just meeting updated standards issued in 2024. And some large energy users, such as commercial and industrial fans, are not subject to any efficiency standards even though efficient options have huge potential to reduce energy waste.

However, federal appliance standards are now under attack. While the appliance standards law prohibits weakening an energy efficiency standard once it has been finalized,[2] DOE nevertheless proposed in May 2025 to roll back 17 efficiency standards. A bill being considered in Congress would provide DOE with a legal mechanism to revoke standards after they have been finalized—which would upend the certainty for manufacturers that the current law provides—while adding significant roadblocks for future administrations seeking to update standards.[3] Any actions that roll back existing standards or threaten DOE's ability to set improved ones would raise costs for consumers and businesses and increase electricity demand.

Efficiency standards benefit consumers, American manufacturers, and the electric grid

Efficiency standards allow all consumers to benefit from efficient technologies that lower utility bills year after year. Innovations that improve efficiency often first appear in high-end products. Standards ensure that manufacturers incorporate those energy- and water-saving technologies into all their models, including models at low price points. Standards also mean that renters and homeowners alike can benefit from the utility bill savings that more efficient products provide. About one-third of all households are renters; renters typically pay their utility bills but are usually unable to choose their own appliances. Standards ensure that landlords are installing products that are reasonably efficient, benefiting their tenants.

National efficiency standards also provide important benefits to American manufacturers. Standards provide a level playing field, helping ensure that domestic manufacturers that make investments to improve their product lines are not undercut by low-cost foreign competitors.

With growing electricity consumption due to data centers and increased domestic manufacturing, the benefits of efficiency standards for the electric grid are now more important than ever. By reducing peak demand, efficiency standards can defer costly investments in new power plants and transmission and distribution infrastructure, helping to keep rates and bills lower than they would otherwise be.

[1] committee.iso.org/files/live/users/aj/bc/fe/tc282contributor%40iso.org/files/Residential%20End%20Use%20of%20Water.
[2] 42 U.S.C. § 6295(o)(1).
[3] H.R. 4626.

In this policy analysis, we provide updated estimates of the state-by-state impacts of all existing federal efficiency standards, including on utility bills, electricity consumption and peak demand, air pollutant emissions, and water use.

Utility bill impacts

In many parts of the country, electricity prices have risen faster than inflation in recent years due to factors including utility investments in transmission and distribution infrastructure, extreme weather and wildfires, and natural gas price fluctuations.[4] A recent analysis found that rising energy bills are driving more households deeper into debt, with the average overdue balance on utility bills increasing by 32% between 2022 and 2025.[5] Water and wastewater bills are also increasing due to rising costs of maintaining and upgrading water and sewer infrastructure.[6] While utility bills are increasingly unaffordable for many American households, efficiency standards have kept bills significantly lower than they would otherwise be; any actions that weaken existing standards or impose hurdles to setting future ones would only worsen the affordability crisis.

Table 1 shows how much a typical household has saved on utility bills—electricity, gas, water, and wastewater—over the past decade (2016–2025) due to existing efficiency standards. The variation across states is due to a range of factors, including differences in energy and water prices and variation in heating and cooling needs. Table 1 also shows how much both households and businesses—including small and large businesses such as grocery stores, restaurants, factories, and farms—have collectively saved on utility bills in each state over the past decade.

Absent existing efficiency standards, a typical U.S. household would have paid about $6,000 more on their utility bills over the past decade. Households collectively would have paid $780 billion more, while businesses would have spent an additional $330 billion.

Table 1. Average per-household utility bill savings and total household and business bill savings over the past decade (2016–2025) due to existing standards (2024$)

	Cumulative average per-household bill savings ($)	Cumulative total household bill savings (billion $)	Cumulative total business bill savings (billion $)
Alabama	6,014	11.8	5.4
Alaska	7,815	2.1	1.0
Arizona	6,187	17.3	7.6
Arkansas	5,092	6.1	2.6
California	7,996	107.4	40.6
Colorado	5,161	12.0	4.8
Connecticut	8,268	11.7	4.3
Delaware	5,718	2.3	0.8

[4] eta-publications.lbl.gov/sites/default/files/2025-10/full_summary_retail_price_trends_drivers.pdf.
[5] tcf.org/content/commentary/fueling-debt-how-rising-utility-costs-are-overwhelming-american-families/.
[6] www.bluefieldresearch.com/ns/u-s-water-and-sewer-bill-has-increased-24-in-five-years-raising-affordability-concerns/.

	Cumulative average per-household bill savings ($)	Cumulative total household bill savings (billion $)	Cumulative total business bill savings (billion $)
District of Columbia	4,939	1.6	1.5
Florida	5,722	48.9	16.5
Georgia	5,901	23.6	9.7
Hawaii	11,446	5.6	2.0
Idaho	4,934	3.4	1.4
Illinois	5,481	27.4	13.0
Indiana	5,640	15.1	7.8
Iowa	5,218	6.8	3.2
Kansas	5,575	6.5	3.5
Kentucky	5,254	9.4	4.3
Louisiana	5,146	9.2	4.6
Maine	7,042	4.1	1.2
Maryland	6,082	14.2	5.4
Massachusetts	8,231	22.7	8.8
Michigan	6,160	24.9	11.6
Minnesota	5,477	12.5	5.5
Mississippi	5,439	6.2	3.0
Missouri	5,218	13.0	5.5
Montana	4,778	2.2	1.2
Nebraska	4,748	3.7	2.4
Nevada	5,779	6.8	2.9
New Hampshire	7,604	4.2	1.4
New Jersey	6,659	23.2	11.1
New Mexico	5,212	4.3	2.1
New York	7,186	55.1	24.5
North Carolina	5,369	22.5	7.8
North Dakota	4,646	1.5	1.9
Ohio	5,515	26.6	13.3
Oklahoma	5,081	7.8	3.9
Oregon	5,365	9.1	4.2
Pennsylvania	6,357	33.3	10.8
Rhode Island	8,162	3.6	1.2
South Carolina	5,865	12.1	4.9
South Dakota	5,046	1.8	1.0
Tennessee	5,296	14.7	7.0

	Cumulative average per-household bill savings ($)	Cumulative total household bill savings (billion $)	Cumulative total business bill savings (billion $)
Texas	5,689	61.1	25.7
Utah	5,234	5.7	2.7
Vermont	6,936	1.9	0.7
Virginia	5,638	18.8	9.9
Washington	4,827	14.6	5.8
West Virginia	5,608	4.0	1.7
Wisconsin	5,642	13.8	7.1
Wyoming	4,778	1.1	1.1
United States	**6,115**	**780**	**332**

Due to a combination of high water and wastewater prices and the large reductions in water use that efficiency standards have achieved, several of the products that contribute the most to the household bill savings are those that use water, including showerheads, toilets, and clothes washers. Standards for other products, such as refrigerators, light bulbs, air conditioners, and water heaters, also contribute significantly to the total household bill savings. The standards that contribute the most to the bill savings for businesses include those for electric motors, commercial air conditioners, and lighting products.

The utility bill savings from more efficient appliances and equipment significantly outweigh any increase in purchase price. For all existing standards finalized by DOE since 2008, we estimate that the savings outweigh the costs by more than a factor of three.[7]

Efficiency standards protect consumer choice

By law, when updating a standard, DOE must ensure that consumers continue to have access to product features they value; the standards for refrigerators, for example, allow models with through-the-door ice dispensers to consume more energy than models without that feature. DOE is also prohibited from eliminating categories of products that use a particular fuel type; electric water heaters and gas water heaters are regulated separately, for example.

Electricity consumption and peak demand impacts

From the mid-2000s through about 2021, total U.S. electricity consumption remained relatively flat even with population and economic growth, in large part due to energy efficiency progress, including through appliance standards. Figure 1 shows how much higher U.S. annual electricity consumption would have been between 1991 and 2025 absent existing standards. The electricity savings from efficiency standards have grown over time as more of the appliances and equipment in homes and businesses have been replaced with new products meeting the standards and additional new and updated standards have taken effect.

[7] Based on discounted total utility bill savings and total incremental product costs for products sold through 2050.

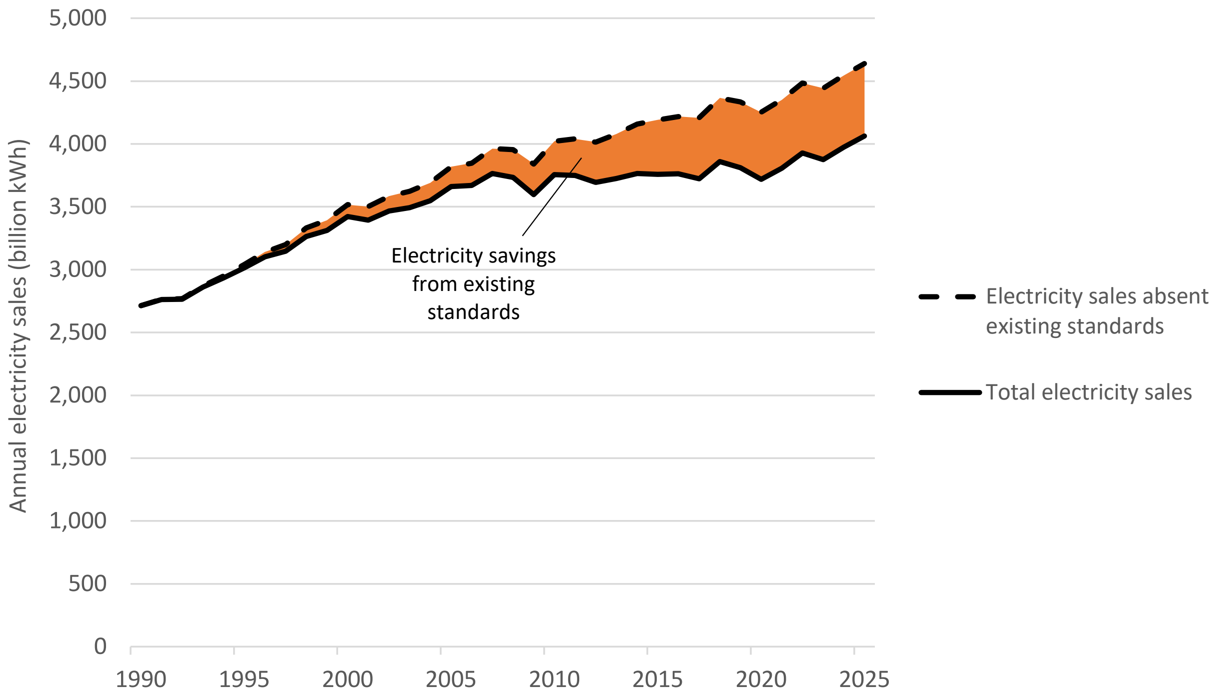

Figure 1. Annual electricity savings from existing standards. *Source for total electricity sales:* U.S. Energy Information Adminstration.[8] Note: Total electricity sales for 2025 are projected sales from EIA's December 2025 Short-Term Energy Outlook.

Electricity consumption has now started to rise due to the huge growth in data centers along with increased domestic manufacturing. This rising electricity consumption is also driving higher peak demand on the grid. A recent forecast projects that electricity consumption will grow by 25% by 2030 compared to 2023 levels, with peak demand increasing by 14%; by 2050, electricity consumption could increase by 78%, with peak demand increasing by 54%.[9] Any weakening of efficiency standards would increase electricity consumption and peak demand at a time when demands on the grid are growing dramatically.

[8] www.eia.gov/totalenergy/data/monthly/. December 2025.
[9] www.icf.com/insights/energy/electricity-demand-expected-to-grow.

Table 2 shows how much higher electricity consumption would have been in each state in 2025 absent existing standards.[10]

Most regions of the United States have historically seen the highest demand on the electric grid during the summer, largely due to air-conditioning use. However, some regions where electric heating is common already see the highest demand on the grid in the winter, and increased electrification of heating will mean that more regions will become winter peaking in the future. Table 2 also shows how much higher summer and winter peak demand would have been in each state in 2025 absent existing standards.

Absent existing efficiency standards, total U.S. electricity consumption would have been 14% higher in 2025. Summer peak electricity demand would have been 115 GW higher—roughly double the power demand of all data centers in the United States in 2025.

Table 2. How much higher electricity consumption, summer peak demand, and winter peak demand would have been in 2025 absent existing standards

	Higher electricity consumption (%)	Higher summer peak demand (GW)	Higher winter peak demand (GW)
Alabama	12%	2.0	1.1
Alaska	15%	0.1	0.1
Arizona	16%	3.2	1.6
Arkansas	11%	1.2	0.6
California	19%	8.1	4.3
Colorado	15%	1.7	1.0
Connecticut	18%	1.0	0.7
Delaware	15%	0.4	0.2
District of Columbia	15%	0.3	0.2
Florida	16%	7.5	4.5
Georgia	13%	4.1	2.2
Hawaii	19%	0.2	0.2
Idaho	12%	0.7	0.4
Illinois	15%	4.5	2.5
Indiana	13%	2.6	1.5
Iowa	10%	1.2	0.7
Kansas	13%	1.2	0.6
Kentucky	12%	1.9	1.0
Louisiana	10%	2.0	1.1
Maine	17%	0.4	0.3

[10] To estimate 2025 total electricity sales for each state, we multiplied 2024 sales by the ratio of projected 2025 sales relative to 2024 sales for the relevant region from EIA's December 2025 Short-Term Energy Outlook.

	Higher electricity consumption (%)	Higher summer peak demand (GW)	Higher winter peak demand (GW)
Maryland	17%	2.2	1.2
Massachusetts	19%	2.0	1.4
Michigan	16%	3.3	2.0
Minnesota	14%	1.9	1.1
Mississippi	12%	1.2	0.6
Missouri	14%	2.2	1.2
Montana	12%	0.4	0.2
Nebraska	11%	0.9	0.4
Nevada	14%	1.2	0.6
New Hampshire	17%	0.4	0.3
New Jersey	19%	3.1	1.8
New Mexico	12%	0.7	0.4
New York	20%	5.6	3.5
North Carolina	14%	4.0	1.7
North Dakota	8%	0.6	0.3
Ohio	14%	4.6	2.7
Oklahoma	11%	2.0	0.9
Oregon	14%	1.7	1.0
Pennsylvania	15%	4.2	2.7
Rhode Island	20%	0.3	0.2
South Carolina	13%	2.2	1.2
South Dakota	12%	0.4	0.2
Tennessee	13%	2.9	1.5
Texas	11%	11.9	6.0
Utah	14%	1.0	0.6
Vermont	17%	0.2	0.1
Virginia	14%	4.2	1.6
Washington	14%	2.4	1.6
West Virginia	11%	0.7	0.4
Wisconsin	15%	2.2	1.3
Wyoming	9%	0.3	0.2
United States	**14%**	**115**	**64**

In some parts of the United States, air-conditioning represents as much as 70% of peak demand on very hot days;[11] efficiency improvements in air conditioners and heat pumps are therefore especially important for reducing peak demand. The 2001 final rule for residential central air conditioners and heat pumps, which raised the minimum cooling efficiency standard from seasonal energy efficiency ratio (SEER) 10 to SEER 13, represents 20% of the total summer peak demand reduction in 2025 from existing standards, or 23 GW. Other standards for cooling products, including those for commercial air conditioners and subsequent updates to standards for residential central air conditioners, also contribute significant summer peak demand reductions. In addition, standards for products such as refrigerators, light bulbs, and electric motors, whose electricity consumption is more evenly spread out over the year, also contribute significant peak demand reductions by virtue of the large electricity savings that those standards are providing.

Air pollution and water use impacts

In addition to lowering utility bills for consumers and businesses and lessening strain on the electric grid, the electricity and fuel savings from existing efficiency standards have resulted in lower emissions of harmful air pollutants, including NOx and sulfur dioxide (SO_2), which can cause respiratory problems, and carbon dioxide (CO_2), a greenhouse gas. Table 3 shows the NOx, SO_2, and CO_2 emissions reductions in 2025 due to lower energy consumption in each state as a result of existing standards.

Absent existing efficiency standards, an additional 143,000 tons of NOx would have been emitted across the United States in 2025, which is roughly four times the annual emissions from all the school buses in the country.

Table 3. NOx, SO_2, and CO_2 emissions reductions and water savings in 2025 due to existing standards

	NOx emissions reductions (tons)	SO_2 emissions reductions (tons)	CO_2 emissions reductions (million metric tons)	Water savings (billion gallons)
Alabama	1,242	993	4.1	23.7
Alaska	3,258	156	0.5	3.4
Arizona	4,963	496	5.2	34.2
Arkansas	1,911	313	2.6	14.2
California	7,378	156	12.9	182.7
Colorado	5,716	1,203	5.3	27.3
Connecticut	1,341	60	1.8	16.7
Delaware	226	272	0.6	4.7
District of Columbia	286	96	0.6	3.0
Florida	8,407	1,970	15.3	103.1
Georgia	2,383	974	8.1	50.9

[11] iea.blob.core.windows.net/assets/0bb45525-277f-4c9c-8d0c-9c0cb5e7d525/The_Future_of_Cooling.pdf.

	NOx emissions reductions (tons)	SO_2 emissions reductions (tons)	CO_2 emissions reductions (million metric tons)	Water savings (billion gallons)
Hawaii	4,447	3,109	1.1	6.7
Idaho	1,461	174	1.5	8.9
Illinois	4,805	3,176	8.5	59.1
Indiana	3,646	5,070	8.8	31.8
Iowa	2,471	902	2.9	14.9
Kansas	1,195	446	2.6	13.7
Kentucky	1,677	3,013	4.2	21.1
Louisiana	2,789	555	4.1	21.6
Maine	516	23	0.7	6.4
Maryland	1,576	1,912	4.2	28.9
Massachusetts	2,648	115	3.5	32.2
Michigan	5,471	3,819	10.6	47.0
Minnesota	3,650	1,264	4.7	26.7
Mississippi	1,165	625	2.5	13.7
Missouri	2,962	3,283	6.9	28.8
Montana	399	68	0.4	5.2
Nebraska	2,680	980	2.1	9.2
Nevada	3,055	360	3.1	14.9
New Hampshire	457	22	0.6	6.4
New Jersey	2,775	2,268	6.1	43.2
New Mexico	1,479	149	1.5	9.9
New York	6,828	842	12.3	90.4
North Carolina	2,795	6,701	7.1	49.6
North Dakota	1,677	641	1.3	3.6
Ohio	5,117	6,753	13.5	55.0
Oklahoma	3,460	442	3.6	18.6
Oregon	917	202	1.1	19.9
Pennsylvania	3,826	4,099	9.5	60.2
Rhode Island	431	18	0.6	5.0
South Carolina	1,453	3,876	3.8	24.4
South Dakota	1,113	382	0.9	4.2
Tennessee	2,576	4,815	6.5	32.9
Texas	10,964	2,040	19.7	139.4
Utah	2,788	308	2.8	15.8

	NOx emissions reductions (tons)	SO_2 emissions reductions (tons)	CO_2 emissions reductions (million metric tons)	Water savings (billion gallons)
Vermont	245	11	0.3	3.0
Virginia	3,031	1,876	7.4	40.5
Washington	1,521	308	1.8	36.4
West Virginia	725	1,100	2.1	8.3
Wisconsin	3,954	1,417	5.3	27.5
Wyoming	905	152	0.9	2.7
United States	**142,758**	**74,006**	**238**	**1,551**

Table 3 also shows the water savings in each state in 2025 due to existing standards. The water efficiency standards established by Congress in 1992 for products including toilets, faucets, and showerheads contribute more than 80% of the total water savings in 2025 from existing standards. More recent standards for products including residential and commercial clothes washers, residential dishwashers, and commercial prerinse spray valves also contribute significant water savings.

Absent existing efficiency standards, an additional 1.5 trillion gallons of water would have been wasted in 2025, which is equivalent to about 16% of total residential water use.

Conclusion

Efficiency standards have kept utility bills lower than they otherwise would be while moderating electricity demand. Absent existing efficiency standards, a typical U.S. household would have paid about $6,000 more on their utility bills over the past decade; households collectively would have paid $780 billion more, while businesses would have spent an additional $330 billion. Electricity consumption would have been 14% higher in 2025 absent existing efficiency standards, while summer peak demand would have been 115 GW higher. Efficiency standards have also lowered emissions of harmful air pollutants while cutting water waste. The benefits of efficiency standards will increase in the years ahead as more appliances and equipment are replaced with models meeting newer standards, as additional standards finalized under the Biden administration take effect, and as DOE updates standards in the years ahead to reflect technology improvements. Any actions that roll back existing standards or threaten DOE's ability to set improved ones would raise utility bills for consumers and businesses, further straining affordability, while unnecessarily increasing electricity demand during a time of significant load growth.

Appendix A. Methodology

For this policy analysis, we derived national energy and water savings estimates for standards in the National Appliance Energy Conservation Act (NAECA) of 1987 and 1988, the Energy Policy Act (EPAct) of 1992, and DOE rulemakings through 1997 based on Geller and Goldstein (1999).[12] For plumbing products (faucets, showerheads, and toilets), we relied on estimates from Koomey, Dunham, and Lutz (1994).[13] Finally, we used previous ACEEE/ASAP analyses and information from DOE rulemakings to estimate savings from standards in EPAct 2005 and the Energy Independence and Security Act (EISA) of 2007 and DOE rulemakings from 1998 through 2024.

Annual energy and water savings

Our general methodology for estimating savings is based on sales of the affected products. We used estimates of annual shipments, per-unit energy and/or water savings, and average product lifetimes. To calculate the per-unit energy and water savings, we subtracted the average per-unit consumption in the standards case from that in the base case (i.e., absent amended standards). Both the base-case and standards-case per-unit consumption values account for the distribution of efficiency levels (i.e., the breakdown of product sales by efficiency).

We assumed that both annual shipments and the distribution of efficiency levels in the base case remain constant over time. In reality, both shipments and base case efficiency tend to increase over time. Thus, we implicitly assumed that these two factors cancel each other out.

We used the equation below to calculate savings in each year of the analysis:

Annual savings = Number of installed units x Per-unit savings

where the number of installed units is:

Before full stock turnover: Annual shipments x (Number of years after compliance date + 0.5)

After full stock turnover: Annual shipments x Average product lifetime

In calculating the number of installed units meeting the new standard prior to full stock turnover, we accounted for products being purchased throughout the year. Thus, in any given year we counted only one-half year of savings from products purchased in that year.

Adjustments to savings for lighting products

For the EISA standards for general service lamps (GSLs) and the "backstop" standard for GSLs finalized in 2022,[14] we used a stock model to estimate savings to account for the varying lifetimes of different lamp types (i.e., incandescents, halogens, compact fluorescent lamps, and LEDs).[15] For other lighting products, we modified our general methodology to account for changes in the lighting market over time, including

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[12] Geller, H., and D. Goldstein. 1999. "Equipment Efficiency Standards: Mitigating Global Climate Change at a Profit." *Physics and Society* 28 (2).

[13] Koomey, J., C. Dunham, and J. Lutz. 1994. The Effect of Efficiency Standards on Water Use and Water Heating Energy Use in the U.S.: A Detailed End-Use Treatment. Berkeley: Lawrence Berkeley Laboratory. eta-publications.lbl.gov/sites/default/files/lbnl-35475e.pdf.

[14] The backstop standard requires a minimum efficacy of 45 lumens/watt, which effectively phased out incandescent lamps in favor of LEDs.

[15] For additional information on our modeling approach for these GSL standards, see: appliance-standards.org/sites/default/files/reducing-costs-across-america.pdf.

declining sales of certain lamp types and increasing sales of LEDs. Specifically, for fluorescent lamp ballasts, linear fluorescent lamps, and metal halide lamp fixtures, we used recent shipment data to reflect significant declines in shipments over time. For ceiling fan light kits, we did not count any savings from the EPAct 2005 standards since manufacturers largely shifted to other socket types not covered by the standards. For torchieres, we incorporated data showing a significant decline in shipments in the years after the EPAct 2005 standards were established and assumed that shipments continued to decline at the same rate. Since metal halides were a replacement for mercury vapor lamps, we assumed that absent the ban on mercury vapor lamp ballasts in EPAct 2005, the shipments trend for mercury vapor lamp ballasts would have followed that of metal halide lamp fixtures. Finally, for incandescent reflector lamps and the 2016 final rule for ceiling fan light kits, we counted savings based on shipments through 2022 since the GSL backstop standard, which took effect in mid-2022, applies to incandescent reflector lamps and the lamps used in ceiling fans.

Allocation of national savings to each state

For residential products, we calculated state-by-state electricity, natural gas, and water savings by allocating national product sales to each state and, where appropriate, making state-by-state adjustments to the per-unit savings. For products for which product saturation does not vary significantly by region (e.g., refrigerators, light bulbs, microwave ovens), we used the number of households in each state to allocate product sales. For residential products for which saturation does vary significantly by state/region (e.g., central air conditioners, electric and gas water heaters, pool heaters, dehumidifiers), we used data on equipment saturation from the 2020 Residential Energy Consumption Survey (RECS) to allocate sales.[16] For faucets and showerheads, we allocated the electricity and natural gas savings from reduced hot water consumption based on the prevalence of electric and gas water heaters in each state.

For furnaces and boilers, central air conditioners and heat pumps, and water heaters, we adjusted the per-unit savings for each state based on average electricity or fuel usage for each product using RECS 2020. For faucets and showerheads, we adjusted the per-unit electricity and natural gas savings based on water heater usage. Finally, for products for which per-household consumption is correlated with household size (toilets, clothes washers, clothes dryers, dishwashers, and ranges), we adjusted the per-unit savings based on average household size.

For products used in the commercial sector for space heating, water heating, cooling, ventilation, refrigeration, and lighting, we allocated commercial-sector savings to each state based on regional energy consumption by end use from the 2018 Commercial Buildings Energy Consumption Survey (CBECS) and state-by-state commercial electricity and natural gas use from the Energy Information Administration (EIA).[17] We first allocated savings to the nine U.S. Census divisions based on end-use consumption, and we then allocated regional savings to individual states based on commercial electricity use or commercial natural gas use. For products used in the commercial sector for which energy use is more closely correlated with population (e.g., commercial clothes washers, traffic signals), we allocated savings based on population. For the portion of motors, pumps, and compressors used in the commercial sector, we allocated savings based on commercial electricity use, and for distribution transformers we allocated savings based on total electricity use. Finally, for the portion of motors,

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[16] www.eia.gov/consumption/residential/data/2020/.
[17] www.eia.gov/consumption/commercial/data/2018/; www.eia.gov/electricity/data.php#sales; www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vgt_mmcf_a.htm.

pumps, compressors, and fluorescent lamps and ballasts used in the industrial sector, we allocated savings based on industrial electricity use.[18]

Peak demand reductions

We calculated peak demand reductions using the National Laboratory of the Rockies (NLR) ResStock and ComStock end-use load profiles (for 2018) for the residential and commercial sectors, respectively, for each state.[19] Since ComStock does not represent all the floor area modeled in CBECS, we scaled the commercial electricity load using 2018 commercial electricity sales for each state. For consistency, we also scaled the ResStock residential electricity load using 2018 residential electricity sales. For each state, we calculated the summer peak hour based on the highest 15-minute usage from June 1–September 30 for the combined residential and commercial loads, and we calculated the winter peak hour based on the highest 15-minute usage from December 1–February 28.

For each electric end use, we summed the four 15-minute data points in the peak hour. We also summed the 15-minute data for the full year for each end use and divided by 8,760 hours to calculate the average hourly electricity use. We then calculated the summer and winter peak load factors (PLFs) for each state by dividing the electricity use during the peak hour by the average hourly electricity use.

The PLF represents electricity usage during the peak hour relative to average hourly usage over the year. A PLF greater than 1 means that during the peak hour, more electricity is used than in an average hour. Cooling products, for example, generally have a summer peak PLF significantly greater than 1 (i.e., significantly more electricity is used for cooling during the summer peak hour compared to the average hourly electricity used for cooling over the year). A PLF less than 1 means that during the peak hour, less electricity is used than in an average hour. For example, for most states, residential lighting has a summer peak PLF of slightly less than 1 (i.e., less electricity is used for lighting during the summer peak hour compared to the average hourly electricity used for lighting over the year).

To calculate the summer and winter peak demand reductions associated with each standard, we first divided the annual electricity savings by 8,760 hours to calculate the average hourly electricity savings. We then multiplied the average hourly electricity savings by the summer and winter PLFs for the appropriate end use. For example, we applied the PLFs for pool pumps to the electricity savings from standards for pool pumps and pool pump motors. For standards for products not represented by the NLR end-use load profiles (e.g., battery chargers, dehumidifiers, microwave ovens), we applied a flat load profile (i.e., a PLF of 1). For fluorescent lamp ballasts, linear fluorescent lamps, and incandescent reflector lamps, we applied the PLF for residential lighting to the portion of products used in the residential sector, the PLF for indoor commercial lighting to the portion used in the commercial sector, and a PLF of 1 to the portion used in the industrial sector. For electric motors and small electric motors, we applied the PLF for the sum of the fan and pump end uses in commercial buildings to the portion of motors used in the commercial sector and a PLF of 1 to the portion used in the residential and industrial sectors. Finally, for commercial and industrial pumps, we applied the PLF for commercial pumps to the portion of pumps used in the commercial sector and a PLF of 1 to the portion used in the industrial sector.

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[18] www.eia.gov/electricity/data.php#sales.
[19] resstock.nrel.gov/datasets; comstock.nrel.gov/page/datasets. We used ResStock 2025 Release 1, AMY2018 (October 2025) and Comstock 2025 Release 2, AMY2018 (August 2025).

The cooling efficiency standards for commercial air conditioners and heat pumps in the 2016 final rule are based on a seasonal efficiency metric—integrated energy efficiency ratio (IEER)—that largely reflects part-load performance.[20] Therefore, to calculate the peak demand reduction, we accounted for the smaller percentage savings during peak demand periods compared to the average savings over the year. Specifically, we adjusted the PLF based on the percentage savings at full load (measured by energy efficiency ratio [EER]) relative to the percentage savings at part load (measured by IEER). Similarly, to be conservative, we assumed that residential and commercial heat pumps use electric resistance backup during winter peak load periods and that therefore there are no peak load savings from improved heating efficiency for heat pumps.

We calculated the total summer and winter national peak load reductions by summing the peak load reductions for each state. Note that this sum does not represent the peak load reductions for a particular hour since the peak load hours vary by state.

Utility bill savings

We calculated utility bill savings by multiplying the annual electricity, natural gas, and water savings for each sector by respective state-by-state average prices. We used state-by-state historical electricity and natural gas prices for the residential, commercial, and industrial sectors through 2024.[21] To project 2025 electricity prices, we used price projections from EIA's 2025 Annual Energy Outlook (AEO) to calculate 2025 electricity prices for each of the Electricity Market Module (EMM) regions relative to 2024 prices.[22] We then applied these projections for the EMM regions to 2024 state-by-state electricity prices.[23] For states that span more than one EMM region, we calculated weighted-average projected changes in electricity prices based on population. Alaska and Hawaii are not included in the EMM data; for these states we assumed the change in electricity prices between 2024 and 2025 was equivalent to the U.S. average. To project 2025 natural gas prices, we used price projections from AEO 2025 to calculate prices for each of the nine U.S. Census divisions for 2025 relative to 2024 prices. We then applied these regional price projections to 2024 state-by-state natural gas prices.[24]

We calculated regional water and wastewater prices based on the historical consumer price index for water and sewerage maintenance, and 2022 regional prices and DOE price projections from the 2024 clothes washers final rule.[25]

Emissions reductions

We calculated NOx, SO_2, and CO_2 emissions reductions by multiplying the annual electricity savings by respective state-by-state average emissions factors using the EMM regions. Note that the emissions reductions for a given state represent the emissions reductions from lower energy consumption in that state, but that some of those reductions may occur outside the state since electricity consumed within a

[20] While the standards for residential central air conditioners and heat pumps are also based on a seasonal efficiency metric, the standards to date reflect single-speed compressor technology, and the technology improvements (e.g., larger heat exchange area, more efficient condenser fan motors) improve both seasonal efficiency and peak efficiency. We therefore did not adjust the PLF applied to these products.
[21] www.eia.gov/electricity/data.php#sales; www.eia.gov/naturalgas/data.php#prices.
[22] www.eia.gov/outlooks/aeo/tables_ref.php.
[23] www.eia.gov/electricity/data/browser/.
[24] www.eia.gov/naturalgas/data.php#prices. For states for which 2024 prices were unavailable, we assumed the change in prices between 2023 and 2024 was equivalent to the change for the United States as a whole.
[25] www.regulations.gov/document/EERE-2017-BT-STD-0014-0513.

state may be generated outside of the state. We calculated emissions factors for 2025 for each of the EMM regions by dividing electric power sector emissions by electric power sector generation from AEO 2025 and assuming transmission and distribution losses of 4.2%.[26] For states that span more than one EMM region, we calculated weighted-average emissions factors based on population. For Alaska and Hawaii, we started with emissions factors from eGRID for 2023.[27] For CO_2 and SO_2, we estimated emissions factors for 2025 for Alaska and Hawaii based on the average annual rate of change between 2020 and 2023; for NOx, there was no clear trend in emissions factors for these two states, and we therefore assumed emissions factors for 2025 equivalent to those in 2023.

We calculated state-by-state NOx, SO_2, and CO_2 emissions reductions from natural gas savings by multiplying annual natural gas savings by emissions factors of 94 lb./million cu. ft. for NOx, 0.6 lb./million cu. ft. for SO_2, and 52.91 kg/million Btu for CO_2.[28]

We calculated the school bus equivalency for NOx emissions reductions based on 5.174 grams of NOx per mile driven for diesel buses for 2025;[29] we assumed school buses are driven 14,084 miles per year on average.[30] There are about 490,000 school buses in the United States.[31]

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[26] We calculated transmission and distribution losses by dividing estimated losses by total disposition minus direct use from "Table 10: Supply and disposition of electricity": www.eia.gov/electricity/state/unitedstates/.
[27] www.epa.gov/egrid/data-explorer.
[28] www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf; www.eia.gov/environment/emissions/co2_vol_mass.php.
[29] www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and.
[30] afdc.energy.gov/data/widgets/10309.
[31] e360.yale.edu/features/ev-school-buses#:~:text=About%2020%20million%20students%20in,are%20powered%20by%20diesel%20engines.