Update to "States Go First: How States Can Save Consumers Money, Reduce Energy and Water Waste, and Protect the Environment with New Appliance Standards"

Appliance Standards Awareness Project
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In our 2017 report, "States Go First,"[1] we estimated state-by-state potential savings from 21 recommended state-level appliance standards. In 2018 and 2019 we updated that analysis for our state appliance standards recommendations for 2019 and 2020, respectively. Here we describe our most recent analysis for our state appliance standards recommendations for 2021.

For 2021, we are recommending that states adopt standards for the following 19 products:

- Air purifiers
- Commercial dishwashers
- Commercial fryers
- Commercial hot-food holding cabinets
- Commercial ovens
- Commercial steam cookers
- Computers and computer monitors[2]
- Electric vehicle supply equipment
- Faucets
- Gas fireplaces
- High CRI, impact-resistant, and cold temperature fluorescent lamps
- Portable electric spas
- Residential ventilating fans
- Showerheads
- Spray sprinkler bodies
- State-regulated general service lamps
- Toilets (water closets)
- Urinals
- Water coolers

As described below, our new analysis reflects the following:

- The addition of one new recommended standard;
- Updated standard levels for one product;
- Updated information on annual shipments and current market penetration;
- Updated assumptions for energy prices and emissions factors; and
- The addition of savings estimates for state-regulated general service lamps.

We assumed a compliance date of 2023 for all the standards, and we estimated savings from sales through 2035. Our updated analysis uses 2019$ for costs and utility bill savings.

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[1] https://appliance-standards.org/sites/default/files/States%20Go%20First.pdf.

[2] While we continue to recommend the adoption of state-level standards for computers and computer monitors, we have not estimated savings for these products due to a lack of data on the current market.

Product scope and standard levels

For our analysis for 2021 we have added one new recommended standard for gas fireplaces. Gas fireplaces are gas-fired appliances that simulate a wood-burning fireplace. Our recommended standards for gas fireplaces are based on standards adopted by Natural Resources Canada. The standards would eliminate wasteful standing pilot lights for heating and decorative fireplaces and would also establish a minimum heating efficiency requirement for heating fireplaces.

Our recommended standard levels for the remaining products are the same as those in our analysis for 2020 except for residential ventilating fans. In our analysis for 2020 we analyzed standards for residential ventilating fans based on the current ENERGY STAR specification (Version 4.1), which took effect in 2015. However, based on new market data, for our analysis for 2021, we are recommending standards based on ENERGY STAR Version 3.2. We estimated that about 57% of shipments of bathroom and utility room ventilating fans meet ENERGY STAR Version 3.2.

Annual shipments and current market penetration

For our analysis for 2021 we used up-to-date estimates of annual shipments for the assumed compliance date of 2023. For products with an ENERGY STAR specification, we updated shipment estimates using the ENERGY STAR Unit Shipment Report for 2019.[3] For gas fireplaces, we used estimated annual sales data from the California Energy Commission (CEC) analysis for the proposed standards in California.[4] The other sources we used for estimates of annual shipments are the same as those we used for our analysis for 2020, except for residential ventilating fans. For residential ventilating fans, we previously had used an estimate of shipments from the ENERGY STAR Unit Shipment Report for 2013.[5] For our analysis for 2021, we developed an estimate of shipments based on the number of bathrooms in new and existing homes and assuming that 70% of bathrooms have a ventilating fan.

We also incorporated the most recent data on the estimated market share of products already meeting our recommended standard levels. For products with an ENERGY STAR specification, we used data on market penetration from the ENERGY STAR Unit Shipment Report for 2019. For the plumbing products (faucets, showerheads, toilets, and urinals), we used data from the DOE Compliance Certification Database.[6] For gas fireplaces, we used compliance rate data from the CEC analysis for the proposed standards in California.[7] We also updated the market penetration estimate for residential ventilating fans based on the number of ENERGY STAR shipments in 2019 and our estimate of total shipments. For the remaining products (portable electric spas and spray sprinkler bodies), the market penetration estimates in our analysis for 2020 represent the most recent available data.

[3] https://www.energystar.gov/sites/default/files/asset/document/2019%20USD%20Summary%20Report.pdf.
[4] https://efiling.energy.ca.gov/GetDocument.aspx?tn=228253&DocumentContentId=59439.
[5] This was the most recent year for which both shipments and market penetration data were available for residential ventilating fans.
[6] https://www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A*.
[7] https://efiling.energy.ca.gov/GetDocument.aspx?tn=228253&DocumentContentId=59439.

Incremental costs

For gas fireplaces, we used data on incremental costs from the CEC analysis for the proposed standards in California.[8] For all the other products, the sources for incremental costs are the same as those used in our analysis for 2020.

Energy prices and emissions factors

We updated our assumptions for natural gas prices based on state-by-state natural gas prices for 2018 and EIA's energy price projections in AEO 2020.[9] (Electricity prices for 2018 continued to be the most recent data available at the time of our analysis, and we continued to use EIA's electricity price projections in AEO 2019.)

For emissions factors for NOx, SO_2, and CO_2, we used EIA's projections for each of the updated NERC regions from AEO 2020.

State-regulated general service lamps (GSLs)

For the GSL analysis, we estimated savings for three main categories of non-preempted lamps: reflector (excluding halogen), globe, and miscellaneous A-type lamps[10]. We assumed that all of these lamps are used in the residential sector.

To calculate the stock of reflector and globe lamps in each year, we started with estimates of the 2018 stock by lamp type from DOE's 2020 *Adoption of Light-Emitting Diodes in Common Lighting Applications* report.[11] For the stock of miscellaneous A-type lamps in each year, we started with historical shipment data from DOE to estimate the 2015 stock of shatter-resistant, three-way, and high-lumen-output lamps.[12]

We estimated the base case market share distributions for reflector and globe lamps based on data from the Consortium for Retail Energy Efficiency Data (CREED) LightTracker. Specifically, for the base case for reflector lamps, we assumed that, as of 2020, only 5% of sales would be incandescents and 95% would be LEDs. For globe lamps, we assumed that, as of 2020, 35% of sales would be incandescents (including halogens) and 65% would be LEDs. For miscellaneous A-type lamps, we assumed an even split of sales between incandescents and LEDs based on estimated recent trends in market share. For the standards case, we assumed a 100% market share for LEDs beginning in January 2023.

We calculated the number of lamps of each lamp type being replaced each year based on the stock in the previous year and the average lamp lifetime. We also accounted for lamp shipments going to new construction based on the U.S. Energy Information Administration's (EIA's) projections of the average annual growth in residential and commercial floor space (EIA 2020).

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[8] Ibid.
[9] https://www.eia.gov/outlooks/aeo/.
[10] Non-preempted miscellaneous A-type lamps include shatter-resistant, three-way, and high-lumen-output lamps.
[11] https://www.energy.gov/sites/prod/files/2020/09/f78/ssl-led-adoption-aug2020.pdf.
[12] https://www.regulations.gov/document?D=EERE-2017-BT-NOA-0052-0001.

We calculated the stock of each lamp type in each future year as the sum of replacement shipments, shipments to new construction, and lamps not being replaced (i.e., installed lamps that did not burn out in the previous year). We calculated total annual energy use in each year based on the stock of each lamp type and the per-unit energy use. Finally, we calculated annual energy savings in each year based on the difference in total annual energy use in the base case and the standards case.