Appliance and Equipment Standards Jobs: A Moneymaker and Job Creator in all 50 States

Rachel Gold and Steven Nadel

May 2011

An ACEEE White Paper

529 14th Street, N.W., Suite 600, Washington, D.C. 20045
(202) 507-4000 phone, (202) 429-2248 fax, aceee.org

ACKNOWLEDGMENTS

The authors would like to thank the Energy Foundation and an anonymous donor. They would also like to thank those internal and external who helped review this paper, especially Skip Laitner of ACEEE who provided helpful direction and thoughtful comments. Thanks also to Lowell Ungar, Brad Penney, and Sarah Wendel of the Alliance to Save Energy for their assistance in this effort. Many thanks to our diligent editor Renee Nida and our communications team, Patrick Kiker, Glee Murray, and Eric Schwass.

BACKGROUND

Appliance, equipment, and lighting efficiency standards[1] have consistently served as a cornerstone of U.S. energy policy for reducing energy waste over the past two decades.[2] Standards save consumers money and reduce harmful energy sector emissions by helping overcome market barriers that hinder the sale of cost-effective and more energy-efficient products. In a January 2011 analysis, *Appliance and Equipment Efficiency Standards: A Money Maker and Job Creator*, the American Council for an Energy-Efficient Economy (ACEEE) and the Appliance Standards Awareness Project (ASAP) estimated the number of jobs created in the United States as a result of the standards in 2010-2030. These were categorized into "historical" or existing standards already in place as of December 2010 and "prospective" or new standards, including most of the standards revisions DOE is now working on and will complete by 2013, and the consensus standards in pending legislation (S. 398).

This study found that standards already in place created about 340,000 jobs in the year 2010. This includes jobs created in 2010 as well as jobs that standards created in earlier years but were maintained in 2010. Current and future standards will create about 380,000 jobs in the year 2030, an increase of 40,000 jobs relative to 2010. This job creation is driven, in large part, by the energy saved when less efficient appliances are replaced with more efficient appliances, providing energy and dollar savings for consumers. Consumers and businesses then have additional money to spend in more labor-intensive but equally productive sectors of the economy, creating a net increase in jobs and wages.

Year	Annual Jobs	Annual Energy Bill Savings
2010	340,000	$34 billion in 2010
2020	387,000	$64 billion in 2020
2030	380,000	$68 billion in 2030

ACEEE compiled data about current and projected state energy consumption and prices, as well as current and projected state employment, income, and energy expenditures. To illustrate the effects of these standards in individual states, ACEEE created a series of allocation factors, described in detail in the methodology below to apportion our energy, energy bill, and jobs estimates to each of the 50 states and the District of Columbia.

RESULTS

The benefits of minimum appliance, equipment, and lighting standards at the national level are mirrored in each of the states, with small net positive consumer energy bill savings and job creation in each state in 2010, 2020, and 2030 (see Figure 1). These standards apply to all states, reducing the regulatory burden for manufacturers that would otherwise have to contend with a confusing patchwork of state standards. As a result, energy savings occur in all places where the new regulated equipment and appliances are purchased, so energy and energy bill savings happen in all states.

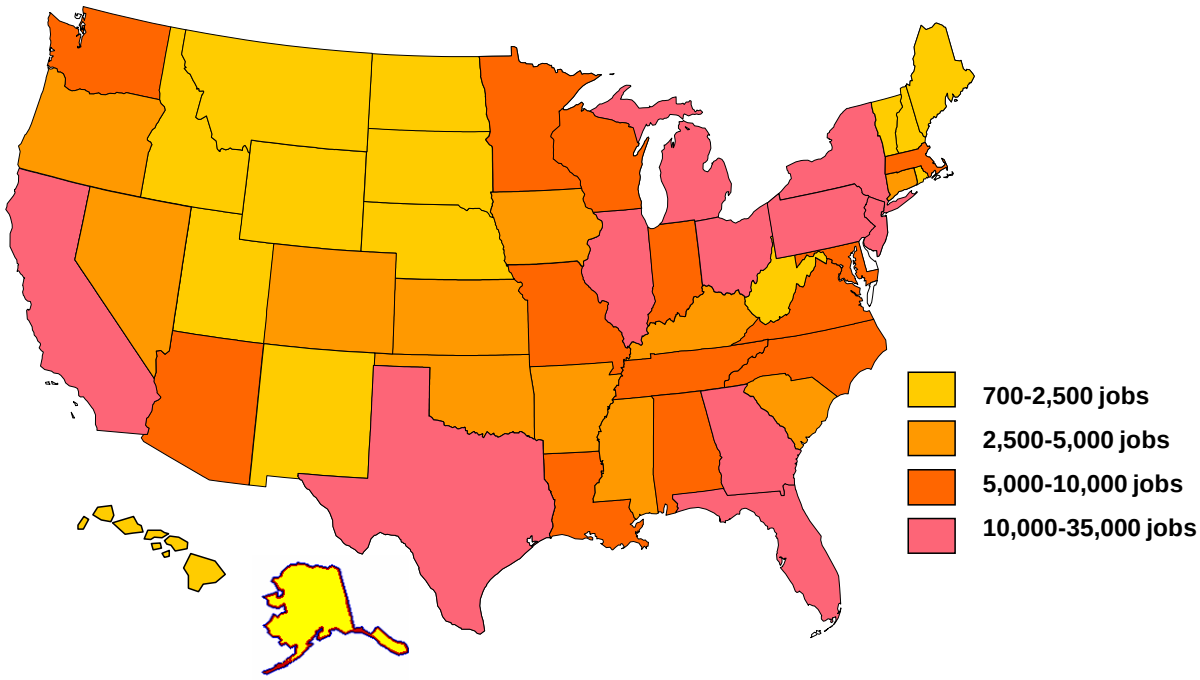
[1] This report uses "appliance standards" or "standards" as shorthand for appliance, equipment, and lighting standards.
[2] U.S. standards also cover water efficiency for many products, but this report only addresses the energy efficiency aspect of U.S. standards.

Table 1. Energy Savings, Energy Bill Savings and Jobs Results by State, in 2010, 2020, and 2030

While all states show small net positive increases in job creation and energy bill savings from existing and new energy efficiency standards, the amounts vary significantly among the states. Job creation is based on energy expenditures and total state employment; however, the number of jobs created roughly correlate with population.

The results for a few states differ significantly from expected jobs just based on population. Alaska, Louisiana, North Dakota, and Wyoming have higher energy expenditures compared to population, and therefore more jobs from this allocation, likely because they are mostly energy-producing states. The District of Columbia had higher consumption compared to population, and therefore more jobs in this allocation scheme, probably because of the presence of many office buildings in the city, and a high ratio of jobs to residents since many jobs are filled by Maryland and Virginia residents. In addition, two states, Arizona and Utah, had lower net energy bill savings compared to population, leading to lower jobs anticipated. This is likely a result of lower consumption or prices for electricity or natural gas in these states.

Figure 1. Net Jobs from Appliance and Equipment Standards in 2010 by State



METHODOLOGY

After calculating national-level energy, energy bill savings and jobs created by existing and prospective standards, we apportioned net consumer savings[3] and net jobs to each state using state-specific energy consumption and price data for each of the 50 states (plus the District of Columbia). Net consumer savings was estimated using state-specific energy cost estimates and jobs were adjusted using a state-specific multiplier factor to reflect differing economic structures in the states.

Energy Savings

The energy savings from appliance standards were calculated as national electricity savings and "fuels" savings, where "fuels" are both natural gas and distillate fuel oil.[4] These were apportioned by taking the total amount of each fuel saved at the national level and apportioning it based on each state's percent of total 2008 consumption from the Energy Information Administration (EIA)'s State Energy Data System (EIA 2010a). In addition, electricity and fuels savings were adjusted based on a population growth factor, derived from the U.S. Census Bureau's December 2009 estimates and projections of population (U.S. Census 2005, 2009). This growth factor is the difference between the state's total projected population for 2010, 2020 or 2030 and total population in 2009 and assumes that energy consumption is proportional to population.

*Annual electricity savings (TWh) = (national electricity savings in TWh) * (state's % of national residential and commercial electricity consumption) * (1 + (change in share of total population in 2010, 2020 or 2030) – (2009))*

*Annual fuel savings (TBTu) = (national fuel savings in TBTu) * (state's % of national residential and commercial NG consumption) * (1 + (change in share of total population in 2010, 2020 or 2030) – (2009))*

Energy Bill Savings

The energy bill savings, or "gross savings," to businesses and consumers in each state were generated from decreased (more efficient) energy use as a result of each appliance standard. "Net" savings took into account the costs imposed from each standard, the result of incremental costs of more efficient appliances.

Gross, or energy bill, savings for each fuel were calculated using each state's 2008 price of a given fuel (from EIA's State Energy Data System), then multiplying by a ratio of 2010, 2020, or 2030 projected national prices to 2008 national prices (from EIA's *Annual Energy Outlook*). This factor assumes that the inter-fuel and inter-sector distribution of consumption and prices remains static. To calculate total savings from all fuels, the heat rates from AEO were used (EIA 2010b).

*State's electricity savings in million $ = (state's annual electricity savings in TWh) * (cents per kWh, adjusted 2020 – avg. state elec. prices in 2008 adjusted to 2010, 2020 or 2030 national estimates from AEO)*

*State's fuels savings in million $ = (Annual fuels savings (TBTu)) *($/MMBtu, adjusted 2020 = avg. state NG prices in 2008 adjusted to 2010, 2020 or 2030 national estimates from AEO)/1000*
Total gross economic savings for each state were calculated by combining the monetary savings from electricity and fuels bill savings. The ratio of each state's gross fuel savings to total national gross fuel savings was calculated, and this ratio was applied to total national net savings to determine the

[3] Net consumer savings is the value of reduced energy bills that result from decreased energy consumption less the investments required to realize these energy savings.
[4] For ease, natural gas consumption and prices were used to apportion fuels savings, since the vast majority of appliance standards fuels savings are natural gas rather than fuel oil.

amount of net savings for each state. Gross savings were adjusted by a factor so that the total national savings equaled the sum of the state savings – this discrepancy occurred because some of the energy bill savings come from fuel oil, which is not represented in the allocation formulas.

State's gross annual consumer savings = (state's electricity savings in million $) + (state's "fuels" savings in million $)

*State's net annual consumer savings = (total national net annual consumer savings) * (ratio of state to national from gross savings)*

Employment

The job creation estimates are based on analysis using an ACEEE input-output economic model, "DEEPER," which uses input-output coefficients published by IMPLAN (Laitner et. al. 2010). In order to calculate the employment impacts from these standards, we calculated the net energy bill savings as described above. The input-output analysis looks at the impact of the costs and benefits of the appliance standards policy on consumers, manufacturers, contractors, retailers, utilities, and fuel producers. We report net impacts on employment, as jobs are created in some sectors (e.g., construction, retail, and services) and lost in others (e.g., reduced demand for coal and natural gas). To allocate these national jobs to the states, we used an average of three factors – the projected 2010, 2020, or 2030 employment level, net consumer savings, and the 2008 energy bill expenditures. The state-level jobs data was taken from the Bureau of Economic Analysis projections and state energy expenditures available from the EIA (EIA 2010b, Moody's.com 2011).

*Total state jobs in 2010, 2020 or 2030 = (total national jobs in 2010, 2020 or 2030) * [(state's employment in 1000s in 2010, 2020, or 2030)/(national total employment in 2010, 2020 or 2030)) * [(state's gross annual consumer savings in 2010, 2020, or 2020)/(national gross annual consumer savings in 2010,2020, or 2030)] * [(state's total energy expenditures in million nominal $)/(national total energy expenditures in million nominal $)]*

REFERENCES

[EIA] Energy Information Administration. 2010a. *State Energy Data System: Consumption, Price, and Expenditure Estimates, 2008*. http://www.eia.doe.gov/states/_seds.html. Washington, DC: U.S. Department of Energy.

_____. 2010b. *Early Release Annual Energy Outlook 2011 Reference Case Service Report, December 2010*. DOE/EIA-0383ER(2011). http://www.eia.gov/forecasts/aeo/. Washington, D.C.: U.S. Department of Energy.

Gold, Rachel, Steven Nadel, John A. "Skip" Laitner, and Andrew deLaski. 2011. *Appliance and Equipment Efficiency Standards: A Moneymaker and Job Creator.* Washington, D.C.: American Council for an Energy-Efficient Economy.

Laitner, John. A. "Skip", Rachel Gold, Steven Nadel, Therese Langer, R. Neal Elliott, and Daniel Trombley. 2010. *The American Power Act and Enhanced Energy Efficiency Provisions: Impacts on the U.S. Economy.* Washington, D.C.: American Council for an Energy-Efficient Economy.

Moodys.com. 2011. *Households: Total, (Ths.), Annual and Labor: Number of Employed, (Ths., SA), Annual.* Downloaded 04/12/11.

U.S. Census Bureau. 2009. *Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July, 2009 (NST-EST2009-01).* Washington, D.C.: U.S. Census Bureau, Population Division.

_____. 2005. *Interim Projections of the Total Population for the United States and States: April 1, 2000 to July 1, 2030.* Washington, D.C.: U.S. Census Bureau, Population Division, Interim State Population Projections.