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Hearing on

Home Appliance Energy Efficiency Standards under the Department of Energy– Stakeholder Perspectives

Energy and Commerce Committee

Subcommittee on Energy and Power

United States House of Representatives

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Introduction

Thank you Chairman Whitfield, Ranking Member Rush, and Members of the Subcommittee for inviting me to share my research on the effects of the Department of Energy's appliance efficiency standards on consumers. I am Senior Policy Analyst at the George Washington University Regulatory Studies Center,[1] where I analyze the effects of regulation on public welfare. I recently published an analysis of the costs and benefits of energy efficiency standards for appliances issued over the last decade, and identified areas where these standards unfortunately harm consumers by reducing their choices and increasing the prices of new appliances.

I appreciate the Subcommittee's interest in the Department of Energy's (DOE's) Energy Conservation Program, including its effects on consumers and whether there are opportunities for Congress to improve it. My prepared statement includes the following points:

- The pace of regulations setting energy efficiency standards has accelerated during the last decade and is likely to continue. These standards regulate appliances used by most consumers and, because they affect almost all households and incur such large potential benefits and costs, they merit close inspection.
- American households reflect significant diversity and have very different needs and preferences when it comes to appliances regulated by DOE's efficiency standards. As a result, one-size-fits-all energy efficiency standards can deprive consumers of the ability to make purchases that best suit their unique circumstances and constraints. In such cases, these regulations are a cost to consumers rather than a benefit.
- Efficiency standards are particularly costly for low-income households who have different constraints and are less able to benefit from the tradeoff between higher upfront costs and lower long-term energy bills as a result of increased efficiency.
- Although energy efficiency standards are often billed as having substantial environmental benefits, these benefits are relatively small and typically are not sufficient to outweigh the costs to consumers of the standards.

My recent evaluation of the estimated benefits of energy efficiency rules issued 2007 – 2014 is attached as an addendum to this statement, as is my 2015 journal article on the regressive effects of DOE's efficiency standards.

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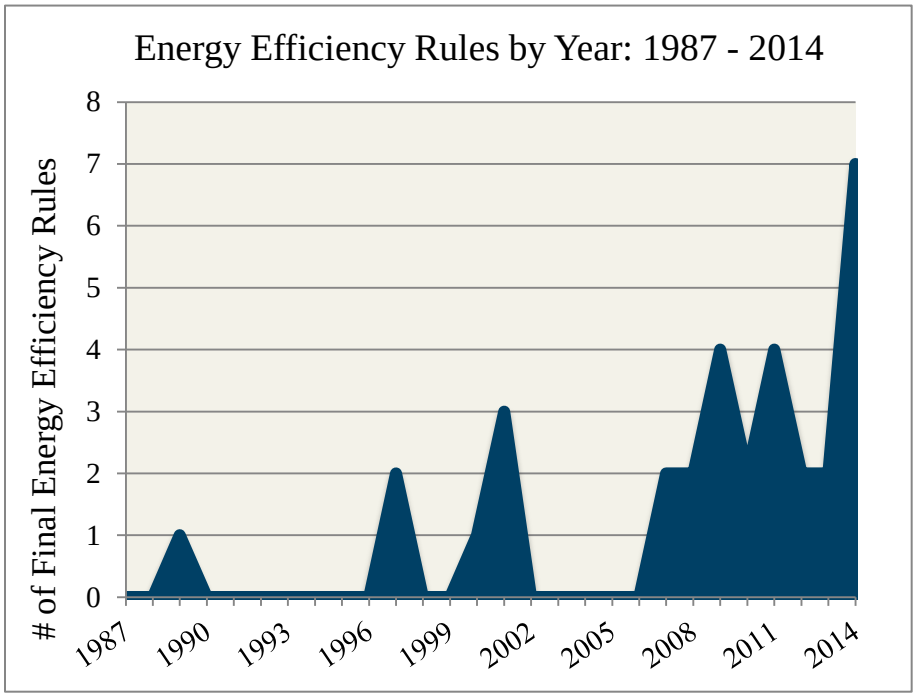
Background

The Energy Policy and Conservation Act of 1975 (EPCA) authorizes the U.S. Department of Energy (DOE) to establish energy conservation standards for twenty different categories of covered consumer appliances including refrigerators, freezers, furnaces, dishwashers, clothes dryers, televisions, faucets, and lamps.[2] The number of energy efficiency standards promulgated by DOE has increased rapidly since passage of the Energy Independence and Security Act of 2007 (EISA), which amended the EPCA and required an increase in efficiency standards for energy-using durables (see the figure below).



This figure displays counts of energy efficiency rules finalized by DOE each year between 1987 and 2014. This figure measures only significant rules reviewed by the Office of Information and Regulatory Affairs.

Source: Mannix & Dudley, "The Limits of Irrationality as the Rationale for Regulation." *Journal of Policy Analysis and Management*, Summer 2015.

This increased pace of new standards is expected to continue. The semiannual *Unified Agenda*, published by the Office of Management and Budget (OMB), lists upcoming regulations planned by agencies for the year ahead. The Spring 2016 *Unified Agenda*, issued just last month, reveals an ambitious schedule; it lists three energy efficiency standards from DOE in the pre-rule stage, twelve standards in the proposed rule stage, and thirteen in the final rule stage.[3]

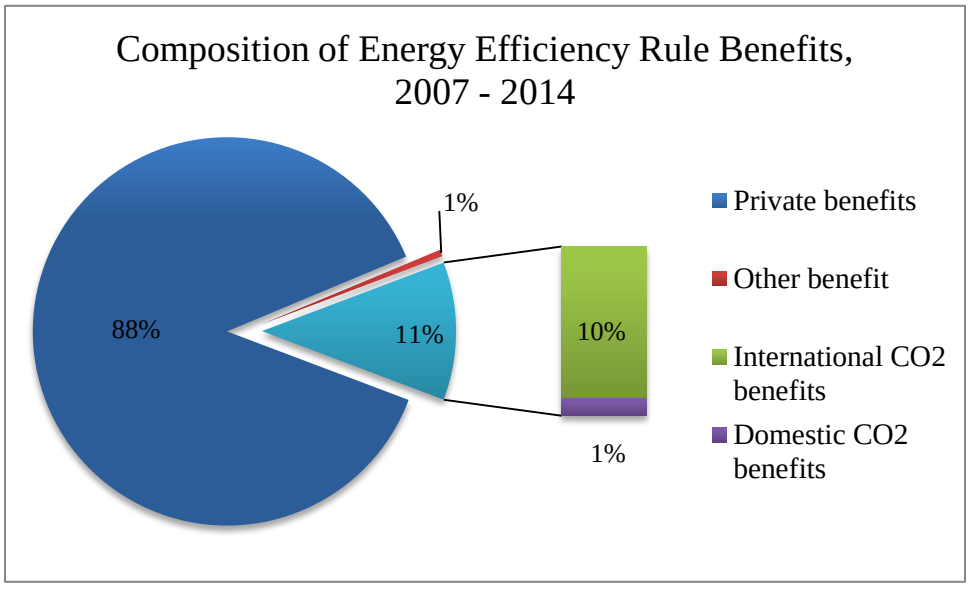
[2] Energy Policy and Conservation Act, as amended, §322 (http://legcounsel.house.gov/Comps/EPCA.pdf)

[3] These counts do not include test procedures or determinations of coverage which, while integral to the promulgation of energy efficiency rules, do not in themselves establish energy conservation standards.

Recently, DOE finalized energy conservation standards for residential dishwashers, microwaves, clothes washers, furnaces, and air conditioners—appliances that most households rely on for everyday tasks. Each of these regulations increases the price of appliances in return for reducing long-term energy and water bills. These standards affect nearly all American households, which means it is very important to examine the rationale behind them, as well as their effects on Americans.

Private Benefits

To justify most of its energy efficiency rule, DOE relies almost entirely on one type of regulatory benefit: the cost savings consumers are estimated to enjoy over the life of a more energy efficient appliance. In a 2015 paper, I found that these "private benefits" constituted 88 percent of all benefits from energy efficiency standards issued between 2007 and 2014.[4] The chart below illustrates the breakdown in benefits that DOE estimates will result from its efficiency standards.



Because this cost saving is a benefit felt only by the private consumer who is buying the appliance, rather than society at large, the benefits that justify DOE's energy efficiency rules are "private benefits" rather than public benefits. This differentiates efficiency rules from the majority of other federal regulations, which have historically relied on public benefits—reducing externalities, such as air pollution—for justification. However, the private benefits of DOE's efficiency rules dwarf the anticipated public benefits, such that most of these rules would not

[4] Sofie E. Miller. *Whose Benefits Are They, Anyway? Examining the Benefits of Energy Efficiency Rules 2007 – 2014*. Washington, DC: The George Washington University Regulatory Studies Center, September 2015. (https://regulatorystudies.columbian.gwu.edu/files/downloads/Examining-Energy-Efficiency-Standards_SMiller-9-2015.pdf)

pass a benefit-cost test if DOE's analysis were to rely on externality benefits alone.[5] The benefits of reducing carbon dioxide (CO_2) emissions constitute 11 percent of the total benefits from these standards. Without the significant private benefits that DOE estimates, the costs of these standards would outweigh the public benefits by $4.6 billion (2010$) annually.[6]

These large private benefits beg the question of why government mandates are required for consumers to enjoy them. This is an important distinction because in many cases consumers already have the option to purchase more efficient, higher-priced appliances before DOE initiates a regulation, indicating that these standards are not motivated by a lack of energy efficient appliances in the market. This also indicates that, when given the option, some consumers are actively choosing not to purchase efficient appliances. Instead of concluding that consumers can benefit from choosing the products that best suit their individual needs, regulators draw on the behavioral economics literature to argue that consumers fail to purchase high-efficiency appliances due to an inability to adequately process information.[7]

In doing so, regulators overlook the possibility that consumers may have legitimate preferences for less-efficient appliances based on household characteristics or other product qualities. By regulating away the option for any consumers to purchase less-efficient appliances, DOE and supporters of efficiency mandates contend that they are improving consumers' choice structure by *removing* choices;[8] but this approach disregards the many legitimate factors, discussed in the section below, that influence consumers' purchasing decisions.

Ignoring Consumer Preferences

People typically consider a number of factors beyond energy efficiency when they make an appliance purchase, including size, ease of use, durability, reliability, speed, or noise level.[9]

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5 See Sofie E. Miller, *Whose Benefits Are They, Anyway? Examining the Benefits of Energy Efficiency Rules 2007 – 2014*, Washington, DC: The George Washington University Regulatory Studies Center, September 2015, Appendix A. (https://regulatorystudies.columbian.gwu.edu/files/downloads/Examining-Energy-Efficiency-Standards_SMiller-9-2015.pdf)

6 Sofie E. Miller. *Whose Benefits Are They, Anyway? Examining the Benefits of Energy Efficiency Rules 2007 – 2014*. Washington, DC: The George Washington University Regulatory Studies Center, September 2015. Page 12. (https://regulatorystudies.columbian.gwu.edu/files/downloads/Examining-Energy-Efficiency-Standards_SMiller-9-2015.pdf)

7 Brian Mannix & Susan E. Dudley. "Point/Counterpoint: Valuing Internalities in Regulatory Impact Analysis," *Journal of Policy Analysis and Management*, Vol. 34, Issue 3. (Summer 2015).

8 As Mannix & Dudley note: "How much is the average consumer willing to pay in order to be prohibited from buying, for example, an incandescent light bulb? After all, prior to the regulation, not buying the incandescent bulb is free. Why would anyone pay to have that choice imposed on them?" "The Limits of Irrationality as a Rationale for Regulation." *Journal of Policy Analysis and Management* Vol. 34, No. 3, page 707. (2015)

9 For example, see the survey results in: *Addendum to Public Interest Comment on the Department of Energy's Proposed Clothes Washer Efficiency Standards*. Docket No. EE-RM-94-403. Arlington, VA: Mercatus Center

Despite this, DOE projects large benefits from its product bans by operating under the assumption that a reduction in energy costs over the long term is the primary rational factor that consumers should consider when purchasing appliances and that removing less-efficient products from the market therefore leaves consumers with better options. However, there are many cases in which more efficient appliances aren't the best choice for a household, and in these cases one-size-fits-all efficiency mandates can force consumers to incur large net costs.

Efficient dishwashers or clothes dryers save consumers more money long-term the more frequently they are used. However, investing in efficient—and more expensive—appliances may result in net harm for households with lower frequency-of-use, including couples or single residents such as the elderly. For example, in proposing its energy efficiency standards for clothes washers, DOE calculated large net benefits by estimating that a household operates its clothes washer 392 times per year, or more than once per day on average. While this may be realistic for large families or households with small children, it doesn't represent every household's appliance usage.[10]

By way of illustration: my mother, who has nine children, used to run the dishwasher as frequently as four times a day. Given this frequency-of-use, she may have been able to recoup the higher cost of an efficient dishwasher through reductions in her energy and water bills.[11] On the other hand, my current household of two runs the dishwasher approximately twice a week; in our case, it's not likely that a more efficient—and more expensive—dishwasher will be worth the investment. This illustrates that the payoff from more efficient appliances is unique for individual households, which may explain why different households choose to purchase different appliances. Preventing households from buying the appliance that best suits their individual needs can be a cost to consumers, not a benefit as DOE posits.

There are many reasons why consumers may have legitimately different preferences from one another (and from regulators). As Brian F. Mannix and I note in a forthcoming book chapter,[12] consumers in Vermont or Michigan are more likely to buy efficient furnaces, but not air

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Regulatory Studies Program. 2000. (http://mercatus.org/sites/default/files/publication/Clothes_Washer_Standards.pdf)

[10] For reference, my household of two runs the clothes washer once per week on average; according to calculations by the Mercatus Center based on DOE's data, such infrequent use would not make an efficient clothes washer a cost-beneficial purchase for my household, or any household that uses its clothes washer fewer than 300 times per year. (See here for additional information: http://mercatus.org/sites/default/files/publication/Clothes_Washer_Standards.pdf.)

[11] However, these long-term savings may not materialize for all high-frequency consumers because increased efficiency can result in reduced performance (e.g. dishes or clothes that are still dirty after a full wash cycle). In this case, consumers may not save on their utility bills because they must run their appliances more than once for the same outcome as a single run with a less efficient appliance.

[12] Sofie E. Miller & Brian F. Mannix. One Standard to Rule Them All: The Disparate Impact of Energy Efficiency Regulations. In *Nudge Theory in Action: Behavioral Design in Policy and Markets*, edited by Sherzod Abdukadirov. New York: Palgrave Macmillan (forthcoming 2016).

conditioners, while consumers in Texas are more likely to do the reverse.[13] Due to differences in climate between the two states, this is the *economically* efficient outcome, and consumers act on that information. Valuing other product attributes over energy efficiency does not indicate information processing deficiencies, it just reinforces that consumers have unique preferences due to location, climate, household size, and income, among other reasons.

Moreover, a furnace or water heater in a beach house may be used rarely; a window air conditioner in the guest room may be used only a tiny fraction of the time that one in a master bedroom is used.[14] While the same consumer will adapt her choices to particular locations and circumstances, regulators do not necessarily take the same approach. Because regulators cannot access, let alone process, all of this relevant information, one-size-fits-all technological mandates harm consumers by reducing their ability to optimize their choices in the marketplace.[15]

Regressive Effects of Efficiency Standards

In addition to limiting consumers' purchasing options, these standards also have a regressive effect on low-income and elderly households. In its annual Report to Congress on the Benefits and Costs of Federal Regulation, OMB considers the possibility that regulations may "disproportionately help or hurt those at the bottom of the economic ladder, or those who are suffering from some kind of acute condition or extreme deprivation."[16] Existing research, both from the George Washington University Regulatory Studies Center and other sources, addresses the effect of regulation on low-income Americans,[17] particularly as a result of DOE's energy efficiency standards.[18]

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[13] And, in fact, websites for homeowners considering high-efficiency furnaces suggest they do just that. See below. Don Vandervort. "Buying a High-Efficiency Furnace." HomeTips. Updated April 21, 2016. http://www.hometips.com/buying-guides/high-efficiency-furnaces.html.

[14] Kenneth Gillingham, Richard G. Newell, & Karen Palmer. *Energy Efficiency Economics and Policy*. Washington, DC: Resources for the Future, April 2009. RFF DP 09-13. §5.4.

[15] Sofie E. Miller & Brian F. Mannix. One Standard to Rule Them All: The Disparate Impact of Energy Efficiency Regulations. In *Nudge Theory in Action: Behavioral Design in Policy and Markets*, edited by Sherzod Abdukadirov. New York: Palgrave Macmillan (forthcoming 2016).

[16] United States. Office of Management and Budget. *2014 Report to Congress on the Benefits and Costs of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities*. June 15, 2015. Page 8. https://www.whitehouse.gov/sites/default/files/omb/inforeg/2014_cb/2014-cost-benefit-report.pdf

[17] For example, see Diana Thomas, "WORKING PAPER: Regressive Effects of Regulation," No. 12 – 35, November 2012, http://mercatus.org/publication/effects-regulation-low-income-households; and Dustin Chambers & Courtney A. Collins. "WORKING PAPER: How Do Federal Regulations Affect Consumer Prices? An Analysis of the Regressive Effects of Regulation." February 2016. http://mercatus.org/sites/default/files/Chambers-How-Regs-Affect-Prices-v2.pdf

[18] For example, see Sofie E. Miller, "One Discount Rate Fits All? The Regressive Effects of DOE's Energy Efficiency Rule," *Policy Perspectives* Vol. 22. 2015.

To its credit, DOE provides its own analysis of subpopulation impacts in many of its rules setting efficiency standards. DOE's analysis shows that its efficiency standards can have a disparate impact on the poor and the elderly.[19] This analysis is confirmed by my own quantitative research in this area, which calculates net benefits and costs for different types of consumers based on inputs from the academic literature.

It is well known that the time value of money is much higher for the poor. That is, the poor place a much higher value on having more money today, compared to the future, than do wealthier individuals who are better able to borrow money and weather financial downturns. The time value of money is expressed as a discount rate. Unfortunately, the existing literature on implicit consumer discount rates for energy-using durables suggests that the discount rates used by DOE to calculate consumer benefits are better representative of high-income households than median- and low-income households.[20] Using higher discount rates, which better represent the implicit time preferences of median- and low-income households, shows that energy efficiency standards *impose net costs on them*.[21]

Discounting: Present Costs vs. Future Benefits

To determine whether the long-term benefits of energy savings outweigh consumers' higher upfront equipment costs, the value of future savings must be discounted to be compared with current costs. In its guidance to agencies on how to conduct regulatory analysis, OMB explains:

> Benefits and costs do not always take place in the same time period. When they do not, it is incorrect simply to add all of the expected net benefits or costs without taking account of when [they] actually occur. If benefits or costs are delayed or otherwise separated in time from each other, the difference in timing should be reflected in your analysis.[22]

Because consumers will receive the benefit of reduced energy bills over the entire lifetime of their regulated appliances, DOE discounts those benefits to make them comparable with the

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[19] Miller, Sofie E. "Public Interest Comment on the Department of Energy's Direct Final Rule: Energy Conservation Standards for Residential Dishwashers." September 14, 2012. https://regulatorystudies.columbian.gwu.edu/files/downloads/DOE_EERE_2011_BT_STD_0060.pdf.

[20] See, for example, Richard G. Newell & Juha V. Siikamäki, "Individual Time Preferences and Energy Efficiency." *National Bureau of Economic Research* Working Paper 20969. 2015; and Jerry A. Hausman "Individual Discount Rates and the Purchase and Utilization of Energy-Using Durables." *The Bell Journal of Economics* Vol. 10, No. 1: 33 – 54. 1979.

[21] Sofie E. Miller. "One Discount Rate Fits All? The Regressive Effects of DOE's Energy Efficiency Rule." *Policy Perspectives* Vol. 22. 2015.
See also: Sofie E. Miller, "Public Interest Comment on the Department of Energy's Proposed Rule Energy Conservation Program: Energy Conservation Standards for Residential Furnace Fans," December 18, 2013; and Sofie E. Miller, "Regressive Furnace Fans," *Regulation Magazine* Spring 2014: 13-14.

[22] Office of Management and Budget. 2003. *Circular A-4: Regulatory Analysis*. Washington, DC. Page 31.

additional upfront appliance cost associated with compliance with the tighter standards. Benefits expected in the future are diminished in this calculation because people generally prefer present consumption to future consumption; that is, they have positive time preference. Discounting benefits and costs allows comparison of gains and losses incurred across different time periods.[23]

A lower discount rate implies that present consumption is valued relatively low compared to future consumption, whereas a higher discount rate implies future consumption has less value relative to present consumption. The appropriate rate by which to discount future benefits, however, varies depending on circumstances, and relying on a discount rate that is too high or too low could effectively misallocate consumption over time. This further complicates the calculation because the benefits of DOE's standards vary dramatically depending on the discount rate used to compare them to costs, which could jeopardize whether they are economically justified as required by statute.

Pursuant to OMB guidelines, DOE discounts at seven and three percent to calculate the present value of its energy efficiency benefits, using a three percent discount rate for its primary benefit estimate. However, consumers' measured discount rates in the academic literature are significantly higher, and tend not to be homogenous either across households or across purchase types.[24] In addition, actual discount rates for consumer appliances also vary quite a bit by household income, education, and race,[25] and, as noted above, the discount rates DOE uses to calculate high net benefits from its rules only adequately represent the time preferences of high-income households. Because many households likely face higher costs for borrowing than three percent to cover the higher up-front expense, the real benefits of these standards are much smaller than DOE calculates, resulting in efficiency standards that do not benefit, and, in fact, harm low- and median-income households.

Costs Outweigh Environmental Benefits

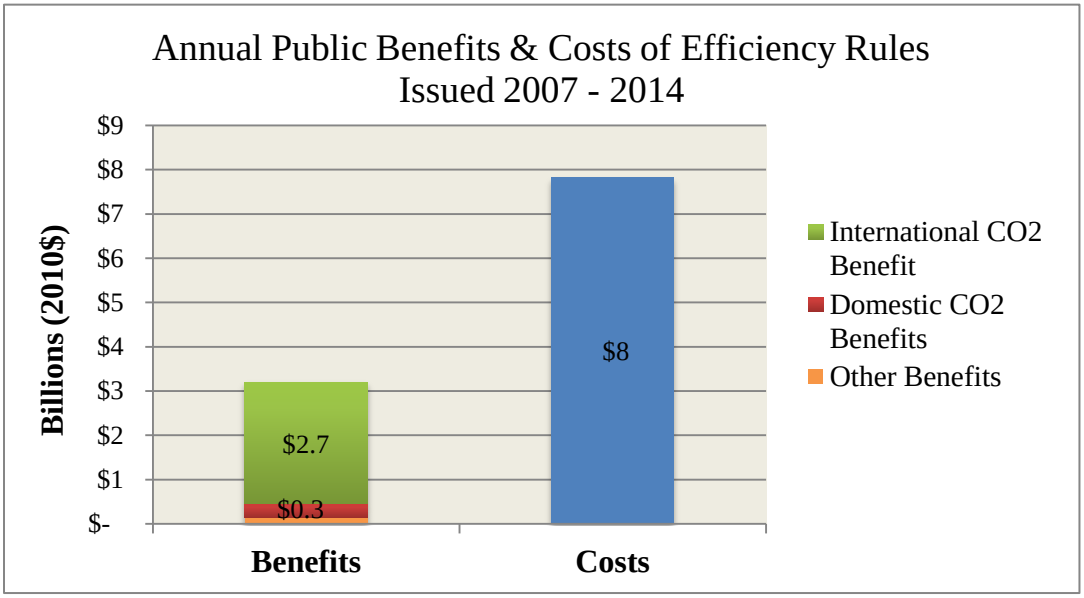
Though many traditionally think of energy efficiency standards in terms of environmental benefits, these benefits play a relatively small role in justifying DOE's standards. For the purpose of illustration, the following chart shows how the environmental benefits of DOE's efficiency rules—that is, the benefit of reducing CO_2 emissions—compare to costs. If DOE did not use private benefits to justify its standards, they would not pass a traditional benefit-cost test; the costs of these standards outweigh the public benefits by $4.6 billion (2010$) annually. After

[23] Office of Management and Budget. 1992. *Circular A-94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. Washington, DC.

[24] Frederick, Shane, George Loewenstein and Ted O'Donoghue. 2002. "Time Discounting and Time Preference: A Critical Review." *Journal of Economic Literature*. Vol. 40, No. 2: 393.

[25] Richard G. Newell & Juha V. Siikamäki, "Individual Time Preferences and Energy Efficiency." *National Bureau of Economic Research* Working Paper 20969. 2015

private benefits, the next largest category of benefits is international benefits from CO_2 reductions, which account for $2.75 billion in annual benefits.



Due to heterogeneity among households, it is unlikely that the large private benefits that DOE expects will materialize for many consumers; however, the Department would not be able to justify its efficiency standards on the basis of environmental benefits alone.

Conclusion

If the past decade is any indication, the DOE will continue to rely—heavily—on highly questionable private benefits estimates to justify energy efficiency standards that reduce consumer choice. Whether these benefits will materialize for consumers remains to be seen. Different households have different circumstances and constraints, and in many cases it is a cost to them, rather than a benefit, to have their options reduced.

While private benefits comprise 88 percent of all regulatory benefits for energy efficiency regulations issued between 2007 and 2014, these estimated benefits are based on faulty assumptions about consumers and their preferences. If DOE's assumptions are incorrect, then many consumers will experience large net costs by having fewer available options that represent their diverse preferences. Without these "private" benefits, the large costs of these standards cannot be justified by the relatively small environmental benefits of reducing CO_2 emissions.