

**REGULATORY IMPACT ANALYSIS FOR TODAY'S ENERGY  
CONSERVATION STANDARDS FOR  
RESIDENTIAL FURNACES AND BOILERS**

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# REGULATORY IMPACT ANALYSIS FOR TODAY'S ENERGY CONSERVATION STANDARDS FOR RESIDENTIAL FURNACES AND BOILERS

## 1.0 INTRODUCTION

The Department of Energy (DOE) has determined that residential furnace and boiler energy conservation standards constitute an “economically significant regulatory action” under Executive Order (E.O.) 12866 “Regulatory Planning and Review.” 58 FR 51735, October 4, 1993. Therefore, today’s energy conservation standards require a regulatory impact analysis (RIA), which involves an evaluation of non-regulatory alternatives to the standards. This document evaluates several possible alternatives to today's standards, and compares the costs and benefits of each to today's standards. As described in section 2.1.2 of this report, today's standards are those in trial standard level (TSL) B.

Under the Process Rule (Procedures for Consideration of New or Revised Energy Conservation Standards for Consumer Products, 10 CFR Part 430, Subpart C, Appendix A), DOE is committed to continually explore non-regulatory alternatives to standards. DOE has prepared this regulatory impact analysis pursuant to E.O. 12866, which is subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA). 58 FR 51735.

DOE identified six major non-regulatory alternatives to standards as representing feasible policy options to achieve consumer product energy efficiency. These are listed in Table RIA.1. DOE evaluated each alternative in terms of its ability to achieve significant energy savings at a reasonable cost, and compared the effectiveness of each one to the effectiveness of today's standards.

### **Table RIA.1 Policy Alternatives to Today's National Furnace and Boiler Standards**

No New Regulatory Action  
Consumer Rebates  
Consumer Tax Credits  
Manufacturer Tax Credits  
Voluntary Energy-Efficiency Targets  
Early Replacement  
Bulk Government Purchases

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## **2.0 NON-REGULATORY POLICIES**

### **2.1 Methodology**

This section describes the approach DOE used to analyze non-regulatory policies for the most common furnace and the most common boiler product classes, which are non-weatherized gas furnaces and gas boilers. DOE used a similar approach to estimate the impacts of the policy alternatives for the other furnace and boiler product classes.

#### **2.1.1 Modeling Method**

To calculate the national energy savings (NES) and the net present value (NPV) corresponding to each policy alternative, DOE used the NES Spreadsheet Model (see Chapter 10 of the technical support document (TSD) accompanying today's final rule for a description of the NES Spreadsheet Model). To compare each alternative to today's standards, DOE quantified the effect of each alternative on the purchase of furnace and boiler equipment meeting the target levels. Once it had made the quantitative assumptions for each alternative policy, DOE made the appropriate revisions to the inputs in the NES Spreadsheet Model. The main model inputs that DOE revised were (1) market shares of equipment at target efficiencies, and (2) equipment replacement rates.

The shipments for any given year are comprised of a distribution of efficiency levels. DOE assumed that standards would affect 100 percent of the shipments, while the non-regulatory policies would affect a smaller percentage of the shipments. In each policy case, DOE made particular assumptions about the percentage of shipments impacted by the policy under analysis. DOE then calculated shipment-weighted average energy consumption and cost using these market shares.

A shift in market share to higher efficiency may increase the average installed cost of furnace and boiler equipment. Operating costs will generally decrease due to a decline in energy consumption. Therefore, DOE was able to calculate an NPV for non-regulatory alternatives in the same way as it did for today's standard. In some scenarios, total installed cost increases are partially mitigated by government rebates or tax credits. DOE assumed that credits and rebates would be paid for by consumers in another form (such as additional taxes), and therefore did not include them as a benefit for the purposes of calculating the national NPV.

The key measures of the impact of each alternative are:

- National energy savings in quadrillion Btus (quads): Cumulative national primary energy savings for equipment bought in the period from the effective date of the policy case (2015) to the year 2038. NES results account for a 15-percent rebound effect. (See Chapter 10 of the TSD for an explanation of the rebound effect.)
- Net present value: The value of net monetary savings from equipment bought in the period from the effective date of the policy case (2015) to the year 2038. DOE calculated

the NPV as the difference between the present value of equipment and operating expenditures (including energy) in the base case, and the present value of expenditures in each alternative policy case. DOE calculated operating expenses (including energy) for the life of the equipment.

### **2.1.2 Policy Assumptions**

The impacts of non-regulatory policies are by nature uncertain, since they depend on program implementation and marketing efforts and the subsequent consumer behavior response. The projected impacts depend on the assumptions regarding the consumer participation rate, and are therefore subject to more uncertainty than the impacts of mandatory standards, which DOE assumes will have full compliance. To increase the robustness of the analysis, DOE conducted a literature review on each non-regulatory policy and consulted with key experts to gather information on similar incentive programs that have been implemented in the U.S. By studying field experience with sample programs of each type, DOE sought to make credible assumptions of their potential market impacts. Section 2.2 below reports the conclusions from this research as they apply to the policy modeling assumptions and includes the corresponding literature citations.

Each of the policy alternatives to today's standards that DOE considered improves the average efficiency of new furnace and boiler equipment relative to the base case (no new regulatory action). The analysis considers that each alternative policy would induce residential consumers to purchase units at the same efficiency levels as required by today's standards. This report refers to these levels as target levels. In contrast to today's standards, however, the penetration rate in the alternative policy cases may not be 100 percent.

Today's standards are those in TSL B, as shown in Table RIA.2.

**Table RIA.2 Trial Standard Levels for Residential Furnaces and Boilers**

Trial Standard Levels	NWGF	WGF	MHF	OF	GB	OB
	AFUE %	AFUE %	AFUE %	AFUE %	AFUE %	AFUE %
TSL 1	80	80	80	80	82	83
TSL A	80	81	80	82	82	83
TSL 2	81	81	80	82	84	83
<b>TSL B</b>	<b>90</b>	<b>81</b>	<b>90</b>	<b>82</b>	<b>82</b>	<b>84</b>
TSL 4	90	81	90	84	84	84
TSL 5	96	83	90	85	99	95

Product class list with current standard level in parentheses:

- NWGF = non-weatherized gas furnace (78%)
- WGF = weatherized gas furnace (78%)
- MHF = mobile home gas furnace (75%)
- OF = oil-fired furnace (78%)
- GB = gas boiler (80%)
- OB = oil-fired boiler (80%)

DOE assumed that the non-regulatory policy impacts last from the effective date for proposed furnace and boiler standards, 2015, through the end of the analysis period, 2038. DOE did not consider administrative costs for any of the non-regulatory policies in its analysis. Inclusion of such costs would decrease their NPV by a small amount.

### 2.1.3 Policy Interactions

DOE calculated the impacts of each regulatory policy separately from those of the other policies. In actual practice, certain policies are often most effective when implemented in combination to provide incentives, such as early replacement with consumer rebates, or early replacement with bulk government purchases. DOE attempted to make conservative assumptions to avoid double counting policy impacts. Therefore, the policy impacts reported below are not additive; the combined impact of several or all of the policies may not be inferred from adding the results together.

Section 2.3 presents the market penetration curves for each of the non-regulatory policy cases for non-weatherized gas furnaces and gas boilers.

## 2.2 Non-Regulatory Policy Assumptions

### 2.2.1 No New Regulatory Action

The case in which no new regulatory action is taken with regard to residential furnace and boiler efficiency constitutes the base case scenario described in Chapter 10 of the Furnace and Boiler TSD.<sup>1</sup> This case defines the basis of comparison for all other scenarios. By definition, no new regulatory action yields zero energy savings and an NPV of zero dollars.

### 2.2.2 Financial Incentives Policies

DOE considered scenarios in which the Federal government would provide two types of financial incentives: tax credits and rebates. Tax credits could be granted to consumers who purchased target-level furnace and boiler equipment, or the government could issue tax credits to manufacturers to offset costs associated with producing such equipment. The government also could provide consumers with a cash rebate at the time of purchase.

DOE's evaluation of financial incentive policies used a comprehensive study of the potential for energy efficiency in California performed by Xenergy, Inc., which summarizes experience with various utility rebate programs.<sup>2</sup> Xenergy developed a re-parameterized, mixed-source information diffusion model to estimate market impacts induced by financial incentives for energy-efficient appliances. The basic premise of this mixed-source model is that information diffusion drives technology adoption. The model is formulated to characterize the influences of both internal and external sources of information on consumer behavior by superimposing two components in the equation, each capturing the effect of one of two different types of information source. The effects of these two types of information diffusion mechanisms are different. *Internal* sources of information influence consumers to purchase new products due mainly to word-of-mouth from early adopters, while *external* information sources influence consumers to change their adoption decisions as a result of marketing efforts and information coming from outside the consumer group. The mixed-source model describes a combined impact of the two information-source types, and specific parameterization determines consumer adoption behavior. (Appendix X of the TSD contains further details.)

Xenergy's model combined these two information diffusion mechanisms and generated a set of "implementation curves," which Xenergy calibrated using evaluation data from utility rebate programs conducted in the 1990s. Consumer response to rebate incentives appears to be a combination of the two information source types. The implementation curves illustrate the increased penetration of efficient equipment (i.e., increased market share) as a result of consumer response to benefit/cost (B/C) ratio changes induced by a specific rebate program. The implementation curves are used to depict various diffusion patterns based on perceived barriers to consumer purchase of high-efficiency equipment. There are implementation curves for varying levels of market barriers, from "no barriers" to "extremely high barriers." These curves provide a means to study the impact of changing the B/C ratio, by reducing the initial equipment cost through financial incentives, on the consumer participation rate.

To further understand the impacts of financial incentives policies, DOE used studies on forecasting the impact of consumer tax credits.<sup>3,4</sup> This research differentiated the impact of tax credits into the "direct price effect," which arises from the incremental equipment cost savings, and the "announcement effect," which is independent of the rebate amount. The announcement effect derives from the credibility that a particular technology receives from its inclusion in an incentive program, as well as changes in product marketing strategy, and the resulting modifications in markups and pricing. DOE assumed that the direct price effect and the announcement effect would also apply to rebate programs, and that half of the increases in

market penetration associated with rebates would be due to the direct price effect and half to the announcement effect.

### *Consumer Rebates*

DOE modeled the impact of the consumer rebate policy by determining the increase in market penetration of target-level equipment relative to the base case. For non-weatherized gas furnaces, DOE estimated the impact of increasing the B/C ratio via a rebate that paid 26 percent of the incremental installed cost between a non-weatherized gas furnace meeting the base case efficiency level<sup>a</sup> and a unit meeting the target efficiency. DOE based the 26 percent rebate amount on rebate programs for condensing gas furnaces throughout the nation.<sup>5, 6, 7, 8, 9, 10, 11, 12, 13, 14</sup> The average rebate in these programs amounted to about 26 percent of the incremental installed cost for condensing furnaces.

For gas boilers, DOE assumed that the rebate would cover 60 percent of the incremental installed cost between a boiler meeting the base case efficiency level and a unit meeting the target efficiency. It based this amount on the average rebate level in programs for 85 percent AFUE gas boilers,<sup>b</sup> which amounted to about 60 percent of incremental installed cost.<sup>5, 7, 8, 9, 10, 11, 15</sup>

DOE assumed the rebates would remain in effect until they had transformed the market so that the market shift in efficiency shares seen in the first year of the program would be maintained throughout the forecast period (2015–2038).

DOE first calculated the B/C ratio for the unit meeting the target level relative to the base case with no rebate. It then calculated another B/C ratio for the unit meeting the target level, with a rebate, relative to the base case unit. Because of the incremental cost reduction due to the rebate, the B/C ratio for the rebate policy unit is larger (see Table RIA.3).

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<sup>a</sup> The base case is a market weighted-average of units at several AFUE levels.

<sup>b</sup> While the target level (82 percent) is lower than 85-percent AFUE for these rebate programs, DOE assumed that a rebate program could be designed to pay an equivalent percentage of the incremental installed costs of the targeted gas boilers.

**Table RIA.3 Benefit/Cost Ratios for Today's Standard and Rebate Policy Cases**

	<b>NWGF* at 90% AFUE</b>	<b>GB** at 82% AFUE</b>
Benefit (Lifetime Operating Cost Savings)	\$524	\$333
Incremental Installed Cost (Increased Installed Cost)	\$698	\$168
<b>B/C Ratio with no rebate</b>	<b>0.8</b>	<b>2.0</b>
Rebate Amount	\$180	\$101
Adjusted Incremental Installed Cost (Increased Installed Cost after Rebate)	\$518	\$67
<b>B/C Ratio for Rebate Policy Case</b>	<b>1.0</b>	<b>5.0</b>

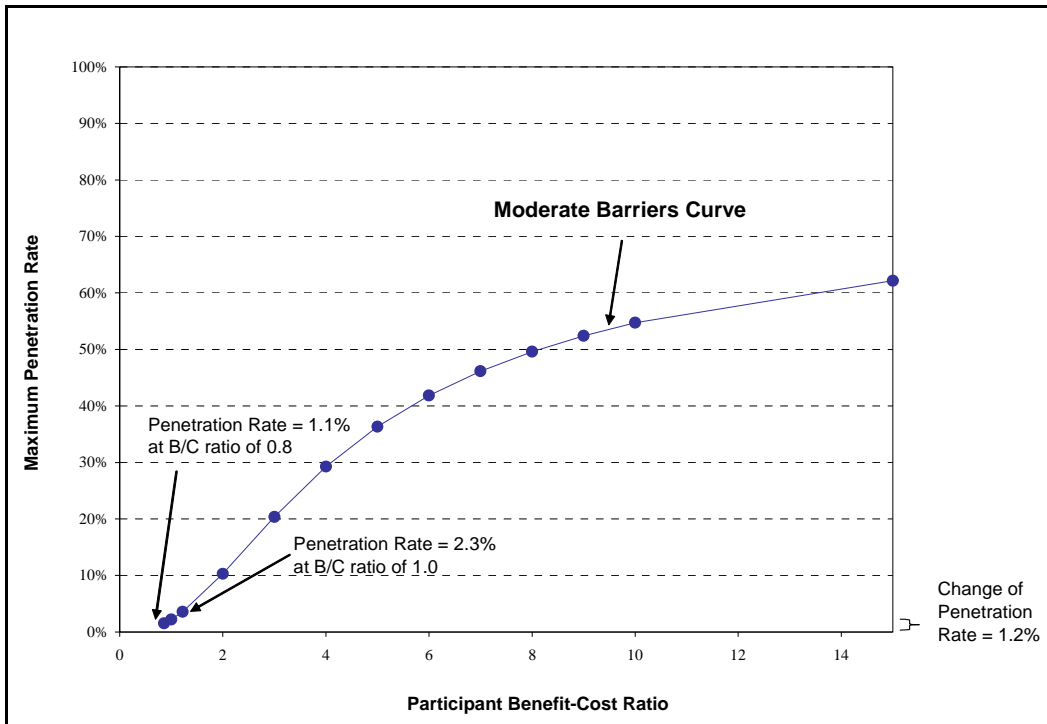
\*NWGF = non-weatherized gas furnace

\*\*GB = gas boiler

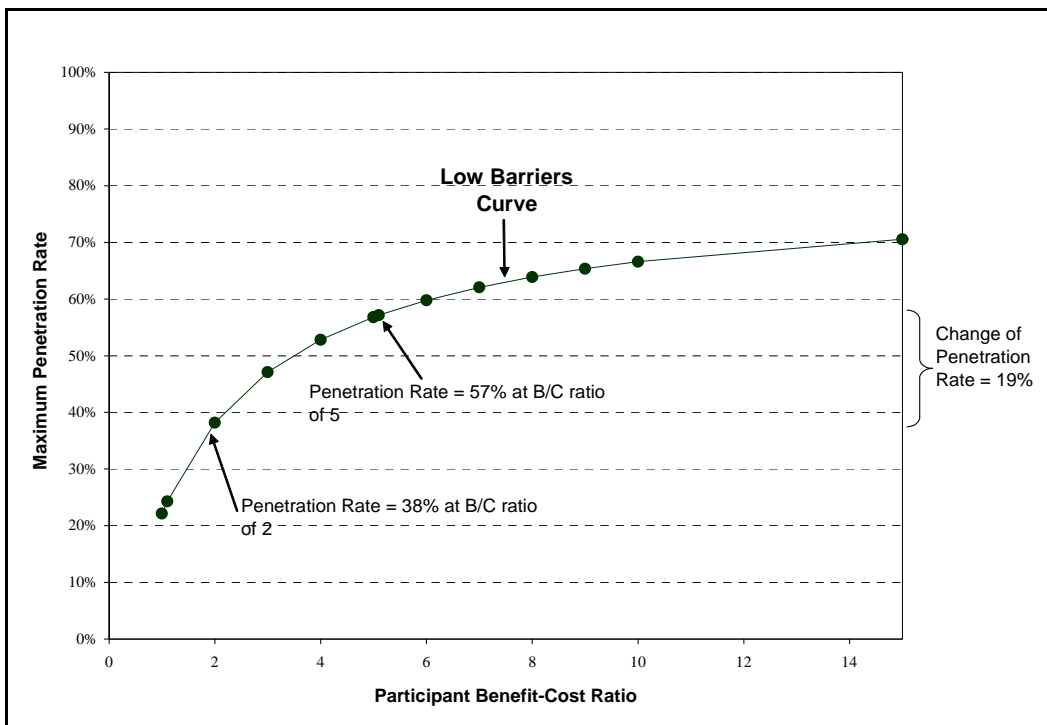
DOE then used the curves shown in Figures RIA.1, RIA.2, RIA.4, and RIA.5 to estimate the increased percentage of consumers who would purchase the units that meet the policy target levels if given a rebate incentive.

For non-weatherized gas furnaces at a 90-percent AFUE standard level, DOE chose the “moderate barriers,” since 90 percent AFUE imposes an economic burden for a large fraction of southern customers. For gas boilers at the 82-percent AFUE standard level, DOE chose the “low barriers,” since these efficiency levels are a common product with relatively large market share in 2004. DOE also used the “low barriers” curve for the other product classes.

Figures RIA.1 and RIA.2 show the penetration rates of target-level units as a function of B/C ratios. Using this method, DOE estimated that, for the non-weatherized gas furnace product class, the market share of equipment meeting the policy target due to a rebate policy would increase by 1.2 percent at a target level of 90-percent AFUE. For the gas boiler product class, DOE estimated that the market share of equipment meeting the policy target due to a rebate policy would increase by 19 percent for 82-percent AFUE units. To calculate the impacts of this policy, DOE adjusted the base case shipments projection in the NES model to reflect these percentage increases in market share of efficient furnace and boiler models.



**Figure RIA.1 Market Penetration Curve for Non-Weatherized Gas Furnaces at 90 Percent AFUE Level**



**Figure RIA.2 Market Penetration Curve for Gas Boilers at 82 Percent AFUE Level**

### *Consumer Tax Credits*

DOE assumed a consumer tax credit equivalent to the amount covered by rebates (i.e., 26 percent of the incremental cost between non-weatherized gas furnace base case equipment and equipment meeting the policy target levels, and 60 percent of the incremental cost for gas boilers). DOE estimated that the consumer participation rate would be lower than that for consumer rebates. Research on tax credits has shown that the time delay to the consumer in receiving a reimbursement via tax credit, plus the added transaction costs in tax return preparation, make the tax credit incentive less effective than a rebate received at the time of purchase. Based on previous analysis,<sup>16</sup> DOE assumed that only 60 percent of the customers who would take advantage of a rebate would take advantage of the tax credit.

Using a similar approach as for the rebate policy, DOE estimated that the market share of target-efficiency gas furnace units would increase due to consumer tax credits by 0.7 percent over the base case at the 90-percent AFUE level. For gas boilers at 82-percent AFUE, the market share would increase by 12.5 percent. DOE assumed the impact of this policy would be to permanently transform the market so that the shipment-weighted efficiency gain seen in the first year of the program would be maintained throughout the forecast period.

### *Manufacturer Tax Credits*

DOE assumed that a manufacturer tax credit program would effectively result in a lower price to the consumer by an amount equivalent to that provided by rebates (i.e., 26 percent of the incremental price difference for furnaces meeting base case efficiency levels and those meeting the policy targets, and 60 percent of the incremental price difference for boilers). Because these tax credits would go to manufacturers instead of consumers, DOE assumed that manufacturers would pass on the reduced costs, causing the direct price effect. However, DOE assumed that the announcement effect would not occur because the program would not be visible to the consumers. Since the direct price effect is approximately equivalent to the announcement effect,<sup>3</sup> DOE assumed that half of the consumers assumed to take advantage of consumer tax credits would purchase more-efficient products with a manufacturer tax credit program. As a result, DOE estimated that the market share of efficient non-weatherized gas furnaces would increase due to manufacturer tax credits by 0.4 percent over the base case at the 90-percent AFUE standard level and by 6.2 percent for gas boilers at the 82-percent AFUE standard level. DOE assumed the impact of this policy would be to permanently transform the market so that the shipment-weighted efficiency gain seen in the first year of the program would be maintained throughout the forecast period.

### **2.2.3 Voluntary Energy-Efficiency Targets**

For a non-weatherized gas furnace target level of 90-percent AFUE, DOE assumed that the voluntary target would be achieved through manufacturer participation in a gradual phaseout of production of units below 90-percent AFUE. It assumed that this phaseout would increase from 2015.<sup>17</sup>

For gas boilers at 82-percent AFUE, DOE modeled the voluntary efficiency target policy assuming expansion of existing Energy Star endorsement labeling programs conducted by the Environmental Protection Agency and DOE for these two products.<sup>18</sup> The Energy Star program sets minimum energy-efficiency specifications for various products, including furnace and boiler equipment. Energy Star encourages consumer adoption of these products through marketing to promote consumer label recognition, adoption of the specifications by various efficiency incentive programs, and manufacturer production and promotion of Energy Star-compliant appliances.

For gas boilers, DOE estimated that an expanded Energy Star program that targeted 82-percent AFUE equipment could moderately increase the market share at these levels. In this case, DOE used estimates of the market impact of the existing Energy Star programs.<sup>17, 19</sup> For gas boilers, DOE assumed the programs resulting from this voluntary efficiency targets policy would increase projected market share of the targeted units above the penetration increases estimated by the Energy Star program by 75 percent for gas boilers at the 82-percent AFUE target level. The Energy Star level for gas boilers is 85-percent AFUE.

Table RIA.4 shows the estimated market share increases from the voluntary efficiency target policy.

**Table RIA.4 Increased Market Share Penetration Levels from Voluntary Furnace and Boiler Programs for Targeted Efficiency Levels\***

Year of Program	Non-Weatherized Gas Furnaces and Mobile Home Furnaces	Weatherized Gas Furnaces	Oil Furnaces	Gas Boilers	Oil Boilers
	90% AFUE	81% AFUE	82% AFUE	82% AFUE	83% & 84% AFUE
2015	0%	0%	0%	0%	0%
2016	0%	0%	0%	3%	2%
2017	0%	0%	0%	5%	3%
2018	1%	1%	1%	8%	5%
2019	2%	2%	2%	10%	7%
2020	3%	3%	3%	13%	8%
2021	4%	4%	4%	16%	10%
2022	4%	4%	4%	18%	12%
2023	5%	5%	5%	21%	13%
2024	5%	5%	5%	23%	15%
2025	5%	5%	5%	25%	16%
2026	6%	6%	6%	26%	17%
2027	6%	6%	6%	26%	18%
2028	6%	6%	6%	26%	18%
2029	6%	6%	6%	26%	18%
2030	7%	7%	7%	26%	18%
2031	7%	7%	7%	26%	19%
2032	7%	7%	7%	26%	19%
2033	7%	7%	7%	26%	19%
2034	8%	8%	8%	27%	19%
2035	8%	8%	8%	27%	20%
2036	8%	8%	8%	27%	20%
2037	8%	8%	8%	27%	20%
2038	8%	8%	8%	27%	20%

\* The percentages in each column refer to shares of the eligible market in each case.

### 2.2.4 Early Replacement

Early replacement refers to the replacement of furnace and boiler units before the end of their useful lives. The purpose of this policy is to replace old, inefficient equipment with higher-efficiency units.

In the 1990s, DOE studied the feasibility of a Federal program to promote early replacement of appliances under the Energy Policy Act of 1992.<sup>20</sup> This study identified policy options for early replacement that included a direct national early replacement program, replacement of Federally owned appliances, promotion through equipment manufacturers, consumer incentives, incentives to utilities, and building regulations.<sup>c</sup>

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<sup>c</sup> The analysis concluded that, while cost-effective opportunities for early replacement exist, a widespread Federal early replacement program was not economically justified. Because premature retirement means that a unit may be replaced by an appliance less efficient than the eventual replacement would probably have been, energy savings would be smaller than anticipated. Early replacement programs could increase sales volatility in the long run by

(continued...)

For this analysis, DOE considered a program that targets the units in the stock that have efficiency levels lower than the policy target level and encourages their early replacement with products at the target efficiency level. Shipments not affected by the early replacement program have base case efficiency levels. Shipments to new construction in 2015 and beyond are not affected by this program. (Chapter 9 of the TSD describes the general approach for estimating replacements in each year; the NES model uses a retirement function that tracks the percentage of units retiring and surviving for each vintage.)

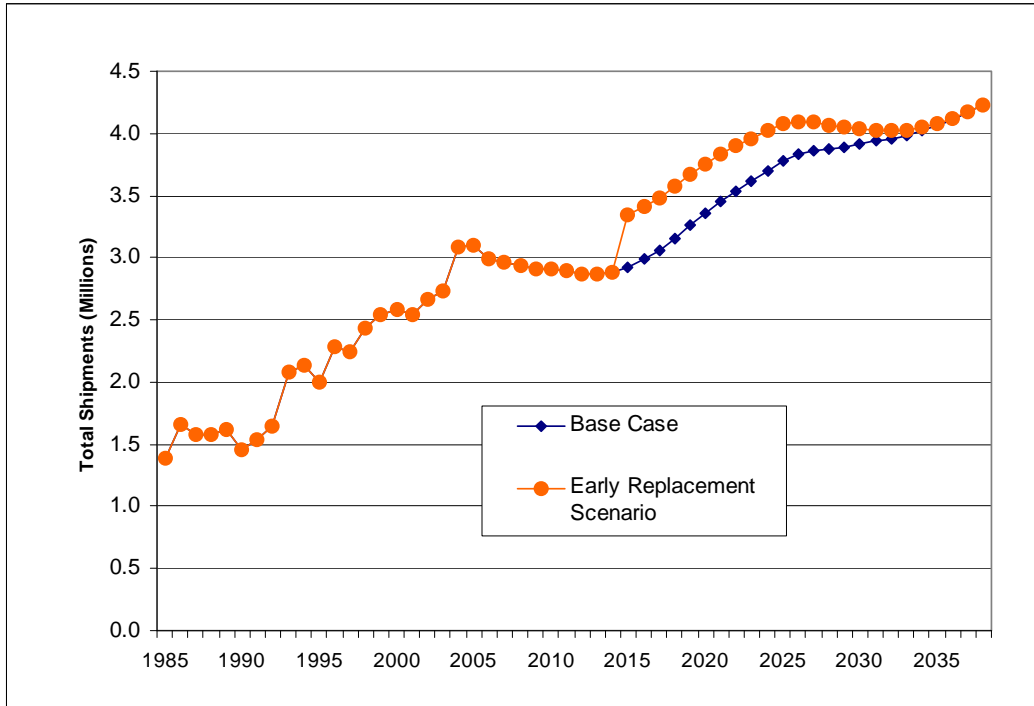
DOE assumed that a portion of the furnace and boiler units in the existing stock in 2015, the first year of the analysis period, would be replaced by models meeting the target levels. It modeled this policy by assuming an increase of 20 percent (over the natural replacement rate based on units being replaced at the end of their useful lives) in the number of replaced units in the first year. It based this level on one of the cases in the report described above. DOE assumed that the program would last as long as it took to completely replace all of the eligible furnaces and boilers in the stock in the year that the program began (2015).

The policy would create a jump in shipments of equipment meeting target AFUE levels relative to the base case in the early years of the program (see Figure RIA.3). As a result, more higher-efficiency units meeting the policy targets would be quickly brought into the equipment stock, leading to an immediate gain in the weighted-average equipment efficiency compared to the base case. However, unlike the other policy cases discussed, the weighted-average efficiency would drop back down to meet the levels in the base case as the eligible stock of equipment for early replacement became depleted.

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<sup>c</sup> (...continued)

encouraging a temporary increase in production followed by a lull in demand. Early replacement could be economical in localities with high energy cost conditions or environmental constraints, when replacement appliances are much more efficient than existing stock, or when a major technology breakthrough has recently occurred, creating the need for a ready market.



**Figure RIA.3 Early Replacement Shipments Projections for Non-Weatherized Gas Furnaces**

### 2.2.5 Bulk Government Purchases

DOE assumed that a bulk government purchase policy would encourage Federal, State, and local governments to purchase equipment meeting the target levels. Aggregating public sector demand could provide a market signal to manufacturers and vendors that some of their largest customers seek suppliers with products that meet an efficiency target at good prices. This program also could induce market pull” impacts through the effects of manufacturers and vendors achieving economies of scale for high-efficiency products.

DOE assumed that government agencies, such as the Department of Housing and Urban Development (HUD), would administer such a program. At the Federal level, this would be an enhancement to the existing Federal Energy Management Program (FEMP). FEMP has procurement guidelines for Federal government equipment purchasing, and Federal construction requirements include these guidelines for installing or replacing equipment.<sup>21</sup>

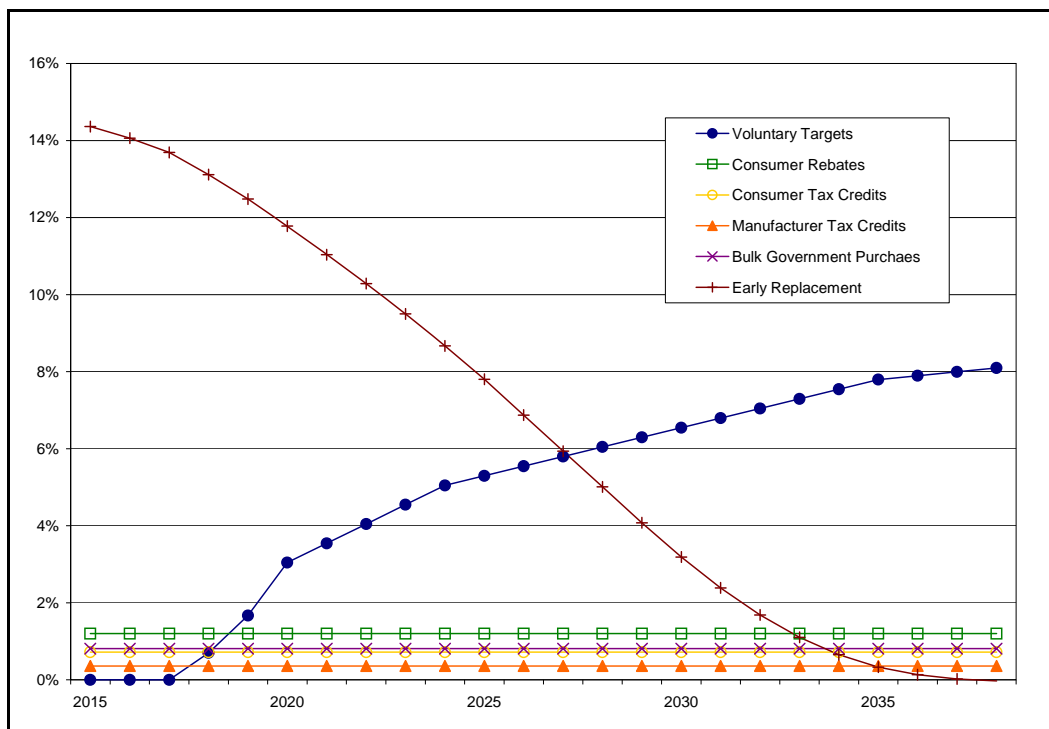
DOE assumed that this policy would impact a subset of housing units for which government agencies purchase or influence the purchase of furnaces and boilers. This subset would mainly consist of public housing and housing on military bases. To represent this subset, DOE considered low-income households identified in the Residential Energy Consumption Survey (RECS) from 2001<sup>22</sup> (see Chapter 11 of the TSD for a description of the low-income household sample). According to RECS 2001, 7.8 percent of the households with gas furnaces and 17.5 percent of those with gas boilers were classified as low-income. DOE assumed that these same percentages of furnace and boiler shipments would go to low-income households in

each year.

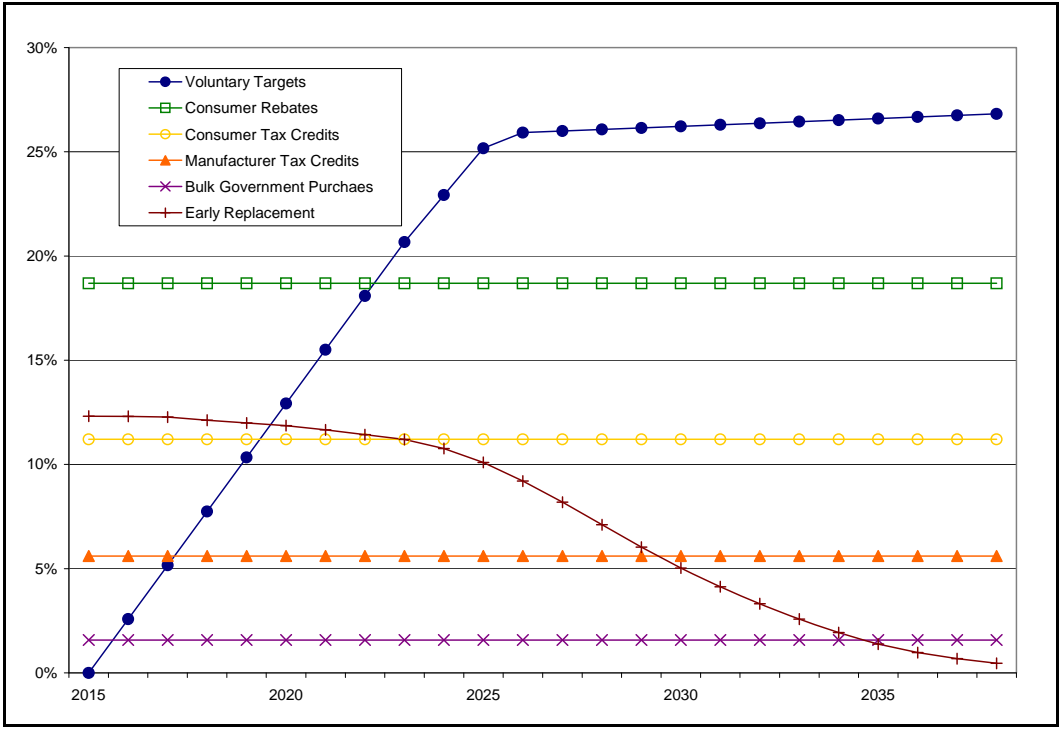
To estimate the market impact, DOE considered previous analysis of the bulk government purchasing policy in the residential air conditioner RIA,<sup>23</sup> where it assumed a five-percent increase in market share of higher-efficiency units over the base case due to the policy. Since DOE envisions that the policy for furnaces and boilers would build on the existing FEMP program for gas furnaces, DOE assumed that the government purchase policy would likely cause a 10-percent increase in market share in each year. Thus, an additional 10 percent (above the base case) of shipments to eligible low-income households would meet the target levels through this policy. The result is an additional penetration of equipment meeting the target efficiency levels of 0.8 percent and 1.8 percent (10 percent respectively of the low-income households with gas furnaces and gas boilers).

### 2.3 Non-Regulatory Policy Market Share Impacts

Figures RIA.4 and RIA.5 show the market share (penetration rate) impacts for each of the non-regulatory policy cases for non-weatherized gas furnaces and gas boilers. In each case, the market penetration refers to the eligible market for the particular product. For each product class, the proposed standard (not shown in the figures) would result in a 100-percent penetration.



**Figure RIA.4 Penetration Rates for Non-Weatherized Gas Furnaces at 90 Percent AFUE Level**



**Figure RIA.5 Penetration Rates for Gas Boilers at 82 Percent AFUE Level**

## 2.4 Results Summary for Non-Regulatory Alternatives

Table RIA.5 shows the NES and NPV of the efficiency target level equal to TSL B. The results are for all six product classes. The case in which no regulatory action is taken with regard to furnaces and boilers constitutes the base case (or "No Action") scenario, in which energy savings and NPV are zero by definition. For comparison, the table includes the impacts of the proposed energy conservation standards. The NPV amounts shown in Table RIA.5 refer to the NPV based on two discount rates (seven percent and three percent real).

**Table RIA.5 Non-Regulatory Alternatives with Target Levels at TSL B**

Policy Alternatives	Primary Energy Savings (quads)	Net Present Value* (billion 2006\$)	
		7% discount rate	3% discount rate
No New Regulatory Action	0.0	0.0	0.0
Consumer Rebates	0.098	0.089	0.480
Consumer Tax Credits	0.059	0.054	0.288
Manufacturer Tax Credits	0.030	0.027	0.144
Voluntary Energy Efficiency Targets	0.148	0.071	0.731
Early Replacement	0.330	0.119	0.829
Bulk Government Purchases	0.031	0.013	0.120
Today's Standards at TSL B	3.209	0.975	11.069

\* Net present value (NPV) is the value of a time series of costs and savings. DOE determined the NPV from 2015 to 2038 in billions of 2006\$.

The alternatives DOE examined would not save as much energy or have as high NPV as the standards. Also, several of the alternatives, such as consumer or manufacturer tax credits, would require new enabling legislation, since authority to carry out those alternatives does not presently exist.

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