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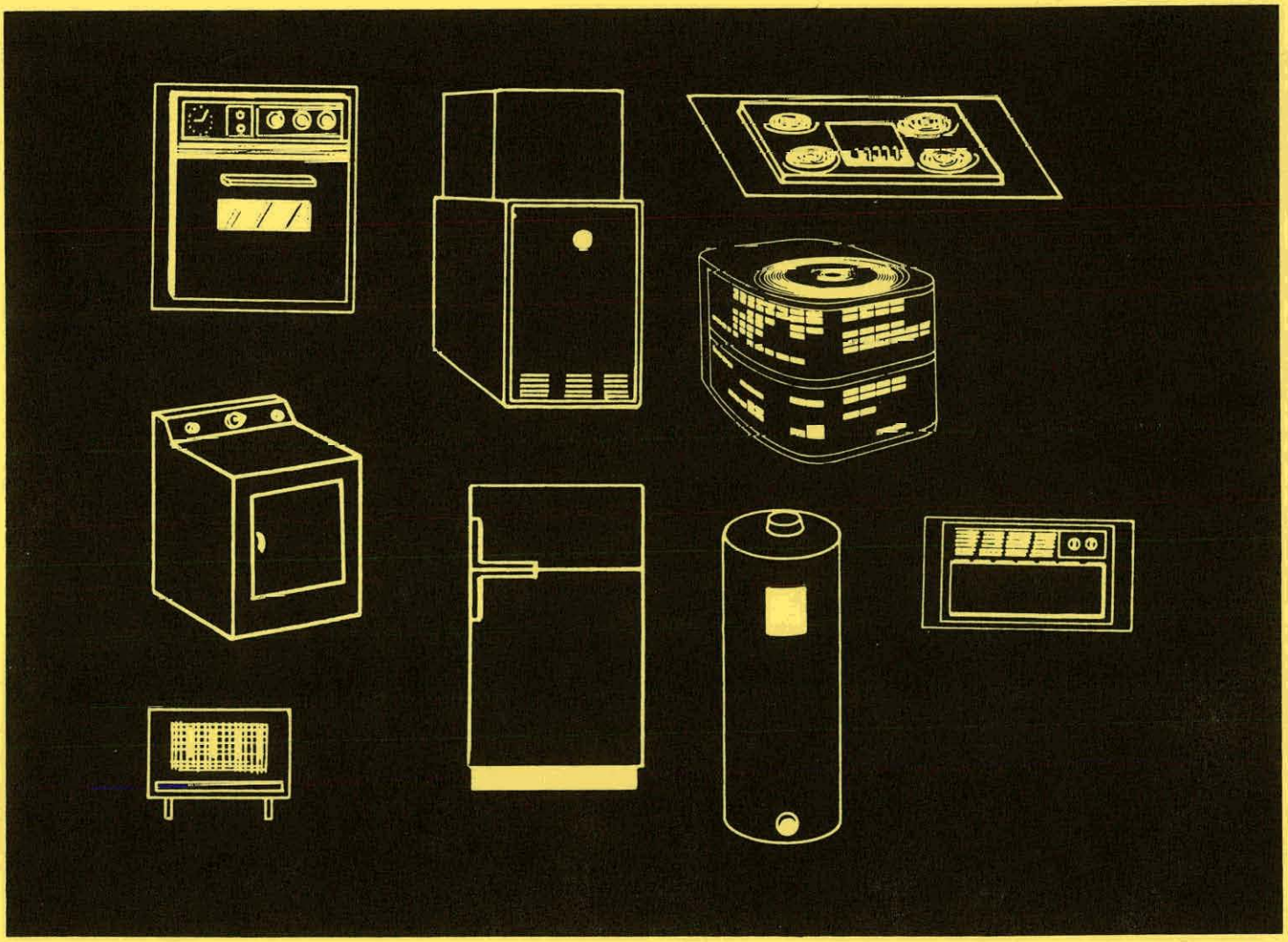
U.S. Department of Energy
Assistant Secetary for Conservation
and Solar Energy
Office of Buildings and Community Systems
Consumer Product Efficiency Branch

June 1980

Draft Regulatory Analysis



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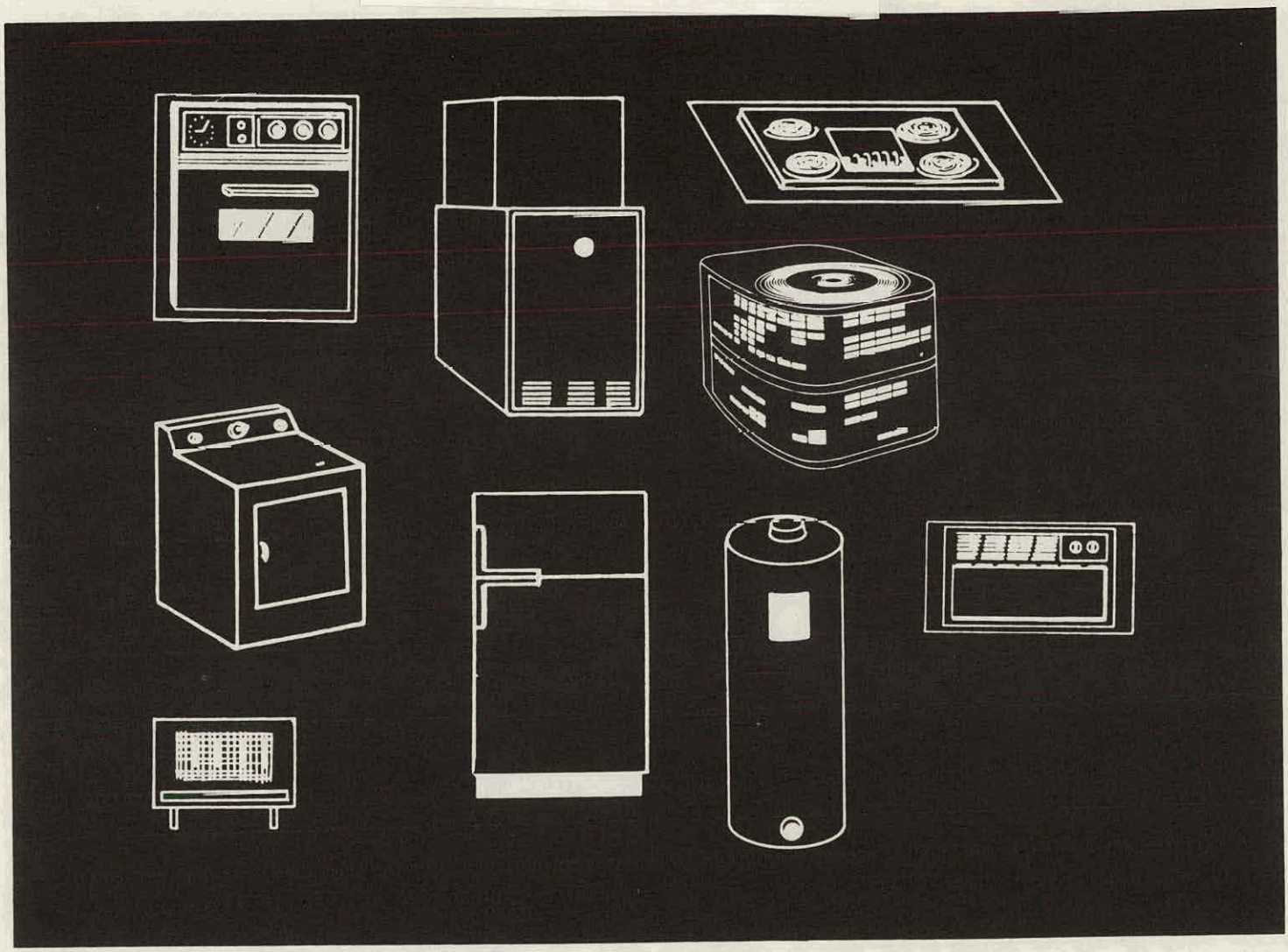

Technical Support Document No. 1:

DRAFT REGULATORY ANALYSIS

Energy Efficiency Standards

for Consumer Products

Covering: Refrigerators and Refrigerator/Freezers, Freezers, Clothes Dryers, Water Heaters, Room Air Conditioners, Home Heating Equipment, Kitchen Ranges and Ovens, Central Air Conditioners and Furnaces

U.S. DEPARTMENT OF ENERGY

Conservation & Solar Energy

Office of Building & Community Systems

DRAFT REGULATORY ANALYSIS

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1.0 INTRODUCTION

In the National Energy Conservation Policy Act of 1978 (NECPA), Public Law 95-619, Congress mandated the development of effective measures to reduce the rate of growth of demand for energy [Section 102(a)(2)] as well as implementing and maintaining effective conservation measures for the efficient use of nonrenewable and other energy sources [Section 102(a)(3)]. In order to achieve the national goals set forth in the Energy Policy and Conservation Act, as amended by the National Energy Conservation Policy Act (hereafter referred to as "the Act"), the Act mandates DOE to promulgate energy efficiency performance standards for the following products:

- Refrigerators and Refrigerator-Freezers
- Freezers
- Dishwashers
- Clothes Dryers
- Water Heaters
- Room Air Conditioners
- Home Heating Equipment (not including furnaces)
- Television Sets
- Kitchen Ranges and Ovens
- Clothes Washers
- Humidifiers and Dehumidifiers
- Central Air Conditioners (including heat pumps)
- Furnaces

The Act calls for the promulgation of energy efficiency standards for each type (or class) of covered product designed to achieve the maximum improvement in energy efficiency which is technologically feasible and economically justified unless it is determined that the establishment of such standard will not result in significant conservation of energy.

The Act also directs that the benefits of the standard are to exceed the burdens. Factors that need to be considered when evaluating the benefits and burdens of the regulation include economic impacts on manufacturers and consumers, the savings in operating costs compared to any increase in the price or maintenance expenses of the covered products, total energy savings likely to result from the standard, any lessening of the utility or the performance of the covered products, the impact of any lessening of competition, the need of the Nation to conserve energy, and any other factors considered to be relevant.

This Draft Regulatory Analysis describes the analyses performed by DOE to arrive at proposed energy efficiency standards for nine of the products listed above. These nine products were given priority in that standards are to be promulgated no later than December 1980. The nine products are refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, kitchen ranges and ovens, central air conditioners (cooling only), and furnaces.

Standards for dishwashers, television sets, clothes washers, and humidifiers and dehumidifiers are required to be published in the Federal Register no later than December 1981. Standards for central air conditioners (heat pumps) and home heating equipment are to be published in the Federal Register no later than January 1982. Accordingly, these products are not discussed in this Draft Regulatory Analysis.

Executive Order 12044, "Improving Government Regulations" May 1, 1978 (43 FR 18634), directs that all Federal regulations achieve their intended goals without imposing unnecessary burdens on the economy, on individuals, on public or private organizations, or on State and local governments. To this end, and in accordance with DOE Order 2030.1, "Procedures for the Development and Analysis of Regulation Standards and Guidelines," December 18, 1978 (44 FR 1031), a Regulatory Analysis is prepared for all major regulations. Such an analysis presents major alternatives to the regulation, examines the economic and administrative effects arising from each alternative and explains why one alternative was selected over the others.

Since Congress mandated that DOE promulgate performance standards, the only other viable alternative that falls within the boundaries of the law is a no standard alternative. However, in preparing this Regulatory Analysis, the list of alternatives has been expanded to include alternatives that would require new enabling legislation or statutory amendments.

This Draft Regulatory Analysis for the Consumer Product Efficiency Standards program is concerned with the projected economic impacts of the Standards, and their major alternatives, on the Nation as a whole, on geographic regions, and on demographic groups. It is also concerned with examining the ability of each alternative to correct existing market imperfections, specifically: 1) inadequate information; 2) consumer failure to value future energy savings; 3) underestimation of future energy prices; 4) institutional barriers; and 5) long lag times for market adjustments. Finally, the potential economic and administrative effects caused by the implementation and enforcement of the Standards, which include the effects on related Federal programs and on State and local governments, are also discussed in this analysis.

In addition to examining possible alternatives to the proposed Standards, this Draft Regulatory Analysis examines the

way in which performance criteria and other factors are defined and measured for the proposed Standards. The options available to the proposed alternative are examined for reasonableness and possible biases which might affect the success of the Standards in achieving the legislated goals of energy conservation and reduced demand for energy. The analysis briefly presents the results of Technical Support Document No. 4, Economic Analysis Document, and explains how these results were used to determine the relative impact of the proposed Standards on different geographic regions and demographic groups.

In addition, a Draft Urban Impact Analysis is included as part of this Draft Regulatory Analysis, as required by Executive Order 12074, and in accordance with OMB Circular A-116, "Agency Preparation of Urban and Community Impact Analysis," (43 FR 37779, August 1978). An Urban Impact Analysis should determine, as much as reasonably possible, the absolute and relative impacts that a major proposed action is expected to have on urban areas, consider possible impacts on employment, population size and composition, income, and the fiscal condition of state and local governments. Where possible, these impacts are determined separately for central cities, suburban communities and nonmetropolitan communities. Attention should focus on impacts on minority employment, low-income households, and communities with high unemployment or below-average per capita income.

2.0 DESCRIPTION AND ANALYSIS OF MAJOR ALTERNATIVES

There are many alternative methods of achieving energy conservation through the increased energy efficiency of consumer products. This section describes and analyzes various regulatory and non-regulatory alternatives and their effectiveness in conserving energy.

The alternatives examined in this analysis ranged from the no action alternative (or the "base case" which provides the baseline for measuring the benefits of other alternatives) to alternatives which would require new legislation for implementation. Existing state, local, and Federal programs that are similar in scope and objectives were also examined as possible alternatives to the proposed action.

Each alternative has been analyzed in comparison to the other alternatives in terms of potential energy savings and other impacts that differ among the alternatives. The summary of this comparative analysis is presented in the following section of this chapter. A detailed discussion and quantitative description of each alternative is presented in the remaining sections of this chapter.

2.1 COMPARATIVE ANALYSIS OF THE ALTERNATIVES

In order to compare each alternative quantitatively in terms of energy savings and the net present value (or cost savings) to the proposed consumer product standards, it is necessary to quantify the impact of each alternative on the purchase and use of energy efficient consumer products. Each alternative to the proposed regulation was quantified so that inputs to the Oak Ridge National Laboratory Engineering/Economic Model of Residential Energy Use could be determined. The ORNL Model was used to calculate the energy use and the net present value corresponding to each alternative. The key inputs to the ORNL Model are:

- energy prices and escalation factors
- implicit discount rates for consumers (the reciprocal of the length of payback period in years that is acceptable to the consumer for recovering the initial higher price for an energy efficienct product)
- consumer demand and income elasticities
- cost versus efficiency relationships for all consumer products
- appliance stock data (purchase of new appliances or turnover rates for inventories)

An example of the inputs to the ORNL Model is shown in Table 2-1 for gas furnaces. The methodology for quantifying each alternative consisted of setting the parameters of the baseline case as constant throughout the analysis. These parameters were changed only when the implementation of a specific alternative indicated that one or more of these parameters would change. Otherwise, all aspects of the baseline case remained constant throughout the analysis to permit a quantitative comparison of the alternatives without extraneous impacts.

Table 2-1 Summary of Key Inputs to the ORNL Model to Simulate the Baseline Case (illustrated for gas furnaces)

Price Escalation Rates

- Low price case: 1.0% real price increase per year for electricity

  1.5% real price increase per year for gas and oil

- High price case: 2.5% real price increase per year for electricity

  3.0% real price increase per year for gas and oil

Implicit Discount Rates (for gas furnace purchases)

56.1% real at 1978 prices
43.2% real at 2000 prices

Elasticities

0.16 demand elasticity (gas furnaces)
0.25 income elasticity (gas furnaces)

Cost vs. Efficiency (for typical gas furnaces)

Efficiency (%)	Cost ($)
65	356
68	404
72	407
76	456

Source: DOE Cost Book

The results of the ORNL Model are summarized in the first three columns of Table 2-2 for each alternative evaluated. All results are relative to the baseline, or no-action case so that the energy savings resulting from each alternative can be assessed more readily. It should be noted that each alternative would result in some energy savings and that all alternatives result in positive net present value compared to the baseline

case. As the comparison shows, the proposed approach results in appreciably higher energy savings and a greater national net present value than any of the other alternatives.

The additional columns presented in Table 2-2 focus on other aspects of each alternative that are identified in Executive Order 12044 as pertinent to the regulatory analysis. The factors that are evaluated for each program alternative relative to the other program alternatives are:

- Equity impacts (or effects on the well being of the Nation as a whole)
- Legislative authority for implementing the alternative
- Major barriers to implementation and enforcement (other than legislative)
- Impact of the alternative on competition
- Compliance and reporting requirements of each alternative.

These remaining factors are compared for each program alternative to the proposed standards. The only areas where the proposed approach appears to be less favorable than some of the other program alternatives is in the competition and reporting/compliance requirements. Only those program alternatives that involve non-mandatory methods for achieving more energy efficient consumer products fare better in these two areas. However, when the magnitude of energy savings is also compared for these same alternatives, the necessity of the reporting/compliance requirements and the potential impacts on competition could be considered to be outweighed by the much greater energy savings of the proposed approach.

2.2 NO-ACTION ALTERNATIVE

This alternative was analyzed as the "base case" and assumes that the proposed standards are not implemented. The no action alternative does not imply that no energy savings would be realized. Some energy savings will be achieved due to higher energy costs, the continuation of other Federal energy conservation activities and a variety of state programs aimed at increased appliance efficiency. These programs include the deregulation of energy prices, state consumer product efficiency standards, consumer product labeling, the public education and information program, and the Federal Building Energy Performance Standards.

Table 2-2. Expected Impacts of Program Alternatives

Alternative \ Impacts	National Energy Policy: Energy Use (QBtu's)	National Energy Policy: Energy Savings (QBtu's)	Net Present Value for Fuel and Equipment (in billions) (in 1978 $s)	Equity Impacts*	Legislative Authority	Major Barriers to Implementation/ Enforcement	Competition	Compliance and Reporting Requirements**
No action	436.3 to 460.4	0	None	Inequities between states due to nonuniform standards	***	None	None	None
Tax Credits (Consumers)	435.9 to 460.2	.4 to .2	$ .48 to $ .98	Some costs will be borne by all taxpayers regardless of purchase of energy efficient product	No	None, other than legislative	May favor large manufacturers	Could be unwieldy
Tax Credits (Manufacturers)	433.7 to 456.7	2.6 to 3.7	$ .39 to $ .79	"	No	Enforcement problems likely	"	"
Rebates (Consumers)	435.7 to 460.0	.6 to .4	$ .80 to $1.64	"	No	Potential difficulties in administration	"	"
Prescriptive Standards	428.2 to 444.9	8.0 to 15.5	$ 9.24 to $12.13	None	No	Restricts development of innovative technology	May reduce number of models and competition	Minimal reporting but extensive testing
Voluntary Energy Efficiency Targets — 5-yr. delay	429.8 to 445.9	6.5 to 14.5	$ 5.45 to $ 8.36	None	No	No assurance that participation will be widespread	None	None
Voluntary Energy Efficiency Targets — 10-yr. delay	433.8 to 453.6	2.4 to 6.8	$ 1.45 to $ 2.79					
Enhanced Labeling and Consumer Education	434.2 to 457.7	2.2 to 2.7	$ 3.28 to $ 3.52	None	Yes	None	None	Minimal
Performance Standards	422.6 to 435.5	13.6 to 24.9	$15.27 to $19.27	None	Yes	None	Not anti-competitive	Reasonable

Key: None = 0, or not significant

QBtu's = 10^{15} Btu's of energy or one quadrillion Btu's

NOTES:
* Economic well-being of Nation as a whole.
** Interpreted to apply only to regulatory programs, not as a measure of effectiveness.
*** Yes, if no standard is justified.

2.2.1 Deregulation of Energy Prices

During recent years, oil and natural gas prices have been steadily increasing and, with energy price deregulation for each fuel slated for the end of 1981 and 1985, respectively, demand for more efficient consumer products could increase. However, as has been the case with the gasoline milage ratings of automobiles, manufacturers may not respond sufficiently to this demand, and may continue to produce inefficient consumer products. In this instance, reliance on the price mechanism or on market forces may generate a disequilibrium between supply and demand. The disparity between supply and demand would most likely result from uncertainty about energy price and supply changes. These uncertainties could result in delayed consumer demand for energy efficient products. Even further delays could then result due to the long lead times required by manufacturers to produce energy efficient products to meet the consumer demand.

2.2.2 Increasing Consumer Information

Congress has mandated in the Act both a labeling program and a complementary consumer education and information program. The labeling program which took effect on May 21, 1980, is to be implemented by the Federal Trade Commission, while the public education and information program is being handled by DOE.

Under the labeling program, consumer awareness of the relative efficiencies of consumer products available in the marketplace would increase. That is, the basic information that consumers would need to make a rational purchase decision would now be available to them.

The consumer education and information program involves the development and expansion of existing Federal energy information programs and is designed to educate consumers in the value and use of energy labels on consumer products. The principal focus of the educational activities is to steer the consumer away from the concept of minimizing first cost and to promote the use of life-cycle costing as the primary factor in selecting a consumer product for purchase.

There are several drawbacks to relying wholly on the education program above or in conjunction with the labeling program to achieve the desired results:

- Consumer education and labeling programs are directed only at the demand for consumer products, they will not guarantee the appropriate supply side responses by manufacturers.

- In many cases, as in new residential construction, consumer products are installed by builders and minimum first cost is an overriding consideration.

- Energy efficiency is only one factor in the purchasing decision of consumers.

- There is a long lag time before the impact of such educational activities is manifested in the marketplace.

As a means of achieving the level of energy savings believed possible under the proposed standards, the labeling effort by itself, or in conjunction with a consumer education program, is expected to have only a moderate impact. According to studies performed in support of the Consumer Product Energy Efficiency Program, consumers can be expected to use the label, together with a number of other criteria, to make the final purchase decision. The studies also indicated that there will be significant variations in consumer attitudes, depending on certain product-specific factors (Ref. 2).

2.2.3 Building Energy Performance Standards

In response to various Congressional mandates, DOE has formulated a set of proposed "Energy Performance Standards for New Buildings." As the title indicates, these are performance standards (as are the proposed consumer product standards), and only apply to new construction. They will have a significant impact on central heating, ventilation and air conditioning products (HVAC) by stimulating the demand for energy efficient equipment and a trend toward smaller units that are better suited to lower heating and cooling levels expected. While these building standards will result in considerable energy savings, they are not sufficiently comprehensive to address the complete market for consumer products. Products sold directly to consumers will not be affected. Also, builders will have considerable latitude to make tradeoffs between energy efficient products and design treatments to achieve the building standard. These tradeoffs will be dependent on the costs involved and are difficult to predict because of the variety of situations that may be encountered in designing a building. Further, products such as refrigerators, freezers, clothes dryers, or cooking equipment are not included in the BEPS program.

2.2.4 State Standards

Several states are developing or have implemented programs for the setting of efficiency levels for certain consumer products and/or the setting of certain prescriptive standards through the adoption of ASHRAE Standard 90-75 (Ref. 1). The ASHRAE standard pertains only to water heaters and HVAC apparatus installed in new construction. One state, California, has established an energy efficiency program for eight of the covered products listed in the Act. New York State legislation covers five of the consumer products and Minnesota one, while Florida

has pending legislation to create an Energy Institute to create energy efficiency standards for consumer products.

There are several apparent drawbacks to the use of state standards to achieve energy savings:

- A proliferation of varying state standards will undoubtedly result in higher prices as manufacturers will have to incur additional costs to design, manufacture and market products to meet the requirements of finely segmented markets.

- In some instances, manufacturers may elect to withdraw their product from certain states if the market is too small or the standards too restrictive, thereby depriving the consumer of competitive choices.

- The level of enforcement of state standards may vary significantly.

2.2.5 Quantitative Description

The base case includes the following assumptions about factors likely to increase residential energy efficiency which can be quantified in the ORNL energy model:

- Increasing real energy prices averaging between a 1.0 and 2.5 percent annual escalation rate for electricity and between a 1.5 and 3.0 percent annual escalation rate for gas and oil. These rates reflect the best estimate by DOE of potential price increases at the time the analyses were performed.

- Mandatory energy efficiency programs for selected consumer products implemented by a few state governments.

- The Federal Trade Commission labeling program for consumer products as currently planned.

- A continuation of the existing public information program at the U. S. Department of Energy designed to inform consumers about the advantages of purchasing more energy efficient products.

- An ability of manufacturers of consumer products to produce the more energy efficient equipment demanded by consumers.

- The effective implementation of the Building Energy Performance Standards at the levels proposed by DOE.

The baseline case as quantified by the ORNL Model shows that cumulative residential energy demand from 1982 to 2005 will range from 436.3 QBtu's (at a 2.5 percent real annual electricity escalation rate and a 3.0 percent real annual gas and oil escalation rate) to 460.4 QBtu's (at a 1.0 percent annual electricity escalation rate and a 1.5 percent real annual gas and oil escalation rate). There are no energy savings associated with the baseline case.

2.3 TAX CREDITS TO MANUFACTURERS

2.3.1 Discussion

The possibility of providing tax credits to manufacturers was also examined by DOE. This approach would allow manufacturers to recoup some of the costs involved in manufacturing more energy efficient consumer products. This, in combination with tax incentives or rebates (discussed in the next section) for consumers could correct some of the market imperfections that would be experienced by focusing on incentives to consumers alone. However, the timing of a dual program for both manufacturers and consumers would have to be carefully orchestrated to ensure that maximum benefits are achieved.

In any event, the potential would still exist that many manufacturers would not respond to tax incentives. The cost of a tax credit program to manufacturers could be very high. Obviously, as more manufacturers respond, the costs increase. The cost of a tax credit program that would attract a high participation rate could be very large. Also, the energy efficiency requirements for receiving a tax credit will affect participation. Less stringent requirements will increase participation but reduce the energy savings achieved by the program while more stringent requirements may reduce participation and thus also reduce energy savings.

Therefore, while the tax credit program has the potential for achieving energy savings, the many issues associated with optimizing the benefits need to be analyzed carefully. Some of this analysis has been performed by DOE (Reference 3). These analyses have indicated that the cost of achieving significant energy savings through this type of program would be very high.

2.3.2 Quantitative Description

Offering tax incentives to consumer product manufacturers was considered as an alternative to regulation. The tax incentive analyzed would take the form of an additional investment tax credit for installation of machinery and tools required to produce more energy efficient appliances.

Production of energy efficient consumer product requires investment in some new tools and machinery. IRS regulations currently allow a 10%, one-time tax credit for this investment. The alternative considered by DOE provided for an

additional 10% credit for investment in tools and machinery required in the production of energy efficient consumer products. The credit would not apply to investment in other forms of tools and machinery nor would it apply to other forms of investment such as acquisition of subsidiaries, financial instruments (i.e., stock, loans), or new construction of plants.

The effect of such an alternative was found to be an increase in the rate of capital replacement. Manufacturers would invest in new and replacement tools and machinery to a greater degree with the additional tax incentive than they would normally. It was estimated that the level of investment would be 23.8% higher with an additional 10% investment tax credit. Because this credit would only be available for manufacturers investing in tools and machinery required to produce energy efficient appliances, the effect of the additional tax credit would be to accelerate the rate at which manufacturers introduce efficient appliances. However, the additional tax incentive will most likely not be sufficient to induce introduction of new production facilities.

Because the tax credit only applies to that portion of investment going toward production of energy efficient consumer products and not toward investment in replacement equipment, an enforcement mechanism would be required to prevent abuse. This enforcement activity would most probably be divided between DOE and IRS. DOE would have to stipulate specific categories of investment subject to the credit. IRS would have principal responsibility for review of claims for the credit. Investigation of alleged violations would most probably require joint action by both DOE and IRS. While the cost of the enforcement program was not investigated, it is thought to be both high and not cost effective.

Energy savings under this alternative are estimated to range from 2.6 QBtu's (high energy price case) to 3.7 QBtu's (low price case) between 1982 and 2005.

2.4 REBATES

2.4.1 Discussion

The alternative of providing a rebate to a consumer for the purchase of more energy-efficient appliances is a difficult one to implement. As currently practiced, manufacturers have employed rebates for short-term periods as a marketing tool to introduce new products, promote lagging sales, or otherwise gain specific competitive advantages. While this practice may be voluntary by a manufacturer at any time, the concept of government-mandated rebates would entail complex interference in the market place as decisions would need to be made as to which products should qualify, amount of rebate, time period covered, etc.

The rebate concept could also be coupled with a tariff, much like the proposed "gas guzzler tax" for automobiles, in which consumers who purchase inefficient units would be charged a federally imposed tax. It would be a costly, unwieldly, and cumbersome program to implement. However, it may be more effective than the no-action alternative.

As with tax credits, the rebate alternative will only act on the demand for energy efficient consumer products. There will be uncertainty about the ability and/or desire of manufacturers to respond to the demand, particularly if the rebate program is not continued over a long enough time period to account for manufacturers' lead time to produce energy efficient products. Thus, as a separate alternative, rebates will have only a small and potentially short term effect in reducing energy consumption.

2.4.2 Quantitative Description

A Federal program that provides a rebate to consumers to encourage the purchase of energy efficient consumer products was analyzed. This program would apply to all new consumer products regardless of whether the product is a replacement or for new construction. The program was assumed to provide a 15 percent rebate applied to the increased cost of energy conservation for product efficiencies in excess of the average efficiency of comparable products purchased in 1978. Thus, for example, a typical central air conditioner purchased in 1978 had a Seasonal Energy Efficiency Ratio (SEER) of about 7.0. If a central air conditioner with a SEER of 10.0 costs about $200 more than the model with the SEER of 7.0, then the consumer would receive a rebate of $30 as an incentive to purchase the more efficient model. The assumption of a 15 percent rebate has been chosen because similar financial incentives for retrofitting energy conservation measures in building shells and for installing renewable energy systems have been approved by Congress.

The implementation of a rebate program could be somewhat complicated, because of the need to specify the exact cost of extra energy conservation in consumer products. Generally, many features are changed at one time when a new model consumer product is developed. Thus, the exact cost of the increased energy efficiency may be difficult to specify. This problem could be circumvented by having the Federal government set the magnitude of the rebate for products of differing efficiencies. However, obtaining the information to establish the level of rebate for numerous products would require considerable effort to avoid arbitrary determinations. No assumption is made regarding the means of implementing the rebate (for example, through the retail store with a refund from the Federal government or directly by the government).

The effect of the rebate program on residential energy consumption is simulated by reducing by 15 percent the incremental cost to the consumer of products with efficiencies greater than the 1978 sales weighted average efficiency. The 15% reduction in incremental price is assumed to be paid by the Federal government. The ORNL model is run with the new cost versus efficiency curves and results are compared with the baseline case.

The 15 percent rebate program alternative results in residential energy savings in the time period 1982 to 2005 ranging from 0.6 QBtu's (low price case) to 0.4 QBtu's (high price case).

2.5 TAX CREDITS TO CONSUMERS

2.5.1 Discussion

The Energy Tax Act of 1978 (PL 95-618) provides a homeowner with a tax credit of up to 15% of $2,000 for the installation of energy-saving materials and equipment. This tax credit can be used by the taxpayer in one year or over a number of years, but it cannot exceed $300 for a given residence. The list of items for which tax credits are given includes only one of the covered products, furnaces that are more energy efficient than the one being replaced. While this incentive may serve its intended purpose in the case of insulation, and for storm windows/doors, the impact on new furnace purchases appears to be minimal. Most new furnaces bought as discretionary products in the past year were purchased to replace existing oil furnaces with gas furnaces. The purchase decision has been based almost wholly on the doubling of fuel oil prices, the fears as to its ready availability in 1978-80, and the timely excesses in the natural gas availability which enabled distributors to take on new customers. Considering the relatively high cost of new furnace installation, it is most probable that the tax credit played only a minimal role in the decision-making process.

Since the tax benefits only apply to furnaces that incorporate energy efficient design features (such as automatic ignition to replace a gas pilot light), the extension of tax credits to other products would require new enabling legislation that would include all covered products. Tax incentives to consumers are applicable only to replacement purchases, and thus impact but a fraction of the market. The use of similarly structured tax credits for the purchase of energy efficient appliances is apt to have only a marginal effect since the size of the credit in most cases would be rather modest. In addition, since the current legislation is based upon certain design features, the new legislation would probably have to be based upon performance of the products and this in itself would be a formidable task. The costs of such a program would be borne by all taxpayers since it would result in less tax revenues to the government.

Tax credits alone act only on the demand for consumer products. There is no guarantee that manufacturers will properly respond to consumer needs by producing more efficient consumer products. Thus, without a complete approach to alleviate the existing market imperfections in the consumer product market, it is doubtful that significant energy savings could be achieved over the no-action alternative.

2.5.2 Quantitative Description

A program offering a tax credit of 15 percent of the increased cost of higher energy efficiency of consumer products was evaluated. Such a program might be more easily administered than a rebate program, because it can be accomplished through an existing organization, the Internal Revenue Service. The program as evaluated here would return to the consumer exactly the same amount of money as the rebate program described above.

The most important difference to the consumer between rebate and tax credit programs is that a rebate can be obtained quickly whereas a tax credit is delayed until income taxes are filed or a tax refund is provided by the Internal Revenue Service. This means that middle and low income purchasers, who generally have little ready cash to purchase more expensive products, are not so likely to take advantage of the program as are upper income purchasers. To simulate this impact, DOE has assumed that only 60 percent of consumers would purchase more energy efficient products as a result of the tax credit program.

The ORNL model results show energy savings ranging rom 0.2 QBTU's (low price case) to 0.4 QBTU's (high price case) for the consumer tax credit program alternative.

2.6 OTHER FINANCIAL INCENTIVES

Several other financial incentives designed to stimulate the purchase or production of energy efficient consumer products were considered by DOE. Concepts such as providing low interest financing through utility companies for purchase of energy efficient appliances or low interest loans to low income groups who might have more difficulty in purchasing the higher priced energy efficient products were examined. Such concepts are plagued by the same problems as are tax credits and rebates, and thus do not offer a balanced approach to energy conservation. However, DOE will continue to study financial incentives such as those mentioned above and others as possible supplements to a more broad-based approach that addresses both demand and supply aspects of residential energy consumption.

2.7 ENHANCED CONSUMER EDUCATION AND LABELING PROGRAMS

2.7.1 Discussion

The option of expanding the current consumer education program and the Federal Trade Commission (FTC) labeling program as an alternative to the approach mandated by Congress was also examined by DOE. The labeling program as it now stands was carefully reviewed for possible improvements or expansion beyond the current scope. An expanded enforcement program was identified as a potential improvement to the existing program. The current enforcement program relies on consumers' and other interested parties' complaints to identify noncompliance. An expanded program could actively pursue the identification of noncomplying manufacturers and retailers.

A similar review was made of the current consumer education program by the DOE. The consumer product education program developed by DOE sponsored 10 regional workshops for industry, educators, utilities, and State energy officials in the Fall of 1979. A national consumer awareness campaign began in May 1980 to inform consumers of the appearance of the consumer product labels and how to use labeling information in the purchase of energy efficient products. A consumer information booklet, public service announcements for radio and TV, educational exhibits and a training package for retail sales persons are among the components of this nationwide efforts.

Several possibilities exist for enhancing the education program. The amount of information provided to consumers could be expanded to include product-specific information about the energy efficient operation and maintenance of the covered products. A more active approach to reach potential consumers prior to actual purchase of the product through increased publicity would also enhance the education program. Increased publicity would be more costly in that this enhancement would require additional expenditures for media advertising and the production of suitable advertisements. This probably should be supplemented by providing additional information through mailouts or the establishment of toll-free hot lines to answer specific questions that consumers might have in regard to efficiency. Finally, the scope of the education program could be expanded to other persons involved in the purchase of the covered products such as builders and retailers.

An enhanced education program could be expected to increase consumer demand in proportion to the amount of money spent on publicity and dissemination of information. This approach, as with the financial incentives to consumer alternatives, does not address the supply side of the marketplace equation and, therefore, could result in less than optimal energy savings due to potential inequalities between supply and demand.

2.7.2 Quantitative Description

The expansion of the Consumer Education and Labeling Program is difficult to specify in terms of impact and therefore requires that assumptions be made about the number of persons reached by the expanded program and how and if the information received will influence their purchase of more energy efficient consumer products. The program is defined, for purposes of analysis, as being able to reach an average of 10% of the purchasers of consumer products per year. These consumers will be encouraged to use life cycle cost techniques for selecting consumer products. Sources of information that will enable consumers to make life cycle cost decisions will be identified.

The average consumer reached by the program will reduce his or her discount rate by 50% (reducing the discount rate by 50% means that the consumer will double the length of time normally considered acceptable to recover the initial higher cost of the product) for those products purchased by the user directly (refrigerators, room air conditioners, clothes dryers, frezers, and ranges and ovens). For those consumer products generally purchased with a house (central air conditioners, water heaters, and furnaces) the consumer will only reduce his or her discount rate by 20%. For purposes of analysis, the reduction in discount rate (increase in acceptable payback period) is distributed equally among all consumers.

In general, any reasonable expansion of a government consumer information program is likely to:

- Reach a relatively small percentage of the purchasing public
- Not be likely to influence those who either have insufficient funds or insufficient potential benefit to purchase more efficient equipment.

The variables in determining whether a purchaser of consumer products will respond positively to the information presented by the programs cannot be assessed with any degree of confidence. The response is highly dependent on the purchasers ability to comprehend the information, agree with the concepts that are presented, gather the needed information to make an energy efficient purchase, and have the financial ability and desire to make the purchase. The quantitative description does not attempt to estimate this reponse. It merely assumes that those reached will respond positively by purchasing the most energy efficient product in terms of life cycle costs for their particular needs. Thus, the energy savings identified by the ORNL model will tend to be overestimates of the response to the program in that no all purchasers reached can be expected to respond positively.

The analyses of the impacts of the expanded consumer product information program involved changing the implicit discount rates in the ORNL model to simulate the program impacts stated above. Total residential energy savings for this alternative from 1982 to 2005 was 2.2 QBtu's (high price case) to 2.7 QBtu's (low price case).

2.8 PRESCRIPTIVE STANDARDS

2.8.1 Discussion

Prescriptive standards as applied to consumer products would involve the specifying of designs, materials, and/or manufacturing methods to achieve the desired energy use levels. For example, one requirement would be to use insulation with a specific R value in specific areas on the product. As this alternative is outside the legislative mandate, it would require statutory amendment in order for it to be operative.

This alternative would have certain advantages in terms of ease of enforcement. However, it would probably result in high start-up costs and would not provide manufacturers with the necessary incentive or flexibility to increase product efficiencies or to reduce costs through innovative designs and use of new technologies. It is also highly likely that competition in the consumer product industry would be severely limited by prescriptive standards due to the design constraints. This lack of competition would be exhibited in higher product prices and an increased firm failure rate.

2.8.2 Quantitative Description

DOE has determined that prescriptive standards could be implemented at the same energy efficiency levels as the proposed energy performance standards. The cost to the manufacturer of complying with such standards is greater than or equal to the cost of complying with performance standards, depending on whether the manufacturers are able to find more cost effective ways of meeting the performance standards than the design changes assumed by DOE in developing the performance standards.

There are two major disadvantages to the prescriptive approach: (1) the manufacturers are given no flexibility in meeting the standards and innovation in product design is likely to be substantially reduced or stifled, and (2) the certification of compliance with the standards is made difficult by the necessity to certify each component of a consumer product. Furthermore, certification may be ineffective, because the efficiency of most consumer products depends on how the components that make up the product are integrated into the product. As a result, individual components could meet prescriptive standards while the overall product performance is lower than could be achieved by energy performance standards.

These two effects are simulated in the ORNL model as follows:

- The lack of flexibility resulting from prescriptive standards is estimated to delay an updating of the 1985 standards to 1995; for comparison, the performance standards are assumed to be updated in 1990. The level of the updated standards is assumed to be the same for both the prescriptive and performance standards.

- The difficulty of testing compliance of the consumer product with a prescriptive standard (because of the need to certify each prescribed component of the product) and potential ineffectiveness as discussed above are assumed to reduce the energy savings achieved by prescriptive standards by 30 percent compared to the savings of performance standards.

The delay in updating the standards resulting from the prescriptive standards results in total residential energy savings ranging from 8.0 QBtu's (for the low price case) to 15.5 QBtu's (for the high price case) from 1982 to 2005.

2.9 VOLUNTARY ENERGY EFFICIENCY TARGETS

2.9.1 Discussion

The original version of the Act, the Energy Policy and Conservation Act (EPCA) (P.L. 94-163) called for industry to meet voluntary energy efficiency targets for the covered products. If industry did not succeed in meeting the voluntary targets, provisions were made for then establishing Federal standards. In amending the Act (NECPA) (P.L. 95-619), Congress specifically changed this section of the legislation to provide for immediate establishment of Federal standards to ensure the manufacture of energy efficient consumer products in a timely manner. Although it is possible that voluntary targets might have been as effective as the mandated performance standards in achieving the energy savings goals, there probably would have been a considerable lag time because of the many uncertainties associated with a program requiring concurrence from so many participants as well as uncertainties in regard to future consumer demand for energy efficient products.

2.9.2 Quantitative Description

It is assumed for analysis purposes that the voluntary program would specify the energy efficiency levels of the performance standards as goals. A fully voluntary program is assumed to cause a delay of 10 years in achieving the energy conservation goals of the proposed standards. (If these goals are achieved earlier in the baseline case for specific consumer products, then the voluntary program and the baseline case are

assumed to be identical for these products.) A voluntary program that is made mandatory if the goals are not met is assumed to achieve the energy efficiencies of the performance standards with a 5-year delay. Thus, the effects of a voluntary program are bounded by the assumptions of a 5- to 10-year delay.

The effect of this alternative is total energy savings in the period 1982-2005 ranging for the high price case from 14.5 QBtu's (5-year delay) to 6.8 QBtu's (10-year delay). The total energy savings for the low price case for the voluntary targets ranges from 6.5 QBtu's (5-year delay) to 2.4 QBtu's (10-year delay).

2.10 PERFORMANCE STANDARDS

2.10.1 Discussion

The only alternative that fully complies with the Act is the setting of energy efficiency standards, or performance standards. It is this alternative that is being used in the proposed regulation.

The standards will establish the minimum energy efficiency level (MEEL) required to be achieved by each product class, but will not prescribe the means by which that level is to be achieved. The levels are specified in ratios relating the output of a product to its energy use. The MEEL's vary between product classes, depending upon the design limitations of each product class. The MEEL's are based on test procedures developed by DOE and for which final rules have been promulgated for all the covered products. Amendments to some of these procedures have been made to reflect new products or designs that do not fall under the product test definition or incorporate unique design characteristics which prevent testing according to the test procedure or where the prescribed test procedures are evaluated in a manner unrepresentative of their true energy consumption characteristics. DOE intends, on a continuing basis, to modify test procedures as necessary to accommodate new product designs.

Performance standards will allow the manufacturers the flexibility that prescriptive standards do not. The performance standards alternative must be viewed in conjunction with the labeling and consumer education/information programs due to the requirements in the Act. This will ensure that purchasers will be aware of the benefits that will accrue from the purchase and use of the more energy efficient products and hopefully in the long term encourage the manufacturer and purchase of even more energy efficient products than required by the proposed standards. In this context, the proposed standards provide a balanced approach to regulating the manufacture and purchase of efficient consumer products that cannot be achieved by any other

alternative or group of alternatives. This balanced approach will ensure that the regulation corrects both the demand and supply side market imperfections, and that energy savings will be realized.

2.10.2 Quantitative Description

The performance standards were quantified by assuming that all products would comply with the standards as proposed. That is, all manufacturers would meet the deadlines for the 1981 and 1986 efficiency levels and after existing stocks of non-regulated products are depleted, only products meeting the proposed standards could be distributed in commerce. Maximum benefits do not accrue immediately, however, as the standards do not require retrofitting of existing consumer products and it, therefore, will take some time to replace all nonregulated products with regulated products.

The implementation of performance standards should result in a total estimated energy savings of 13.6 QBtu's (low price case) to 24.9 QBtu's (high price case).

3.0 OPTIONS AVAILABLE WITHIN THE DEVELOPMENT OF THE PROPOSED STANDARDS

During the development of the proposed standards, DOE had several options for formulating the Energy Efficiency Levels. This section presents a short description of each of the major decisions, the options considered, and the reasons DOE selected the option used in the proposed rule. More detailed discussions of the format issues can be found in the Technical Support Documents.

3.1 REGIONAL OR NATIONAL STANDARDS

One option considered for the proposed standards was different standards for those regions of the United States where the energy usage of the appliance is higher than in other regions. This approach would permit more stringent standards to be implemented in those areas where the appliance is used the most, and less stringent standards where the appliance is used less frequently. For many of the appliances, the variation in regional use was insignificant. However, for the heating and cooling products, namely, furnaces, central air conditioning, and room air conditioners, the variations were significant. Therefore, while the option of promulgating regional standards for all products was rejected, the option of enacting regional standards of the heating and cooling products was considered by DOE to be a viable alternative throughout the regulatory analysis. The final decision on whether to select regional or national standards for the heating and cooling products was based on a comparison of the economic justification of both types of standards for each specific heating and cooling product.

The impact of regional standards was evaluated for the three heating and cooling products by DOE (Reference 4). The regional standards were analyzed based on different standards for three climatic regions of the United States (see Figure 3-1). Higher standards than those proposed for national standards were used for the region where the product was used the most. The same level as proposed was used for the middle region and a lower standard was used for the region in which the product was used the least.

These levels resulted in the following energy reductions over the proposed standards as shown below.

Product	Energy Savings
Room Air Conditioners:	5.0%
Central Air Conditioners:	3.7%
Gas Furnaces:	1.0%
Oil Furnaces:	Less than 1.0%

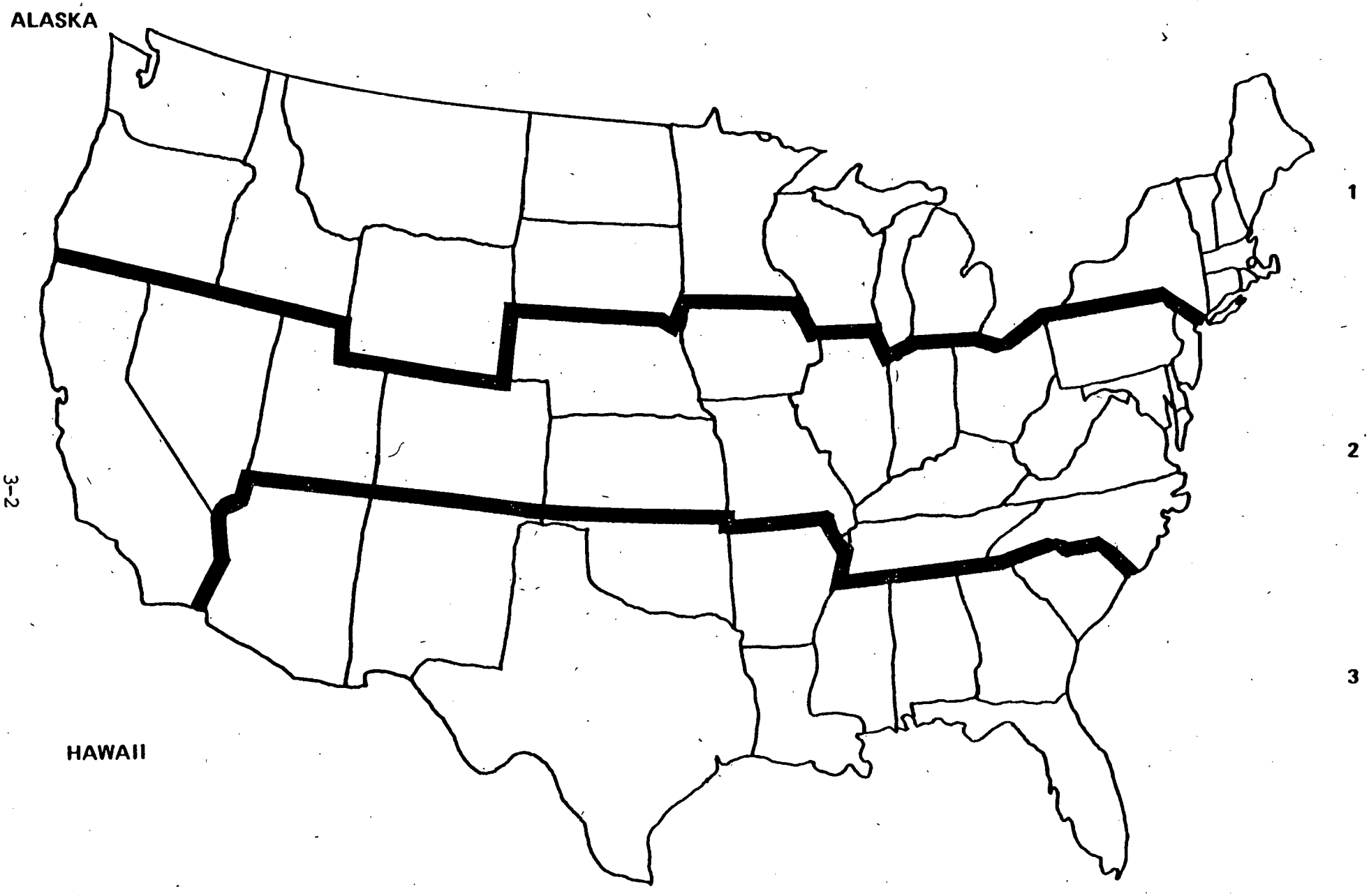

FIGURE 3-1 REGIONAL MAP

In order to determine whether to establish a national standard or a regional standard for each product type, it is necessary to compare the following:

1) The reduction in fuel cost due to the implementation of a regional (rather than a national) standard

2) The increase in equipment price due to the implementation of a regional (rather than a national) standard, evaluated on the basis of price increases due to increased manufacturing cost, distribution cost, and certification and enforcement costs.

If (2) is greater than (1), the proper choice, on a benefit-cost basis, would be a national standard rather than a regional standard.

Analysis indicated that equipment cost increases greater than approximately 4% for central air conditioners, 20% for room air conditioners and 12% for furnaces would negate the fuel cost savings of regional standards. These estimates were based on outputs of the ORNL Model presented in Reference 9 and data in Reference 4.

It should be noted that there are two components of the additional equipment cost increases associated with regional standards instead of national standards. The first component is the additional cost of meeting the more stringent requirements in the region where the product is used the most. The more stringent level is based on advanced technology that is not widely available in commerce. The costs associated with achieving this high a standard are expected to be high; however, these costs should be partially offset by the lower standards (which have lower costs) required in the region where the product is used the least. The second component of the additional equipment costs associated with regional standards is all the other costs associated with complying with regional standards rather than national standards. These costs are discussed in the following paragraphs.

Based on discussions with 28 manufacturers of heating and cooling products (Ref. 7), the following estimates of the potential increases in per unit product prices due to compliance with regional standards were made:

- Central Air Conditioners 35 - 45%
- Furnaces 40 - 55%
- Room Air Conditioners 50 - 70%

These estimates were based on manufacturers doubling their current number of models to comply with regional standards

and include the increased distribution costs as well as the associated manufacturing costs. The actual impact of regional standards on manufacturers, distributors and retailers (Reference 8) is summarized below.

Manufacturers selling products in more than one region will have to:

- Multiply the number of basic model lines by the number of different standards they confront, or
- Manufacture a single basic model line to meet the highest standard confronted, or
- Stop selling products in some or all of the regions, or
- Do some combination of the above.

In addition, the certification testing will increase in accordance with the increase in the number of basic models.

Distributors selling to more than one region will have to:

- Multiply the number of models being held in inventory
- Institute new inventory systems to accommodate the increased number of models
- Increase the ratio of inventory-to-sales in order to keep an adequate selection of models in stock
- Made adjustments in the use of shippers with routes going through more than one region.

Retailers selling in more than one region will have to:

- Adjust buying practices to accommodate the increased number of models (e.g., forecast sales by regions), and
- Reduce the use of stock interchanges across regions.

Based on analysis at the proposed levels, DOE determined that regional standards were not economically justified because potential cost impacts on manufacturers and consumers would outweigh the small energy savings over nationally uniform standards. In addition, regional standards will result in decreased benefits vis-a-vis national standards if national standards are set at the more stringent levels. Increased benefits will only be achieved by regional standards when the national

standards are low. Thus, only nationally uniform standards are proposed for each of the nine products.

3.2 TIME PHASING OF STANDARDS

Section 325(c) of the Act allows for the phasing-in of standards over a period of up to 5 years through the establishment of intermediate standards. Use of the full 5-year period would provide manufacturers with sufficient planning and development time, and thus it would appear that they would be better able to meet higher final standards than might otherwise be the case were a shorter period adopted. DOE also considered the option of extending the mandated phase-in period beyond the 1986 deadline. This option would provide manufacturers with the greatest possible planning and development time and would allow the setting of higher efficiency standards. However, such an action would require the introduction of new enabling legislation and would result in additional delay in promulgating efficiency standards. Energy savings lost by a 5- to 10-year delay in promulgating standards after 1986 are estimated to be 10.4 QBtu's to 18.1 QBtu's as calculated in assessing the voluntary target alternative (high price case) in Chapter 2. Since the option remains open to promulgate more stringent standards after 1986, the loss of these energy savings cannot be justifed. For these reasons, DOE plans to utilize the full phase-in period and has proposed final standards which are to be achieved by January 1986.

To assure that manufacturers make steady progress toward the 1986 standards, intermediate standards are proposed for the subject consumer product types, to be effective no earlier than July 1981, 6 months after the final rule is prescribed. These intermediate standards take into account the short lead time that manufacturers will have had to make design changes. Accordingly, DOE is proposing intermediate standards which it believes are technologically feasible and economically justifiable.

3.3 CERTIFICATION AND ENFORCEMENT APPROACHES

3.3.1 Major Certification and Enforcement Approaches Considered

Four alternative certification and enforcement approaches were considered in the development of the proposed rule:

1) A Minimum Government Involvement
2) A Strong Certification Control
3) A Strong Enforcement Audit
4) A Mixed Certification and Enforcement

Each of the four approaches represents a different philosophical focus. The first approach represents the lowest level of direct Federal intervention into the consumer product industry consistent with the DOE mandate in the Act. The remaining three approaches represent a larger level of effort, each placing the major program emphasis on different stages of the certification and enforcement process.

The second approach emphasizes the certification process and provides assurances of compliance before products are distributed in commerce. The third approach emphasizes the enforcement process by stressing continuing test and records audits of post-certification production. The fourth approach represents a mix between the second and third approaches, distributing the emphases between the roles of certification and enforcement audit activities.

The choice among these four certification and enforcement approaches involved an assessment of anticipated impacts on associated costs of the program (to the Federal government, industry and commerce), the likelihood of discovered noncompliant products and consequent impact on the anticipated level of compliance.

These approaches are discussed in detail in TSD No., 3, "Certification/Enforcement Document."

3.3.2 Proposed Certification and Enforcement Approach

The certification and enforcement portion of the proposed rule is based on the Mixed Certification and Enforcement Approach. This approach places responsibility for compliance on manufacturers. A manufacturer's determination of compliance is based on energy efficiency testing in accordance with DOE specified test procedures. The manufacturer's statement of compliance, plus supporting data, must be submitted to DOE in a product certification report for each covered basic model prior to the beginning of distribution of that basic model in commerce. On the basis of the review of product certification reports, other submittals, and test and information audits, DOE will selectively verify manufacturers' statements of compliance through the DOE enforcement program.

The mixed certification and enforcement approach will yield a superior data base required to monitor the compliance behavior of manufacturers. Test costs will be spread more evenly over all of the basic models being distributed. The potential for adversely affecting new product introduction and placing smaller manufacturers at a disadvantage through delays in distribution and production will be reduced. The anticipated level of compliance (and consumer confidence) will be higher.

3.3.3 Evaluation of Sampling Plans and Types of Standards for Certification Purposes

Various options for types of standards and types of sampling plans for enforcement purposes were considered by DOE. The following types of standards were considered by DOE:

- Mean (average level of efficiency)
- Percent defective (specific percentage of units produced achieve greater or equal energy efficiency than the standard)
- Combination mean and standard deviation (uses standard deviation to measure the variability of energy efficiencies among units)
- Combination mean and percent defective

The following types of sampling plans were considered by DOE:

- 100% sampling plan (test the total population of units
- Single sampling plan (test a predetermined fixed number of production units
- Double sampling plan (test units within a basic model on a batch or integer basis until a determination can be made that the basic model is in compliance)

Eighteen different combinations of the above types of standards and sampling plans were evaluated by DOE according to the following five criteria:

- Minimize the manufacturers' testing responsibility, thereby reducing costs, and equitably distribute the testing burden among manufacturers;
- Limit the calendar time required for testing;
- Compatible with the sampling plan promulgated for the FTC labeling program;
- Provide a high probability that a manufacturer determined to be in noncompliance actually is in noncompliance; and
- Provide a high probability that basic models that are tested meet applicable energy efficiency standards.

A summary of the evaluation of the eighteen options is presented in Table 3-1. Based on this evaluation, a certification approach was chosen using a mean energy efficiency type of standard and a double sampling plan.

3.4 ALTERNATIVE EFFICIENCY LEVELS

This option would either consist of standards that require higher levels of energy efficiency or lower standards than the proposed action. In arriving at the proposed standard, DOE reviewed the following alternative levels for each product:

- Four alternative regulatory levels for 1981 standards; four alternative regulatory levels for 1986 standards; and
- No regulation (in case none of the above are economically feasible).

The alternative levels for analysis in the formulation of the 1981 standards were determined separately for each product class. In order to simplify and systematize these determinations, a method of selecting the levels was sought which would apply to all consumer products on the same basis. By utilizing standard deviations from the average values of the distribution of energy efficiency factors of appliance models, the same technique could be applied in all cases. For each product class the sales weighted average efficiency factor (SWEF) for 1978 was determined from industry survey data. The levels were set as follows:

Level 2:	SWEF = sales weighted energy factor
Level 1 (lowest):	SWEF minus one standard deviation
Level 3:	SWEF plus one standard deviation
Level 4 (highest):	SWEF plus two standard deviations (but not exceeding the maximum technologically feasible efficiency)

The four alternative levels analyzed in the formulation of 1986 product class standards were derived as follows:

- Level 4 was based on implementation of advanced technologies (advanced technology is defined as design not currently utilized on a wide scale).
- Level 3 was near the maximum product class efficiency factor considered to be attainable through conventional technologies (manufacturing processes currently applied on a wide scale).

Table 3-1. Evaluation of Sampling Plan Options

Sampling Plan Options	Cost of Testing		Calendar Time Required for Testing	Consistency with FTC Rule	Preferred Options (*)
	Expected Total	Distribution Among Manufacturers			
Option #1 - All units tested + 0% defective standard	Infeasible	Proportional to production volume	Infeasible	No	
Option #2 - Fixed sample + 0% defective standard	Highest	Equal	Shortest(d)	Option more precise (a, b)	
Option #3 - Integer sequential sampling with unlimited iterations + 0% defective standard	Low	Unequal but favors efficient models	Longest and unlimited	Option more precise (a, b)	
Option #4 - Integer sequential; limited iterations + 0% defective standard	Lowest	Unequal but favors efficient models	Multiple of unit test time	Option more precise (a, b)	
Option #5 - Batch sequential sampling with unlimited iterations + 0% defective standard	Moderate (c) but unlimited	Unequal but favors efficient models	Moderate (c) but unlimited	Option more precise. (a, b)	
Option #6 - Batch sequential sampling with limited iterations + 0% defective standard	Moderate (c)	Unequal but favors efficient models	Moderate (c)	Option more precise (a, b)	

a. After transformation of EELs to defective indicators.
b. For certain confidence limits and tolerances
c. Depends on batch size, as well as other parameters.
d. Same as unit test time.

Table 3-1. Evaluation of Sampling Plan Options (Cont'd)

Sampling Plan Options	Cost of Testing		Calendar Time Required for Testing	Consistency with FTC Rule	Preferred Options (*)
	Expected Total	Distribution Among Manufacturers			
Option #7 - All units tested + greater than 0% defective standard	Infeasible	Proportional to production volume	Infeasible	No	
Option #8 - Fixed sample greater than 0% defective standard	Highest	Equal	Shortest (d)	Option more precise (a, b)	*
Option #9 - Integer sequential sample with unlimited iterations + greater than 0% defective sample	Low	Unequal but favors efficient models	Longest and unlimited	Option more precise (a, b)	
Option #10 - Integer sequential sampling with limited iterations + greater than 0% defective sample	Lowest	Unequal but favors efficient models	Multiple of unit test time	Option more precise (a, b)	
Option #11 - Batch sequential sampling with limited iterations + greater than 0% defective sample	Moderate (c)	Unequal but favors efficient models	Usual	Option more precise (a, b)	
Option #12 - Batch sequential sampling with limited iterations + greater than 0% defective standard	Moderate (c)	Unequal	Moderate (c)	Option more precise (a, b)	*

a. After transformation of EELs to defective indicators.
b. For certain confidence limits and tolerances
c. Depends on batch size, as well as other parameters.
d. Same as unit test time.

Table 3-1. Evaluation of Sampling Plan Options (Cont'd)

Sampling Plan Options	Cost of Testing		Calendar Time Required for Testing	Consistency with FTC Rule	Preferred Options (*)
	Expected Total	Distribution Among Manufacturers			
Option #13 - All units tested + mean energy efficiency standard	Infeasible	Proportional to production	Infeasible	No	
Option #14 - Fixed sample + mean energy efficiency standard	Highest	Equal	Shortest (d)	Option more precise (b)	*
Option #15 - Integer sequential sampling with unlimited iterations + mean energy efficiency standard	Low	Unequal but favors efficient models	Longest and unlimited	Option more precise (b)	
Option #16 - Integer sequential sampling with limited iterations + mean energy efficiency standard	Lowest	Unequal but favors efficient models	Multiple of unit test time	Option more precise (b)	
Option #17 - Batch sequential sampling with unlimited iterations + mean energy efficiency standard	Moderate (c) but unlimited	Unequal but favors efficient models	Moderate (c) but unlimited	Option more precise (b)	
Option #18 - Batch sequential sampling with limited iterations + mean energy efficiency standard	Moderate (c)	Unequal but favors efficient models	Moderate (c)	Option more precise (b)	*

a. After transformation of EELs to defective indicators.
b. For certain confidence limits and tolerances
c. Depends on batch size, as well as other parameters.
d. Same as unit test time.

- Levels 2 and 1 were derived by scaling down level 3. This scaling down represented DOE's judgment regarding alternative burdens on manufacturers and was taken to provide a lower bound for choosing the preferred alternative.

The analysis for selecting the proposed standard first focused on the four levels selected for each covered product class. If the product was to be evaluated on a regional basis, all four levels (for the 1986 standard only) were examined for regional standards as well as for nationally uniform standards. The standards that were chosen were those that were most cost effective, showed net gains in benefits with regard to costs, and met the other policy objectives, including energy demand reduction and conservation. The economic tests performed to evaluate all of the above criteria are described in the following chapter on the economic impact of the proposed regulations.

If these criteria could not be satisfactorily met for a specific product with any of the four levels, national or regional standards, then the no regulation option for the specific covered product class was invoked.

The selection of proposed levels of regulation was based upon the use of a highly articulated benefit-cost methodology that has been computerized and is referred to as the "Value Model" (Reference 6). Several sets of alternative levels of regulation were examined in the process of developing the proposed efficiency standards for each product class. Each set consisted of a level in 1981 and a level in 1986. In total, several hundred cases were examined. The Value Model was exercised to identify the optimum cases in the manner described below.

The Model ranked alternative standard levels according to results of a series of economic efficiency and equity tests. As required by the enabling legislation, these tests were performed from three different perspectives: consumer, manufacturer, and nation. Alternative standard levels, screened for adverse impacts from the consumer and manufacturing perspectives, were ultimately ranked from the national perspective using national net present value and energy savings as the ordering criteria. The proposed standards were economically the most efficient levels that could be promulgated without causing undue burden on specific sectors of society.

Based on the Value Model economic tests, it can be determined that if more stringent standards were proposed, manufacturers would find it more difficult to meet the 1981 and 1985 deadlines. Consequently, many manufacturers would incur severe economic problems. The possibility of firms failing to continue manufacturing the covered products would increase thereby reducing competition in the marketplace. In addition, these higher standards would lead to higher first costs which would pose an additional hardship on low income consumers. Because of these

adverse economic impacts, DOE has rejected the concept of more restrictive standards than those proposed. On the other hand, lower standards would not yield the same level of energy savings as the proposed action. It would result in delayed and reduced energy savings and would not conform to the requirement that standards be set at the maximum efficiency levels which are technologically feasible and economically justifed.

3.5 SUMMARY

The proposed standards are time-phased, with intermediate energy efficiency standards taking effect in July 1981 and final standards becoming effective in January 1986. This will permit early benefits from the regulation, while providing adequate time for manufacturers to make design changes to achieve the more stringent 1986 levels.

The following are key features of the proposed standards:

- Performance standards -- the standards regulate the performance of a product as a whole rather than requiring that certain materials or design specifications be used. This will allow manufacturers complete flexibility in achieving the standards and will allow innovative energy efficient design to enter the marketplace.

- Direct benefit to consumers -- the standards were chosen in such a way that the consumer will realize cost savings over the life of the product. Although the price of the covered products will generally be higher, the lower operating costs will enable the consumer to recover any initial cost differential over a period of time.

- Energy saved* -- the standards will result in between 0.79 and 1.59 QBtu's per year savings by the year 2000. The cumulative energy savings are expected to range from 13.8 to 25.2 QBtu's in the period of 1982 to 2005.

- Overall economic benefit to nation* -- while the standards will result in additional costs needed to manufacture more efficient consumer products (between $7.3 billion and $10.2 billion in discounted 1978 dollars over the period of 1982-2005),

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* The methodology used to determine energy savings and economic benefits is the same as was used to evaluate the various alternatives to the proposed regulation in Chapter 2.

these costs will be offset by the expected savings in discounted energy costs that will range between $22.4 billion and $29.4 billion over the period 1982-2005.

4.0 ECONOMIC IMPACT OF THE PROPOSED STANDARDS

4.1 INTRODUCTION

The proposed consumer product efficiency standards will result in impacts to both consumers and manufacturers of the covered product types. In addition, there will be national economic impacts. Potential economic impacts to consumers are: 1) higher first cost, and 2) lower energy cost of operation. Manufacturers will probably experience: 1) retooling and equipment costs, 2) changes to sales volume, and 3) changes to sales revenue. Potential national impacts include: 1) changes in GNP, 2) changes in energy consumption, and 3) changes in income distribution and employment.

The economic analyses performed in support of the proposed standards focused on studying the above impacts for each class of covered products. For each product class, the economic impact of several potential standards were evaluated. Four levels were evaluated for 1981 standards, and three levels were evaluated for 1986 standards. No economic data were available for evaluating the most stringent 1986 level that was determined to be technologically feasible. Based upon the economic analysis, the most stringent energy efficiency level that could be justified economically was chosen for each product class. The complete economic analysis is presented in the draft Economic Analysis, TSD No. 4. A brief overview and summary of the methodology and results of the economic analysis are presented in the following paragraphs.

4.2 METHODOLOGY

The economic analysis of the proposed standards focused on likely impacts on consumers, manufacturers and the nation. Economic tests to measure these impacts were developed and applied for varying levels of regulation. The tests applied to the alternative levels of regulation for each covered product class examined the potential of each level of regulation to cause:

- Higher costs to the consumer
- An inequitable distribution of the costs and benefits among consumer groups
- An inequitable distribution of costs and benefits between regions of the United States
- No reasonable energy savings to the Nation
- Reduced profit margins among consumer product manufacturers

- An inequitable distribution of financial impacts among manufacturers, especially small manufacturers
- Exposure of manufacturers to a greater risk of financial failure
- Reduced competition.

A computerized model, the Value Model, was developed to implemented to compare systematically the effects of alternative regulatory scenarios. The Value Model is organized into three components as follows:

1) Impact on Consumers

   Efficiency: consumer life-cycle cost

   Equity: distribution of income (using Gini coefficients)

2) Impact on Manufacturers

   Efficiency: profit to net worth ratio

   Equity: loss of profits to small, medium, large firms

3) Impact on Nation

   Efficiency (a) net present value of life cycle costs
   (b) total energy savings

   Equity: regional disparities of life-cycle costs and energy savings

Input to the model is provided by the outputs of all other models such as the ORNL Residential Energy Use Model, Dispersion Model, financial model and macroeconomic model. In addition to the six outputs listed above, the Value Model also displays the macroeconomic indicators: GNP, balance of payments, inflation change and unemployment shifts.

4.3 EFFECTS OF THE PROPOSED STANDARDS ON CONSUMERS

The major impact of the proposed standards on consumers will be changes in the purchase price of the covered products and changes in the energy use of the product. These two potential impacts are evaluated by analysis of the life cycle costs (LCC) of each product class without regulation and with various regulatory levels. The gross benefit accruing from regulation is defined as the life cycle cost savings accruing to the consumer as a result of regulation.

No standard for any product class was considered that did not result in life cycle cost savings to the consumer. The benefits to consumers resulting from implementation of the proposed 1986 standards are expected to range from $6 for gas clothes dryers to $624 for gas indoor boilers. The period of time over which the consumer must use the product to recover the initial higher cost of the product ranges from .19 years for upright freezers to 5.7 years for split system central air conditioners. Table 4-1 displays the LCC and payback period range for each covered type.

The distribution of impacts of the regulation on consumer income among varying income levels of society was computed using Gini coefficients. These coefficients measure the extent of unfairness of shifts in income. A coefficient of ± 1.0 implies total inequity while 0.0 implies perfectly equitable distribution. A shift of ± 0.005 in this coefficient is marginally significant. As seen in the table below, the change was less than .005 and was in a positive direction which does not harm lower income groups.

	Before Regulation	Proposed Standard	
Year		1981	1986
Gini Coefficient	.3851	.3851	.3818
Change	.0000	.0000	-.0034

The complete analysis indicates that the lower income groups fare somewhat better than the upper income groups. This is because increases in disposable income, due to reductions in the life cycle costs of the covered products, are relatively greater for the low income groups. The total amount of income inequality in the nation is reduced relative to the base case when standards are promulgated.

4.4 EFFECTS OF THE PROPOSED STANDARDS ON MANUFACTURERS

The proposed standards will result in changes to manufacturers' costs, sales, profits, and financial position. These impacts were analyzed by examining capital requirements, financing alternatives, and shipment levels for both the proposed standards and for the manufacturers' financial position in the absence of regulation. Because the profit-to-net-worth ratio incorporates all aspects of the operation of a manufacturer, it was chosen as the measure of impact. Table 4-2 displays the profit-to-net-worth ratio for all covered products with the proposed regulation as compared to the baseline case without regulation.

Table 4-1. Life Cycle Costs and Payback Period for Proposed 1986 Standard for Covered Products

Product Type	Life Cycle Cost Savings Range*	Payback Period Range* (Years)
Refrigerator and Refrigerators/Freezers	$91 - $322	.54 - 0.79
Freezers	$295 - $546	0.19 - 0.44
Clothes Dryers	$6 - $47	2.8 - 5.5
Water Heaters	$130 - $170	0.75 - 1.1
Room Air Conditioners	$33 - $112	1.4 - 4.6
Kitchen Ranges and Ovens	$14 - $90	1.6 - 3.4
Central Air Conditioners	$303 - $429	2.6 - 5.7
Furnaces	$62 - $624	0.25 - 2.7

* Range is the highest and lowest cost (period) for each classification within the product type.

Table 4-2. Profit-to-Net Worth Ratio*

Industry	Without Regulation	With Proposed Regulation		
		All Sizes of Firms	Large	Medium	Small
Refrigerator/ Freezers	29.9	23.3	23.7	21.4	**
Freezers	27.4	10.6	11.5	**	**
Ranges/Ovens	41.6	37.8	39.1	28.0	**
Water Heaters	23.8	13.4	14.6	**	**
Room Air Conditioners	28.5	27.0	27.5	25.0	**
Central Air Conditioners	37.5	37.3	37.6	33.3	33.3
Furnaces	35.3	34.3	35.1	25.0	25.0
Clothes Dryers	34.3	33.4	33.4	35.0	25.0
All Firms	32.3	27.1	27.8	21.0	10.4

* Before taxes

** Indicates that the ratio was not computable by reason of one or more of the following conditions: 1) profits are low or slightly negative, 2) financing methods will be required which are not contemplated by the scenario used to compute impacts on manufacturers, or 3) the ratio excedes values normally considered acceptable.

Source: Appendix A, Economic Analysis Document, TSD #4

In the absence of regulation, the mean profit-to-net-worth ratio is 32.3% for all consumer product manufacturers, with values ranging from a low of 23.8% for water heaters to a high of 41.6% for ranges and ovens. There is little difference in this ratio among different size firms. With standards imposed, this ratio falls on average to a value of 27.8% for large firms; to an average value of 21.0% for medium size firms; and to an average value of 10.4% for small firms. With standards imposed, there will be a difference in profit-to-net-worth ratios for different size firms due to a change in the asset levels and debt structure of different size firms.

Firms will require additional capital equipment, tooling, etc., in order to produce consumer products that comply with the standards. This will force an increase in asset levels. However, these assets will be partially or completely financed by increases in both short and long term debt. The debt burden will fall more heavily on smaller firms, since ability to finance without incurring debt is less than it is for larger firms. The tendency will be for the net worth, as a percent of total assets, to fall from an average of 51.5% without regulation to averages of 47.4% for large firms, 44.3% for medium size firms, and 29.9% for small firms. There was little difference among firms of different sizes in the no-regulation case; however, with the proposed standard, smaller manufacturers are impacted more severely than medium or large manufacturers.

DOE has studied the effect of the proposed regulation on the level of competition in the consumer product industry and found there to be no appreciable decrease in the level of competition. More detailed information about market shares of differing size firms by industry are not available, as many of the covered product industries consider these data to be proprietary. Currently, the largest 20% of consumer product manufacturers are estimated to account for 92% of the value of shipments per year. Price and quality competition among these large firms is intense, with each competing for customers by holding the line on price increases and by offering those convenience and efficiency features demanded by the buying public.

Analyses have shown that the firms most likely to be affected adversely under the proposed regulation are the smallest firms. In total, the smallest 60% of the consumer product manufacturers are estimated to account for 1.2% of the value of shipments per year. Many of these firms can be exempted from the standards for two years under the Act. However, if, as a result of regulation, they are acquired by larger firms, only a minute portion of the market will have been redistributed from small firms to large firms. Accordingly, it would be difficult for a large firm to acquire enough additional market shares through failure of small firms to cause a significant deterioration in competition.

The proposed standard provides some recourse for small manufacturers in that they can apply for a two-year exemption to the 1981 standards. This should enable small manufacturers to meet the 1986 standards in 1983 without first meeting the 1981 levels. This could provide a competitive edge to small manufacturers during 1983-1985 if demand for the most energy efficient products continues.

Raising the 1981 level to one level higher than the proposed regulation would result in a greater loss of revenue to the industry due to a greater number of models that are currently below that level of efficiency. It was estimated that the industry would lose shipments totaling $1793.1 million. The effect would be to force 48% of all consumer product manufacturers to post operating losses in the year 1981. Firms would be forced to incur even larger losses during succeeding years as they attempt to invest in capital equipment required to meet the 1986 standard. Additionally, firms showing losses of that magnitude would find investment capital difficult to raise. It is extremely likely that a large number of firms would either experience failure or be forced to exit the consumer product market as a result.

DOE has determined that: 1) impact on the industry is acceptable at the proposed levels, and 2) although the impact is also acceptable at the next lower level, the amount of energy saved is not sufficiently high. Therefore, the next lower level is not acceptable by reason of insufficient energy savings.

4.5 EFFECTS OF THE PROPOSED STANDARDS ON THE NATIONAL ECONOMY

Indicators of the impacts of consumer product energy efficiency standards on the economy are measures of total energy savings and national net present value. National net present value is computed by subtracting the net present cost of fuel and equipment for the proposed standards from the net present cost in the base case.

The national net present value of the proposed standards is expected to range between $15.1 billion and $19.2 billion in 1978 dollars during the 1982 through 2005 time period. The total energy savings range from 13.8 QBtu's to 25.2 QBtu's under the proposed regulatory levels. These are savings compared to the baseline, or no regulation case. Table 4-3 presents the energy savings and net present value of the proposed regulation as compared to the baseline case by each covered consumer product type. Note that in all instances there are positive energy savings and a positive net present value.

In addition, the equity impact of the proposed regulation on different regions was examined. Consumer product utilization rates and fuel costs differ by region of consumer use and adverse equity effects can occur if the costs/burdens of

Table 4-3. Summary of Net Present Value and Energy Savings by Industry for the Proposed Standards

Product Type	(1978$)(billions) Net Present Value		(QBTU's) Energy Savings (1982-2005)	
	High* Price Case	Low** Price Case	High* Price Case	Low** Price Case
Refrigerator/ Freezers	4.6	6.6	3.6	7.6
Freezers	1.0	1.4	0.8	1.7
Ranges/Ovens	0.3	0.7	0.3	0.8
Water Heaters	5.4	6.0	3.9	5.9
Room Air Conditioners	0.3	0.4	0.2	0.6
Central Air Conditioners	0.8	0.4	2.6	3.7
Furnaces	2.5	3.4	2.0	4.3
Clothes Dryers	0.3	0.4	0.3	0.6
Home Space Heating			-0.1	-0.2
TOTAL	15.2	19.3	13.6	24.9

* The high energy price case assumes a 2.5% annual real electricity price increase and a 3.0% annual real oil and gas price increase.
** The low energy price case assumes a 1.0% annual real electricity price increase and a 1.5% annual real oil and gas price increase.

regulation are unequally distributed among different regions. The equity impact was analyzed by comparing regional life cycle costs of the proposed national standards to the baseline or no regulation case. It was found that for almost all combinations of standards for different regions that the life cycle cost savings were greater for the proposed standards. For those few instances where the life cycle cost savings were greater for regional standards, the differences were extremely small, i.e., less than $10.

Energy efficiency standards also have other macroeconomic impacts that will affect gross national product, inflation, balance of trade and employment. Table 4-4 summarizes these effects over a 15 year timestream. The following paragraphs describe each indicator briefly. A more detailed discussion can be found in Chapter 5, Section 5.8 of the Economic Analysis Document, TSD #4.

The proposed regulations will have a positive impact on the Gross National Product (GNP). GNP is expected to rise by $0.6 billion in 1986, by $2.5 billion in 1990, by $2.5 billion in 1995, and by $5.3 billion in 2000. In the long term, no inflationary impacts are expected in that the GNP deflator shows either no change or a negative change.

The proposed standards are expected to favorably impact the balance of trade with other nations. The incremental change in the U. S. balance of trade will be $0.3 billion in 1986, $1.2 billion in 1990, $2.5 billion in 1995, and $1.7 billion in 2000.

The production of energy efficient consumer products will result in increased employment in the regulated industry and in other industries as well. Some jobs will be created to develop, design, and produce energy efficient products. Employment will also rise as increases in disposable income, resulting from fuel cost savings, are spent on other goods and services. By 1986, the proposed regulations are expected to increase employment in all industries by 30,000 jobs. The increase is expected to rise to 110,000 jobs by 1995, to 190,000 in 1990, and to 220,000 in 2000.

4.6 EFFECTS OF ENFORCEMENT AND IMPLEMENTATION ON COSTS

The enforcement costs for the program are expected to be a small percentage of the total cost of the product (Reference 5). Using the worst case scenario where the anticipated number of certification tests is maximized, the costs range from 0.58% of the value of shipments for central air conditioners to 0.02% for refrigerators and refrigerator-freezers for the first year. In subsequent years, the costs will decrease in that only a limited number of carry-over models will be required to be retested. The enforcement costs include certification test costs, the cost to manufacturers when DOE conducts audits (estimated at 20% of all basic models), and administrative costs.

Table 4-4. Estimated Impact of Proposed Standards on Macroeconomic Indicators (All Covered Products Combined)

Economic Indicator	Year			
	1986	1990	1995	2000
Change in GNP ($1978: millions)	0.8	3.0	5.5	6.4
Change in GNP Deflator (Inflation Measure)	Negligible	Negligible	Negligible	Negligible
Change in Balance of Trade ($1978: millions)	0.3	1.2	2.5	1.7
Change in Employment	+30,000	+110,000	+190,000	+220,000

5.0 URBAN AND COMMUNITY IMPACT ANALYSIS

In accordance with Executive Order 12044, an "Urban and Community Impact Analysis" is required in order to assess the probable effects of proposed agency initiatives on central cities, suburban communities, and non-metropolitan areas. In complying with this mandate for the proposed energy efficiency standards for consumer products, it should be noted that only a limited amount of data is available on the geographic distribution of appliance plant locations and the number of employees per plant. Moreover, in the absence of a survey of each manufacturer, there is no data base that could be researched to determine the composition of the work force at each plant. However, there is information available that broadly indicates the current employment picture on a national and statewide basis and the changes that have occurred during the 1970s. Table 5-1 below, derived from the 1972 and 1977 Census of Manufacturers* for the covered products for which data are available, suggests several national trends independent of energy efficiency factors that are apt to continue in the next decade. These trends are:

Table 5-1. TOTAL U. S. EMPLOYEES IN SELECTED APPLIANCE INDUSTRY SEGMENTS, 1972-1977

Industry Segment	Number of Employees (1000s)		Percentage Increase or Decrease
	1972	1977	
Household Cooking Equipment	23.3	25.2	+ 8
Refrigeration and Heating Equipment	150.8	139.9	- 5
Household Refrigerators and Freezers	34.1	35.9	+ 5
Household Laundry Equipment	23.6	19.9	-16
Other Household Appliances, NEC (including water heaters and dishwashers)	14.0	15.4	+10
	245.8	236.3	- 4

Source: 1972 and 1977 Census of Manufacturers

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* Figures for 1977 are preliminary.

- There was an overall reduction of about 4 percent in employment in the consumer product industry for the 5-year period and, given the current fall-off in housing starts, it can be expected that this decline will continue.

- On an absolute basis, there were 11,000 fewer positions in the Refrigeration and Heating Equipment area in part due to market saturation in 1977.

- Other consumer product industry areas show a slight increase in terms of employment, e.g., household cooking equipment due to the introduction of new product lines such as microwave ovens and outdoor cooking devices; and other household appliances which likewise reflect increased demand for dishwashers, garbage disposal units, trash compactors, etc.

Data are available only on a limited basis for employment by specific states for each of the above industry segments. As shown in Table 5-2, the major appliance producing states of Ohio, Illinois, Indiana, Kentucky, and Tennessee have maintained their relative positions in the 1972-1977 period. However, if any trend is noticeable, it is that there has been a shift in employment from the northeast and east-north central states to the east-south central states, especially to Kentucky and Tennessee. This movement is typical of other shifts that have occurred throughout the decade when many industries have moved from northern states to the south, southeast, and southwest -- resulting from a variety of causes such as lower tax rates, relocation incentives, more favorable opportunities for new plant construction, lower labor costs, and better weather conditions.

In terms of specific locations of existing plants, the data base available is rather sparse. For 1979, Table 5-3 lists various consumer product manufacturers, the location, and the number of employees. In some cases, the location listed is essentially the same as that for the company's plant, while in others, especially the larger firms, the location shown is primarily the corporate office, while the manufacturing plants are located in a myriad of places.

Manufacturers unable to finance the retooling and redesign of products will be more inclined to agree to acquisitions or mergers by larger firms with greater financial resources. Historically, most acquisitions and mergers have not resulted in the relocation of plants.

Table 5-2. U. S. EMPLOYEES IN SELECTED APPLIANCE INDUSTRY SEGMENTS BY STATES, 1972-1977

Industry Segment/Location	Number of Employees (1000s)		Leading States in 1977 and Percent Concentration	
	1972	1977		
Household Cooking Equipment				
E. North Central				
IL	4.8	3.4		
E. South Central			TN) IL) KY) OH)	55%
TN	2.5+	5.1		
Other States				
KY, OH	NA	16.7		
TOTAL	23.3	25.2		
Household Refrigerators and Freezers				
All States	34.1	35.9	OH) IN) IL) KY)	65%
Refrigeration and Heating Equipment				
New England				
MA	.9	.8		
CT	.05-.10	.8		
Middle Atlantic				
NJ	6.9	6.0		
PA	8.1	7.0		
E. North Central				
OH	30.9	21.2		
IN	4.7	5.4		
IL	8.2	7.0		
MI	9.5	7.4		
WI	5.3	6.3		

Table 5-2. U. S. EMPLOYEES IN SELECTED APPLIANCE INDUSTRY SEGMENTS BY STATES, 1972-1977 (Cont'd)

Industry Segment/Location	Number of Employees (1000s)		Leading States in 1977 and Percent Concentration	
	1972	1977		
W. North Central				
MN	3.9	4.4		
IA	1.0-2.5	1.4		
MO	5.6	4.5	OH)	
			NY)	40%
S. Atlantic			TX)	
VA	1.0-2.5	2.0	TN)	
GA	1.0	.8		
FL	.5	.7		
E. South Central				
KY	8.2	8.0		
TN	7.1	8.6		
AL	1.0-2.5	1.5		
W. South Central				
AR	1.6	3.2		
OK	1.0-2.5	1.5		
TX	8.9	10.8		
Mountain				
AZ	1.0-2.5	1.2		
Pacific				
CA	5.5	.46		
Other States (incl. NY)	NA	24.7		
	150.8	139.9		
Household Laundry Equipment				
E. North Central				
IL	2.5+	2.3	OH)	
			IA)	80%
Other States			KY)	
OH, IA, KY	NA	17.6	IL)	
TOTAL	23.6	19.9		

Table 5-2. U. S. EMPLOYEES IN SELECTED APPLIANCE INDUSTRY SEGMENTS BY STATES, 1972-1977 (Cont'd)

Industry Segment/Location	Number of Employees (1000s)		Leading States in 1977 and Percent Concentration	
	1972	1977		
Other Household Appliances				
E. North Central				
WI	1.2-2.5	1.4		
E. South Central			KY)	
KY	2.5+	3.8	IL)	75%
TN	1.2-2.5	2.5	TN)	
			IN)	
Pacific				
CA	1.2-2.5	1.2		
Other				
IL, IN	NA	6.5		
TOTAL	14.0	15.4		

Source: 1972 and 1977 Census of Manufacturers

Table 5-3. APPLIANCE MANUFACTURERS

Company Name, City, State	Number of Employees
Carrier Corp., Syracuse, NY	36,000
Emerson Electric Co., St. Louis, MO	46,900
General Electric, Fairfield, CT	401,000
Hoover Company, Canton, OH	22,000
Maytag Company, Newton, IA	4,100
McGraw-Edison Company, Elgin, IL	25,000
Rangaire Corp., Cleburne, TX	1,760
Rheem Manufacturing Co., New York, NY	5,500
Westinghouse Electric Corp., Pittsburgh, PA	141,000
Whirlpool Corp., Benton Harbor, MI	22,200
Williamson Company, Cincinnati, OH	779

Source of Data: Dun & Bradstreet, 1979

In conclusion, it is apparent that employment shifts in the consumer product industry have occurred in recent years due to a variety of market factors.

The economic analyses of the impacts of the proposed standards on manufacturers indicates that employment will increase as a result of the proposed standards. Some employment increases will occur in the consumer product manufacturing industry. Additional employment increases will occur in other industries as a result of the increased disposable income available to purchasers of the regulated consumer products to spend on additional goods and services. While these employment increases may counteract the downward employment trends in the consumer product industry, the proposed regulations are unlikely to affect shifts of plant locations away from the northeastern region of the United States.

The effect of the proposed regulation on various income groups within the population was examined in the economic analysis. No adverse impacts on low income or minority groups were identified.

The distribution of impacts of the regulation among various regions of the U. S. was also examined in the economic anaylsis. No one region of the nation is expected to be impacted more severely than another.

In summary, the overall impact of the regulation on cities, suburban communities, and non-metropolitan areas is expected to be beneficial in that demand for energy will be reduced without lowering the utility provided by the covered products. In addition, this reduced demand may serve to mitigate possible future energy shortages, such as brownouts, in urban areas. Reduced demand could serve to keep energy prices lower than may have been possible without the proposed regulations.

6.0 AFFECTED REGULATIONS AND PROGRAMS

6.1 Federal Programs

The proposed consumer product efficiency standards will not directly affect existing and proposed Federal energy conservation legislation. Indirect effects of the proposed standards are expected to be beneficial in that compliance with other Federal legislation concerning energy conservation may be eased by the increased availability of energy efficient products. For example, compliance in the future with the Energy Performance Standards for New Buildings (10 CFR Part 435) (often referred to as BEPS for Building Energy Performance Standards), which will require meeting a specified energy budget for new construction, will be made simpler in that builders will have a greater selection of energy efficient central heating and cooling products to choose from in the design of the building. Since builders usually select products with the lowest first costs, the proposed standards will eliminate the possibility of choosing inefficient products. When the proposed BEPS rule is effective, it will also require revision of the Minimum Property Standards of the Federal Housing Administration and the Farmer's Home Administration to meet the BEPS. Those sections of the HUD Mobile Home Construction and Safety Standards (Part 280 CFR, December 18, 1975) which contain references to consumer product efficiencies will also be superseded by BEPS.

It has been determined by DOE that the proposed standards will not affect compliance with other Federal regulations concerning the covered products.

6.2 State Programs

State energy efficiency regulations covering the nine consumer product types for which standards have been proposed, as well as the other four product types named specifically in Section 322(a) of the Act, have been superseded until July 1, 1980, as provided for in Section 322 of the Act if the state regulations have been enacted after January 1, 1978. State energy efficiency regulations of the covered products are also superseded when final Federal rules pertaining to these products are published if the state regulations do not conform to the Federal regulation.

The situation arising between July 1, 1980, and final promulgation of rules by DOE for each of the covered products leads to the following scenario. Legally, states may enforce their energy efficiency standards during this time period. However, manufacturers of the covered products may petition for a Federal rule to supersede state regulation where insufficient state or local interest exists to justify such regulation and such regulation unduly burdens interstate commerce.

Also, after a final Federal rule has been published, a state may request that the state regulation not be superseded if the state standard is more stringent, there is sufficient state and local interest, and interstate commerce is not unduly burdened.

At this time, California, Minnesota and New York are the only states with state regulation of some of the covered products. Forty states have enacted legislation adopting ASHRAE 90-75 and its requirements for water heaters and HVAC efficiencies. In addition, eleven states have some legislation prohibiting the use of continuously burning pilot lights on one or more gas-fueled consumer products.

Many of the state laws have been incorporated into building codes that require use of energy efficient consumer products. Most of the codes are based on ASHRAE 90-75 or a similar derivative model code. The proposed rule should not require changes to the building codes, per se, except that it may be necessary to incorporate more stringent requirements, if the current requirements are less stringent than the Federal requirements for the covered products.

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