

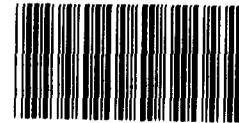
GAO

Report to the Chairman, Environment,  
Energy, and Natural Resources  
Subcommittee, Committee on  
Government Operations, House of  
Representatives

March 1993

ENERGY  
CONSERVATION

Appliance Standards  
and Labeling Programs  
Can Be Improved



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United States  
General Accounting Office  
Washington, D.C. 20548

Resources, Community, and  
Economic Development Division

B-251928

March 24, 1993

The Honorable Mike Synar  
Chairman, Environment, Energy, and  
Natural Resources Subcommittee  
Committee on Government Operations  
House of Representatives

Dear Mr. Chairman:

This report responds to your request that we examine the federal energy efficiency standards program for household appliances. The report discusses, among other things, the Department of Energy's efforts to establish and update appliance efficiency standards and the status of the Federal Trade Commission's appliance labeling program. The report contains recommendations designed to improve the timeliness of the appliance standards and to ensure that appliances comply with applicable standards.

As arranged with your office, unless you publicly announce its contents earlier, we will make no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the appropriate congressional committees, the Department of Energy, the Federal Trade Commission, and the Department of Commerce's National Institute for Standards and Technology. We will also make copies available to others upon request.

This work was performed under the direction of Victor S. Rezendes, Director, Energy and Science Issues, who can be reached at (202) 512-3841 if you or your staff have any questions. Other major contributors are listed in appendix VI.

Sincerely yours,

J. Dexter Peach  
Assistant Comptroller General

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# Executive Summary

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## Purpose

Household appliances, such as refrigerators, air conditioners, and heat pumps, consume about 20 percent of the electricity used annually in the United States. To lower energy use and costs, the federal government requires that appliances meet minimum energy efficiency standards. The Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, asked GAO to examine (1) the status of the Department of Energy's (DOE) efforts—required by law—to upgrade appliance standards; (2) the effectiveness of the Federal Trade Commission's (FTC) labeling program in informing consumers about appliance energy use and costs; and (3) DOE's and FTC's methods for promoting both compliance with appliance standards and accurate reporting of energy efficiency, including labeling.

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## Background

The 1975 Energy Policy and Conservation Act (P.L. 94-163), as amended, provides performance standards that specify a minimum level of energy efficiency or a maximum level of energy use for certain types of household appliances. The act requires DOE to review these standards (called "efficiency standards") according to specified timetables and to upgrade them—thereby requiring appliances to be even more energy efficient—if doing so is economically justifiable and technologically feasible. DOE also determines the need for performance standards for other appliances. The Energy Policy Act of 1992 (P.L. 102-486) extended the standards program to cover certain commercial and industrial appliances.

As provided by the act, DOE develops test procedures that manufacturers use to determine if the appliances are as energy efficient as the standards require. Manufacturers must list data on energy use, efficiency, and cost on appliance labels and/or related fact sheets. The FTC's rules govern the content and format of appliance labels, which are intended to allow consumers to compare the energy efficiencies and the estimated annual operating costs of competing brands and models of appliances. DOE and FTC do not systematically test appliances or verify the accuracy of appliance labels.

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## Results in Brief

DOE is behind the schedules prescribed in the act for upgrading appliance efficiency standards. The delays have occurred because (1) the appliance program's budget has declined and the program's staffing has remained constant while the workload has increased and (2) DOE officials generally review proposed standards sequentially, rather than using a faster concurrent process. Because these delays prolong the time that the

less-efficient existing appliances are on the market, DOE estimated that U.S. consumers will spend \$1.7 billion (in constant 1992 dollars) more on energy costs through 2030 than they would have if DOE had upgraded the standards on time.

FTC has not reviewed the format and information content of appliance labels as specified in its labeling rules; as a result, the labeling program's effectiveness in informing consumers about the energy use, efficiency, and costs of appliances is uncertain. Manufacturers, consumers, and others have expressed concerns about the content and format of existing labels. A review of the labeling rules initiated by FTC in 1988 has been repeatedly delayed; it is now estimated that the review will be completed in October 1993. FTC officials attributed the delay to increased workloads, resources that have not increased, and other rule-making that had to be completed.

To promote compliance with federal efficiency standards and accuracy in appliance labels, DOE and FTC largely rely on voluntary testing programs conducted by associations of appliance manufacturers. These testing programs are designed to certify that the manufacturers' energy efficiency claims for appliances, such as those on labels, are accurate. However, these programs do not test the efficiency of all appliances covered by energy efficiency standards. GAO did not determine the extent to which appliances did not comply with the efficiency standards, but it did find instances in which tested pool heaters and refrigerator-freezers did not conform to the energy efficiency claimed on their labels and/or were not as efficient as the energy efficiency standards required. DOE and FTC do not systematically or comprehensively monitor and investigate compliance.

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## Principal Findings

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### DOE Has Not Met Statutory Schedule for Efficiency Standards

DOE upgraded efficiency standards for five types of appliances between 4 and 16 months past statutory deadlines, and the agency will be over 2 years late in upgrading standards for another nine types of appliances.

Although the appliance program's workload has increased from upgrading standards for nine types of appliances in fiscal year 1980 to upgrading standards for 12 types in fiscal year 1992, the program's budget has declined in real terms and staffing levels have not changed. Reflecting a

belief that standards were not needed to increase appliance energy efficiency, DOE did not request resource levels conducive to meeting statutory deadlines. Funding for the program decreased from about \$11 million in fiscal year 1980 to about \$3 million in fiscal year 1992.<sup>1</sup> DOE officials said that DOE is reassessing the program's funding in light of the requirements of the Energy Policy Act of 1992.

DOE's use of sequential, rather than concurrent, reviews for notices of proposed and final standards may have contributed to the missed deadlines. A DOE official in charge of the program estimated that if DOE officials reviewed proposed standards concurrently, the time needed to upgrade standards would be shortened by about 3 months. This change would reduce DOE's delays in meeting statutory requirements.

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### Effectiveness of Labeling Program Is Uncertain

Since the early 1980s, manufacturers, consumer groups, and others have expressed concern that appliance labels in some cases do not effectively inform consumers about appliance energy efficiency and costs. For example, a coalition of appliance manufacturing associations, environmentalists, and others told FTC in 1988 that displaying different costs on labels may be misleading because energy prices change but the labels rarely do so. The coalition favored expressing appliance energy use in terms of units of energy, such as kilowatt-hours, used over a year. In a 1992 report, the Office of Technology Assessment noted that without periodic FTC reviews and updates, FTC labeling rules could fall behind technological changes.

In 1988, FTC began a voluntary review of the labeling rules and solicited suggestions for changing label format and content. However, the review has been repeatedly delayed by the need to work on other rules. FTC officials said their agency would finish the review by October 1993.

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### Efforts to Ensure Accurate Energy Efficiency Ratings Are Limited

To ensure both compliance with federal efficiency standards and accurate appliance labeling, DOE and FTC rely on manufacturing association programs that test appliance models at random and then compare the energy efficiency of the tested models with the manufacturer's claimed energy efficiency that is shown on labels and in appliance catalogues. However, the programs do not include efficiency tests for all types of appliances subject to pertinent federal standards. Therefore, the programs

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<sup>1</sup>Dollars figures are in constant 1992 dollars, including a GAO estimate of program management costs.

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do not comprehensively ensure that the appliances comply with efficiency standards or that the manufacturers' efficiency claims are accurate.

For example, manufacturing association programs do not cover swimming pool heaters. The California Energy Commission found that 11 of 15 pool heaters tested in 1992 were not as energy efficient as federal standards required. In addition, unlike other appliances, the programs do not directly test refrigerator-freezer energy use or certify the accuracy of manufacturers' efficiency claims. Rather, the programs measure and validate the total shelf area or refrigerated volume of refrigerator-freezers and then arithmetically estimate annual energy use on the basis of these factors.<sup>2</sup> In a 1992 study funded by New York electric utilities, the average claimed efficiency of 24 refrigerator-freezers was overstated by about 6 percent.

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## Recommendations

To promote DOE's ability to satisfy statutory deadlines for establishing appliance efficiency standards, GAO recommends that the Secretary of Energy (1) allocate resources, after appropriate consideration of competing priorities, that will enable the appliance standards program to comply with statutory deadlines and (2) direct DOE staff to use concurrent steps wherever possible for internal reviews of proposed standards. To enhance DOE's ability to ensure compliance with the appliance efficiency standards, GAO also recommends that the Secretary ask manufacturing associations to test the energy efficiency of all types of appliances subject to federal efficiency standards.

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## Agency Comments

GAO discussed the facts of this report with officials from DOE's Office of Conservation and Renewable Energy and the FTC. In general, DOE's Deputy Assistant Secretary, Building Technologies and the Director, Office of Codes and Standards, as well as FTC's manager for the appliance labeling program, among others, agreed with the facts presented. Where appropriate, GAO revised the report to incorporate the views of DOE and FTC officials. As requested, GAO did not obtain written agency comments on a draft of this report.

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<sup>2</sup>In 1993, the energy efficiency of room air conditioners, which has historically been estimated by using product traits, will be tested directly.

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**Abbreviations**

DOE	Department of Energy
EPA	Environmental Protection Agency
ETL	ETL Testing Laboratories, Inc.
FEA	Federal Energy Administration
FTC	Federal Trade Commission
GAO	General Accounting Office
LBL	Lawrence Berkeley Laboratory
NIST	National Institute for Standards and Technology
NOPR	Notice of Proposed Rulemaking
OTA	Office of Technology Assessment

# Introduction

The U.S. Department of Energy (DOE) is responsible for establishing energy efficiency standards for household appliances—such as refrigerators, heat pumps, air conditioners, clothes washers, and dishwashers—that collectively consume about 20 percent of the electricity used each year in the United States.<sup>1</sup> By establishing and periodically increasing the standards, DOE hastens the introduction of more efficient appliances. The Lawrence Berkeley Laboratory (LBL) estimates that the appliance standards program may save the U.S. economy up to about \$50 billion<sup>2</sup> in reduced energy costs by the year 2015. In addition, the program reduces the need to generate more electricity and thus benefits the environment.

DOE's process for establishing efficiency standards relies upon both complex quantitative analyses and upon qualitative judgements. When selecting standards, DOE must balance and weigh many factors that often conflict, such as the technical feasibility and cost-effectiveness of an appliance standard versus the standard's impact on appliance manufacturers and consumers. DOE must also consider the public comments that it solicits on proposed standards.

## Recent Legislation Calls for Mandatory Appliance Standards

In 1975, the Energy Policy and Conservation Act (called "the act")<sup>3</sup> authorized the appliance standards program. Congress subsequently amended the program by enacting the National Appliance Energy Conservation Act (P.L. 100-12) in 1987 and the National Appliance Energy Conservation Amendments (P.L. 100-357) in 1988. These laws (1) established specific, mandatory appliance efficiency standards for 12 categories of household appliances<sup>4</sup> and (2) required DOE to periodically review the standards and to make them more stringent if the Secretary of Energy determines that more stringent standards are technically feasible and economically justified. The Secretary may not make the standards less stringent. (See app. 1 for a discussion of the history of the appliance standards program.)

<sup>1</sup>In this report, energy efficiency is the ratio of tasks performed per unit of energy used. For example, for a dishwasher, energy efficiency is the ratio of dishwashing cycles per kilowatt-hour. The more energy-efficient the appliance, the more tasks (for example, the greater the number of cycles) it can accomplish per unit of energy.

<sup>2</sup>Unless otherwise stated, dollars in this chapter are expressed as constant 1992 dollars.

<sup>3</sup>P.L. 94-163.

<sup>4</sup>The act also authorizes DOE to determine if efficiency standards are needed for televisions, but the act does not specify standards for televisions.

The act, as amended, contains two kinds of energy conservation standards (or "efficiency standards"): performance standards and design requirements (or "design standards"). Performance standards prescribe minimum energy efficiency levels—that is, the minimum performance an appliance must demonstrate using a given amount of energy, or the maximum amount of energy an appliance is allowed to use in performing a function. Performance standards apply to eight types of appliances: refrigerator-freezers, furnaces, central air conditioners and heat pumps, direct heating devices, water heaters, room air conditioners, pool heaters, and fluorescent light ballasts.<sup>5</sup> In contrast, design standards specify certain energy-saving features that appliances must possess. Design standards apply to four types of appliances: dishwashers, clothes washers, clothes dryers, and kitchen ranges and ovens. For example, dishwashers made on or after January 1, 1988, must contain a setting to dry dishes without heat. Appendix II summarizes the standards for appliances that are covered by the act, as amended.

A recently enacted law, the Energy Policy Act of 1992 (P.L. 102-486), establishes efficiency standards for (1) commercial and industrial heating, ventilation, and air conditioning equipment (air conditioners and heat pumps, package terminal air conditioners and heat pumps, warm air furnaces and package boilers, and various water heaters); (2) small electric motors; and (3) general service fluorescent and incandescent reflector lamps. The 1992 act also provides efficiency standards for plumbing products, including showerheads, faucets, water closets, and urinals.<sup>6</sup> In addition, the 1992 act requires DOE to establish standards for high intensity discharge lamps, distribution transformers, and small electric motors. The standards contained in the 1992 act are described in app. III.

In addition, DOE must technically and financially assist the efforts of manufacturing associations to (1) rate the efficiency of windows and window systems; (2) test commercial office equipment, and luminaires<sup>7</sup> and (3) inform consumers about the energy efficiency of these devices.

<sup>5</sup>Fluorescent light ballasts start and operate fluorescent lamps by providing a starting voltage and current and regulating the electrical current during normal operation.

<sup>6</sup>According to the Director, DOE Office of Codes and Standards, efficiency standards that apply to plumbing products save water use but may not reduce energy use unless they reduce the use of hot or warm water.

<sup>7</sup>A luminaire is a complete lighting unit consisting of a lamp or lamps, together with parts designed to distribute the light.

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DOE shall monitor these voluntary programs and determine if mandatory testing and labeling programs are needed.

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## DOE Reviews Standards and Establishes Appliance Testing Procedures

For appliances covered by legislatively-established efficiency standards, DOE must periodically review the standards and determine whether more stringent ones would achieve the maximum technically feasible, yet economically justified, energy savings.<sup>8</sup> DOE is also responsible for establishing testing procedures; manufacturers use these tests to measure the energy efficiency of their products.

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## Periodic Reviews Are Designed to Assess Need for New Standards

The act, as amended, authorizes the Secretary to amend existing efficiency standards based on certain criteria. According to the Director of DOE's Office of Codes and Standards, DOE must weigh the maximum technically feasible energy savings with other considerations, including economic impacts. In assessing the benefits and burdens of a more stringent standard, DOE must consider

- the economic impact of the standard on appliance manufacturers and consumers;
- the savings in operating costs of the appliance throughout its estimated life (called "life-cycle costs") compared with any increase in the appliance's price or maintenance costs that may result from the new standard;
- the total projected energy savings that will result from the standard;
- any decrease in the usefulness or performance of the appliance that will result from the standard;
- any decrease in competition in the marketplace and the effect of such a decrease, as determined by the Attorney General;
- the need for national energy conservation; and
- other factors deemed necessary by the Secretary of Energy.

In analyzing prospective efficiency standards, DOE relies upon engineering and economic analyses performed by LBL. DOE identifies potential standards that would result in more efficient appliances. LBL performs an engineering analysis and identifies potential types of appliances that might be produced to meet the more stringent standards. For example, a technical analysis for dishwashers found that dishwashers would be more energy efficient if they incorporated new features to decrease hot water

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<sup>8</sup>Under the act, as amended, an economically justified standard must have economic benefits that exceed its burdens.

and energy use, such as food filters that remove more food with fewer rinse cycles and electronic timers that more accurately control the amount of water in a dishwasher. Using computer models, LBL projects the cost impacts of these models on manufacturers, consumers, and others.

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### Testing Procedures Are to Ensure That Appliances Meet Standards

Under the act, as amended, all performance standards must be based upon test procedures approved by DOE, except in cases involving design standards. Manufacturers use approved test procedures to determine (1) the levels of energy use that can be claimed for their appliances and (2) whether the appliances satisfy existing efficiency standards. The Department of Commerce's National Institute of Standards and Technology (NIST) provides DOE with technical assistance and advice for developing or amending proposed test procedures.

Testing the energy use and efficiency of some appliances can be very expensive. For example, testing the energy efficiency of central air conditioners and heat pumps can cost as much as \$6,300 per unit. In attempting to satisfy the act's provisions that testing procedures must not be "unduly burdensome" for manufacturers, DOE has established test procedures that allow manufacturers to sample and test as few as two units. According to manufacturing association officials, testing small samples can yield accurate measures of energy efficiency for all units because industrial production techniques ensure that little variation in performance between units of a particular model will occur. (The DOE testing methodology is detailed in app. IV.)

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### Federal Trade Commission Administers Labeling Program

To help consumers make informed purchasing decisions, the act requires that data on appliance energy use and costs be made available to consumers. The Federal Trade Commission (FTC) promulgates rules governing appliance labels, fact sheets, or other methods of conveying appliance energy use information. The manufacturers derive this information using the DOE-approved test procedures. The FTC establishes rules that specify the information to be displayed on labels and the format in which this information is presented.

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### EPA Also Promotes More Efficient Appliances

To achieve environmental goals, the Environmental Protection Agency (EPA) has initiated efforts promoting the production and sale of more efficient appliances—even those covered by the standards administered by DOE.

- EPA's Green Lights Program, launched in January 1991, encourages corporations, hospitals, and other organizations to install energy efficient lighting in their facilities. The program is aimed at preventing pollution by reducing the need for electricity generation. EPA estimates that the program has resulted in electric bill savings of \$6.1 million.
- In June 1992, EPA initiated a program in partnership with computer manufacturers to promote the introduction of energy-efficient personal computers in the workplace.
- Also in July 1992, the EPA-sponsored Super Efficient Refrigerator Program, Inc.—a nonprofit corporation formed by 23 electric utilities—requested proposals from refrigerator manufacturers to produce refrigerators that are (1) at least 25 to 50 percent more efficient than 1993 federal appliance efficiency standards and (2) free from chlorofluorocarbons (ozone depleting substances).

The Energy Policy Act of 1992 requires that DOE and EPA coordinate with utilities and appliance manufacturers to identify other candidate appliances that have the potential for substantial improvement in energy efficiency—improvement beyond the minimum established in federal or state law. When an appliance has such potential, and development and production of the appliance would be substantially accelerated by utility support to manufacturers, DOE and EPA are to coordinate and assist utilities and manufacturers in this commercialization.

## Objectives, Scope, and Methodology

Because the appliance efficiency program promises to reduce the nation's energy bills, the Chairman, Environment, Energy and Natural Resources Subcommittee, House Committee on Government Operations, asked GAO to examine (1) the status of DOE's efforts—required by law—to upgrade appliance standards; (2) the effectiveness of FTC's labeling program in informing consumers about appliance energy use and costs; and (3) how DOE and FTC promote both compliance with the appliance standards and accurate reporting of energy efficiency, including labeling.

To examine the status of DOE's efforts to update the appliance efficiency standards, we compared DOE's progress in analyzing and updating the standards with the rulemaking schedule contained in the act. We also reviewed DOE's process for analyzing and updating efficiency standards and interviewed responsible officials in DOE's Office of Codes and Standards. In addition, we performed fieldwork at the Lawrence Berkeley Laboratory (Berkeley, California), which is DOE's primary contractor for analyzing the costs, benefits, and impacts of proposed efficiency

standards. We obtained from LBL estimates about the monetary benefits associated with DOE's appliance efficiency standards program. We also obtained from LBL projected benefits losses resulting from DOE issuing the standards late. We also solicited the views of many different groups regarding the efficacy of the appliance standards program. These groups included appliance manufacturing associations, state energy agencies, environmental groups, representatives of the utility industry, and consumer groups. (For a complete listing of organizations contacted, see app. V.)

To examine the status of the FTC's appliance labeling program, we reviewed FTC's labeling regulations and sample test labels, and interviewed FTC and appliance industry officials. We also reviewed FTC's files regarding its ongoing effort to assess its labeling rules and requirements.

To determine how DOE and FTC promote both compliance with the standards and accurate reporting of energy efficiency, we interviewed officials from DOE's Office of Codes and Standards, from the FTC, and from NIST. After determining that the federal government relies primarily upon test and certification procedures employed by appliance manufacturing associations to assure the accuracy of data, we reviewed available DOE and industry testing and certification guidelines, and we interviewed officials from the manufacturing associations that sponsor the testing and certification programs. In addition, we interviewed officials and obtained data from ETL Testing Laboratories, Inc., in Cortland, New York—the primary facility used by manufacturing associations to certify the accuracy of the appliance energy efficiency information claimed by manufacturers. Because of the significant costs and time involved, GAO did not attempt to determine the extent of inaccurate efficiency claims and appliance labels, or of noncompliance with federal standards. However, we did review the results of appliance testing implemented by the California Energy Commission and the Empire State Energy Research and Development Corporation (a research organization funded by New York electric utilities).

Our work was performed from April 1992 through January 1993 in accordance with generally accepted government auditing standards.

# DOE Has Not Met Statutory Deadlines for Reviewing Efficiency Standards

DOE has not met the statutory deadlines for updating efficiency standards for five appliance categories; moreover, DOE estimates that it will be over 2 years late in updating the standards for another nine types of appliances. When the issuance of more stringent efficiency standards is delayed, the appliances that are produced and sold during that period of time are the relatively inefficient existing ones, instead of more efficient appliances that would have been produced had new and more stringent standards been issued. Because of DOE's delays, U.S. energy bills may be more than \$1.7 billion<sup>1</sup> higher between now and 2030 compared to what they would have been if DOE had met the statutory deadlines, according to an estimate by DOE's Lawrence Berkeley Laboratory.

According to the DOE official responsible for the appliance standards program, the delays have occurred in part because the appliance program's budget and staffing have declined or remained constant while the workload has increased. The official said that resource increases needed to fulfill the statutory deadlines were not forthcoming because it was believed that federal appliance standards were not needed in order to encourage the production and sale of more efficient appliances. According to DOE officials, DOE is now reviewing the funding levels for the program and may request added funding in the near future. We also found that DOE's process for reviewing and obtaining internal approvals of proposed appliance standards may be unnecessarily lengthy because DOE primarily uses sequential, rather than concurrent, review steps.

## Delay in Revising Initial Standards Causes Delays for Other Standards

The Energy Policy and Conservation Act, as amended, requires DOE to update each appliance efficiency standard every 3 to 8 years, depending on the appliance. The act called for DOE to determine if standards in the act for refrigerator-freezers should be upgraded and, if necessary, to publish a final rule with the upgraded standards by July 1, 1989. The act also called for DOE to establish entirely new standards for small furnaces by January 1, 1989. DOE met neither deadline: it established new standards for small furnaces and upgraded standards for refrigerator-freezers on November 17, 1989.

DOE officials explained that delays experienced in updating the first set of efficiency standards caused cascading delays in updating subsequent sets of standards. DOE established new standards for a second group of appliances (clothes washers, clothes dryers, and dishwashers) on May 14,

<sup>1</sup>All dollars in this chapter are constant 1992 dollars unless otherwise specified.

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1991, more than 16 months past the January 1, 1990 deadline specified in the act.

Because of the delays already experienced in establishing updated efficiency standards, DOE officials estimated that updated standards for seven types of appliances<sup>2</sup> that were due on January 1, 1992, may not be established until sometime after January 1994, or more than 24 months past the statutory deadline. Table 2.1 contains the statutory deadlines for updating efficiency standards and the status of DOE's actions to date (excluding types of appliances added by the Energy Policy Act of 1992).

**Table 2.1: Status of DOE Actions to Update Appliance Efficiency Standards**

Type of appliance	Action required	Statutory deadline for action	Status of DOE action
Refrigerator- freezers	Update standards specified in the act.	July 1, 1989	Completed on Nov. 17, 1989.
Small furnaces	Establish new standards.	Jan. 1, 1989	Completed on Nov. 17, 1989.
Dishwashers, clothes washers, and clothes dryers	Update standards specified in the act.	Jan. 1, 1990	Completed on May 14, 1991.
Mobile home furnaces, water heaters, pool heaters, direct heating equipment, room air conditioners, kitchen ranges and ovens, fluorescent lamp ballasts	Update standards specified in the act.	Jan. 1, 1992	DOE estimates completion after Jan. 1994.
Televisions	Establish standards if DOE determines need.	Not specified.	DOE estimates completion after Jan. 1994.
Central air conditioners and heat pumps	Update standards specified in the act.	Jan. 1, 1994	DOE estimates completion after Jan. 1994.

<sup>2</sup>This rulemaking includes new standards for television sets and a DOE review of existing standards for dishwashers. There is no requirement or deadline for DOE to institute standards for television sets, and upgraded standards for dishwashers are not due until 1995.

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## Delayed Standards Could Result in Higher Energy Costs

Because DOE has not met the statutory deadlines for updating efficiency standards for some appliances and may miss deadlines for others, existing standards remain in effect. To the extent that DOE's reviews ultimately result in more stringent efficiency standards, consumers who purchase appliances in the interim may incur higher energy costs over the life cycle of their appliances than they would have otherwise.

It is difficult to precisely quantify the impact of these delays on consumers' future energy costs. However, LBL estimated that consumers may experience appliance energy costs through the year 2030 that are about \$1.7 billion higher than they would have been if DOE had met statutory deadlines for updating appliance efficiency standards.<sup>3</sup> While we did not verify the precision of this estimate, we believe it indicates a significant impact.

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## Resource Constraints and Sequential Review Process Contribute to Delays

DOE's workload for the appliance standards program has increased over the years, while its budget and staffing resources have declined. Reflecting a belief that appliance standards were not necessary to improve appliance energy efficiency, DOE did not request resource levels conducive to meeting statutory deadlines. According to the DOE official responsible for the appliance standards program, funding constraints and staff limitations make it difficult to get back on schedule once delays have begun. DOE officials also noted that the agency's use of sequential, rather than concurrent, reviews of proposed standards by staff—prior to reviews by senior DOE managers—contributes to the time required to establish the standards.

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## Workload Has Increased While Resources Have Not

The appliance program's total budget, including the activities of DOE's Office of Codes and Standards, of LBL, and of NIST, declined significantly in the early 1980's and has not increased in response to the workload engendered by the 1987 legislation. In fiscal year 1980, DOE—operating under an estimated budget of about \$11 million—wrote efficiency standards for nine products.<sup>4</sup> In fiscal year 1992, with a workload that

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<sup>3</sup>LBL examines the number of appliances that would be replaced in a given time period in conjunction with future energy prices.

<sup>4</sup>These efficiency standards were not adopted by DOE.

involved establishing standards for 12 of the 13 types of appliances covered by the act, the program budget was about \$3 million.<sup>5</sup>

The DOE official responsible for the appliance standards program stated that DOE does not have enough resources to simultaneously conduct work in an efficient manner on separate groups of standards, which is necessary to meet the deadlines required by the act. According to the official, DOE is unable to assign staff to work continuously as teams on specific appliances for the length of time required to complete the work. Instead, as needs arise, staff must interrupt their work from one appliance standard to work on another.

At LBL, DOE's primary contractor for analyzing prospective efficiency standards, the workload increased from analyzing standards for just 2 appliances between 1987 and 1989, to analyzing 12 appliances at present. At the same time, the budget remained steady or declined. In 1987, LBL worked on standards for two appliances with budget resources of about \$1.3 million and a staff of about eight full-time workers. In 1992, working on standards for 12 appliances, LBL's budget was relatively unchanged at about \$1.3 million, with a staff of about 10 full-time workers. The budgeting and staffing for LBL's appliance standards analysis effort, along with its workload requirements, are summarized in table 2.2.

The table excludes the increased workload from the Energy Policy Act of 1992. LBL officials noted that enactment of this law further increases DOE's workload by adding work on standards for such items as commercial and industrial heating, ventilation and air conditioning equipment, electric motors, various types of lamps, and various types of bathroom and plumbing fixtures. In general, DOE will be required to establish new standards for these items between 1993 and 1997.

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<sup>5</sup>The \$11 million and \$3 million budget estimates include estimated program management costs incurred by the Department of Energy's Office of Codes and Standards. We estimated these costs by allocating funds from an overall program management line-item on the basis of staffing levels for the Office of Codes and Standards.

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**Table 2.2: Lawrence Berkeley Laboratory Resources and Workload for Analyzing Appliance Efficiency Standards**

Fiscal year	Appliance standards analyzed	Percent of resources used	Full-time staff positions	Budget (1992 \$)
1987	2 Products <sup>a</sup>	100	7.8	\$1,305,925
1988	2 Products <sup>a</sup> 3 Products <sup>b</sup>	54 46	6.1	905,471
1989	2 Products <sup>a</sup> 3 Products <sup>b</sup> 9 Products <sup>c</sup>	50 30 20	6.9	1,056,730
1990	3 Products <sup>b</sup> 9 Products <sup>c</sup> Lighting	77 13 20	8.2	1,339,381
1991	9 Products <sup>c</sup> Lighting	80 20	10.0	1,076,923
1992	9 Products <sup>c</sup> 3 Products <sup>d</sup> Lighting	54 26 20	10.1	1,335,000

Note: Appliance standards are analyzed and updated in the following sets:

<sup>a</sup>Refrigerator-freezers and small gas furnaces.

<sup>b</sup>Clothes washers, clothes dryers, and dishwashers.

<sup>c</sup>Mobile home furnaces, water heaters, central air conditioners and heat pumps, pool heaters, direct heating equipment, room air conditioners, kitchen ranges and ovens, fluorescent lamp ballasts, and televisions.

<sup>d</sup>Central air conditioners, furnaces, and refrigerator-freezers.

Source: Lawrence Berkeley Laboratory and Department of Energy.

Many organizations we contacted, representing a wide variety of interests and views, agreed that the appliance standards program has suffered because resource shortfalls have contributed to delays in analyzing and upgrading efficiency standards. These organizations included an appliance manufacturing association, environmental groups, energy efficiency groups, and utility associations.

**Program Budget Reflected View That Appliance Standards Were Unnecessary**

In the early 1980s, funding levels for the appliance standards program were reduced, reflecting a belief that appliance standards were not needed to increase appliance energy efficiency. The Congress has continued to fund the appliance program at relatively reduced levels. Specifically, the DOE budgets that were submitted to the Congress for fiscal years 1982 and 1983 proposed the elimination of funding for the appliance standards program, stating that the market by itself would encourage the production

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and use of more efficient appliances without federal appliance standards. The Congress funded the appliance program at \$1.6 million in fiscal year 1982 and \$1 million in fiscal year 1983, down from a funding level of \$6 million in fiscal year 1981.<sup>6</sup> Between fiscal years 1984 and 1992, DOE requested about \$2 million each year for the program, and Congress has made appropriations that are equal to, or slightly less than, the amount requested.

According to the Deputy Assistant Secretary, Building Technology, DOE is reviewing the funding levels for the appliance standards program in light of mandates in the Energy Policy Act requiring DOE to issue new efficiency standards. The Deputy Assistant Secretary said that DOE may request supplemental funding for the remainder of fiscal year 1993, and that the new act's requirements may weigh heavily in budget decisions for fiscal year 1994.

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### **Opportunities May Exist to Shorten Review Process**

Opportunities may exist to streamline DOE's lengthy process for reviewing and approving prospective efficiency standards. According to the Director, DOE Office of Codes and Standards, implementing concurrent reviews of proposed Federal Register notices by DOE staff-level officials (attorneys, policy analysts, and environmental specialists) prior to reviews by senior DOE managers could achieve time savings of as much as 3 months.

The act requires DOE to solicit and consider public comments while the agency is analyzing prospective standards and selecting a final efficiency standard. Under this process, DOE prepares and publishes three separate notices in the Federal Register: (1) an advanced notice of proposed rulemaking to announce the appliance for which the standard is being established, (2) a notice of proposed rulemaking that describes the amended or proposed efficiency standard and identifies the impacts of the proposed standard, including the maximum energy savings that could be achieved, and (3) a final rule with a new final efficiency standard. DOE must respond to public comments on these notices; comments may concern such issues as whether a proposed standard has benefits that exceed its costs or whether it will achieve energy savings that are technologically feasible. According to DOE's Director, Office of Codes and Standards, it may take as long as 3 years to analyze efficient appliances and their associated efficiency standards, obtain and consider public comments, and establish new standards.

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<sup>6</sup>The budget dollars in this paragraph exclude program management costs and are nominal, not constant, dollars.

In order to ensure that top-level management agrees with proposed standards, DOE provides for internal review of each of the three notices (advanced notice of proposed rulemaking, notice of proposed rulemaking, and final rule) it publishes in the Federal Register. The Director of DOE's Office of Codes and Standards estimated that these three review cycles, which involve DOE's Offices of Policy, Environmental Affairs, General Counsel, Deputy Assistant Secretary for Building Technologies, and Assistant Secretary for Conservation and Renewable Energy, as well as the President's Office of Management of Budget, take about 300 working days (about 1.5 years) to complete.

The Director estimated that, by instituting concurrent reviews of draft Federal Register notices by working-level staff prior to review of draft notices by senior officials, DOE could save up to 20 working days for each draft notice, or 60 working days total (about 3 months). He noted that DOE has informally instituted some concurrent reviews and may continue to use them. The Deputy Assistant Secretary, Building Technologies, said that DOE views streamlining the internal review process as key to meeting statutory deadlines, along with other key factors such as obtaining sufficient budget and other resources for the appliance standards program.

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## Conclusions

DOE is required by statute to establish and/or update appliance efficiency standards by prescribed dates. The appliance standards program mandates the production and sale of more efficient appliances that replace less-efficient models. In this manner, the program can lower consumers' collective energy bills over time by billions of dollars from the bills that would result from continued production and sale of less efficient models. However, because DOE has not sought sufficient funding levels for the appliance standards program, it has missed statutory deadlines for updating efficiency standards. Streamlining DOE's internal reviews of proposed rules—for example, by using concurrent, rather than sequential, reviews—would also help to satisfy statutory deadlines. Because DOE will have to issue new standards for appliances covered by the Energy Policy Act of 1992, further delays in issuing standards may occur without remedial actions.

DOE officials have recognized the need to address the delays. For example, DOE officials stated that DOE is currently reassessing the funding levels of the appliance standards program in light of the requirements of the Energy Policy Act of 1992.

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## **Recommendations**

To help ensure compliance with the requirements for establishing appliance efficiency standards in both the Energy Policy and Conservation Act and the Energy Policy Act of 1992, GAO recommends that the Secretary of Energy (1) allocate resources, after appropriate consideration of competing priorities, that will enable the appliance standards program to comply with statutory deadlines, and (2) direct DOE staff to use concurrent steps whenever possible for internal reviews of proposed standards.

# FTC Has Not Resolved Concerns About the Effectiveness of the Labeling Program

Because FTC has not completed a comprehensive review of its appliance labeling program, it cannot be sure that appliance labels are effective in conveying information to consumers about the energy use, efficiency, and costs of appliances. Although FTC has long been aware of concerns regarding the effectiveness of the labeling program in conveying appliance energy efficiency and cost data to the public, the program has been largely unchanged since its 1979 inception.

In response to these concerns, FTC initiated a comprehensive review of the appliance labeling rules in 1988 and solicited public suggestions for improving the labeling program. However, the review has been subject to repeated delays. In February 1993, FTC officials estimated that the review would be complete in October 1993. According to the officials, the agency's efforts have been hampered by a growing workload and lack of resources.

## Labeling Program Is Directed at Assisting Consumer Decisions

The purpose of FTC's appliance labeling program is to allow consumers to compare energy efficiencies and estimated annual operating costs when making purchasing decisions among competing appliance brands and models. When considered along with the appliance purchase price, energy efficiency and cost information helps consumers determine which appliance model will be less expensive to own and operate over the long run.

Under the provisions of the act, FTC issued rules in 1979<sup>1</sup> for manufacturers to follow when preparing appliance labels. These rules govern the design, content, placement, and size of appliance labels. Specific labeling requirements vary among different types of appliances, reflecting perceived differences in the usefulness of energy efficiency and/or cost data to consumer purchasing decisions. Generally, under the act, appliance manufacturers must disclose an appliance's estimated annual operating cost on the label unless FTC determines that doing so would not be technologically feasible or economically justified, or would not effectively assist consumers in making informed purchasing decisions. In that case, the act requires that another measure of energy consumption, such as the energy efficiency rating, be displayed.

FTC does not require labels for kitchen ranges or ovens, microwave ovens, television sets, clothes dryers, or home heating equipment other than

<sup>1</sup>In 1987, FTC issued rules for informing consumers about the energy efficiency of central air conditioners. In 1989, FTC added labeling rules for fluorescent lamp ballasts.

furnaces. Because these appliances have relatively small differences in operating costs between brands and models, FTC determined that labels would be neither economically justified nor assist consumers in making purchase decisions. For fluorescent lamp ballasts and luminaires, FTC only requires that the products and their packaging be marked conspicuously with a capital letter "E" printed within a circle, which indicates that the device has conformed with federal efficiency standards but does not indicate the relative energy efficiency of these devices. In addition, according to an FTC official, although FTC does not currently require labeling for pool heaters, it plans to do so in the future.

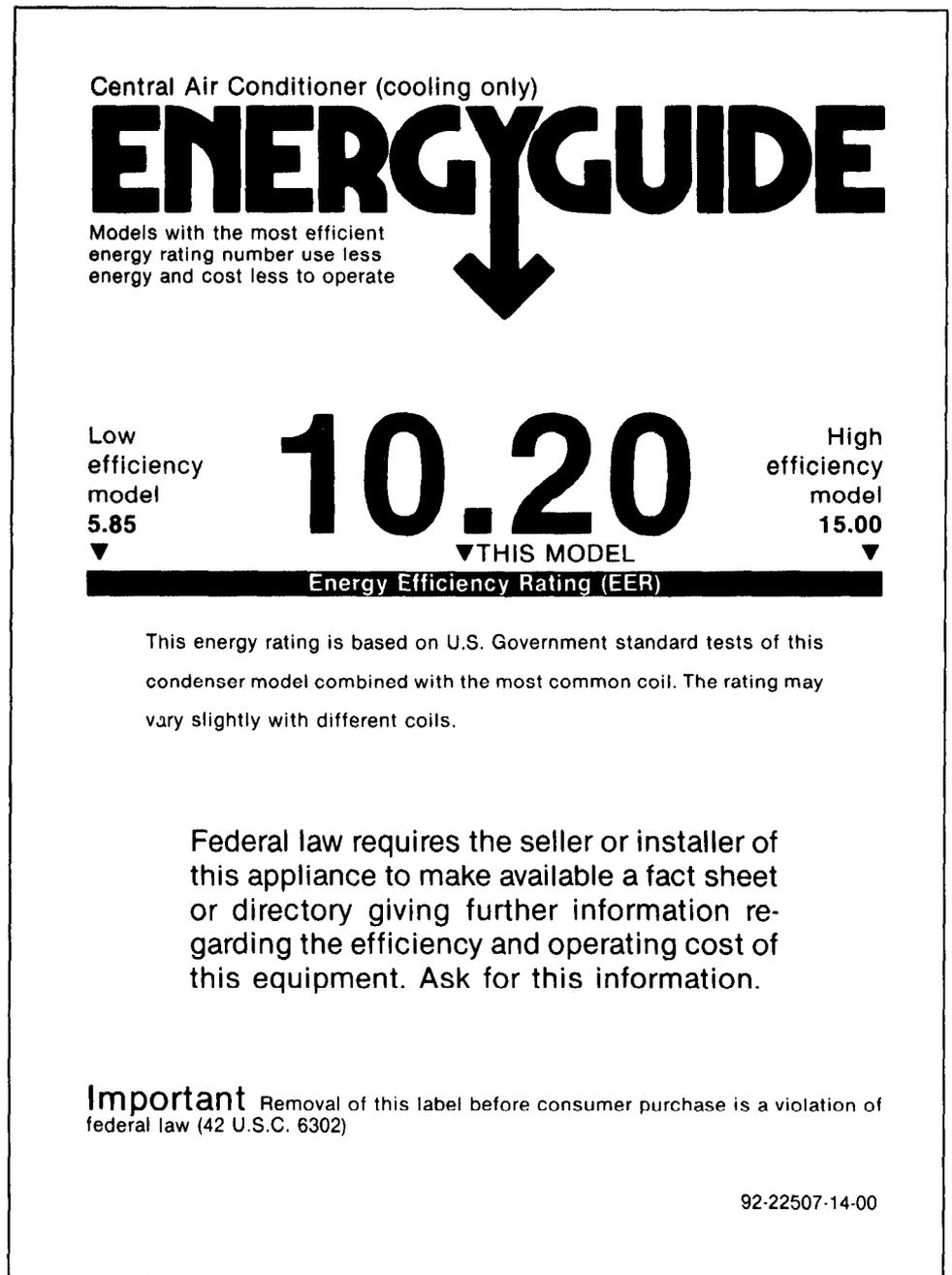
### Informing Consumers About Efficiency Ratings of Climate Control Appliances

FTC requires that labels for climate control appliances, including room air conditioners, central air conditioners, and heat pumps, provide information which allows consumers to compare the energy efficiency of the unit with the energy efficiency of competing models and brands. These labels do this by displaying the energy efficiency of the unit on a scale that shows the range of efficiency for all of the competing brands and models. For climate control appliances, FTC does not require that manufacturers disclose estimated dollar operating expenses to consumers as the primary energy usage disclosure. FTC has determined that doing so would be impractical because the use of these appliances—and consequently their operating costs—varies widely due to differing climate conditions in the United States. For these appliances, the energy efficiency rating is the primary disclosure; a cost grid or fact sheet provides the cost of operating the appliance as a secondary disclosure.

For room air conditioner labels, FTC requires a highlighted energy measure called the energy efficiency rating. Room air conditioners contain labels that also display a cost grid that allows consumers to calculate the appliance's yearly energy costs based on the local electric utility rate and yearly hours of use.

In addition to containing information about energy efficiency ratings, central air conditioner labels direct the consumer to ask for energy fact sheets or a directory for further information on an appliance's energy efficiency and operating costs. (See figure 3.1)

Figure 3.1: Label Displaying Energy  
Efficiency Rating



Furnace labels contain only general information on how to conserve energy in the home ("Energy Saving Tips") along with a statement

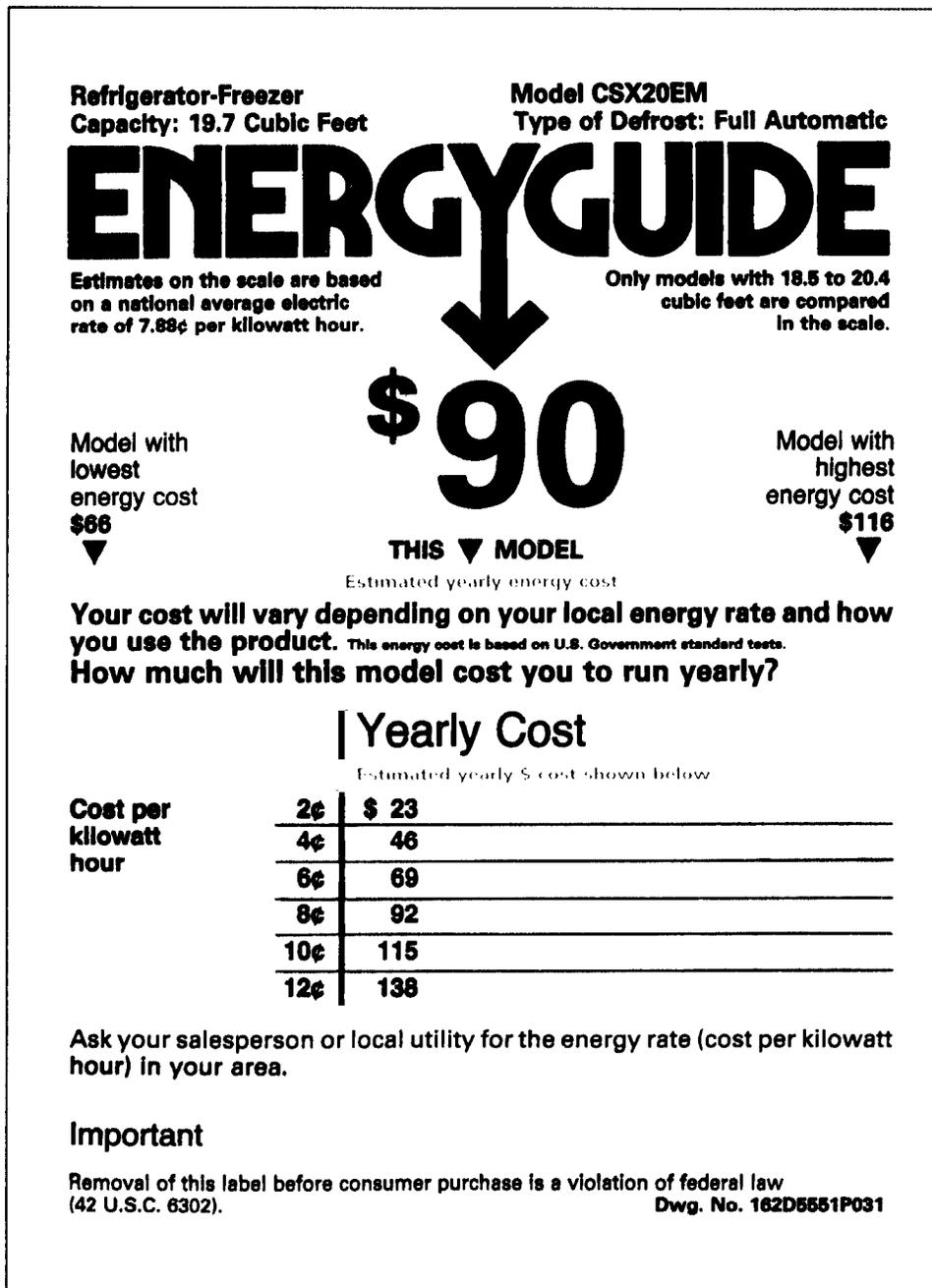
directing the consumer to energy fact sheets developed by the manufacturer. The manufacturers' fact sheets must contain furnace energy efficiency and cost information on specific models.

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**Informing Consumers**  
**About Annual Energy**  
**Costs of Other Appliances**

For other types of appliances—refrigerator-freezers, water heaters, clothes washers, and dishwashers—FTC requires “EnergyGuide” labels that disclose the estimated annual cost of operation in dollars (see figure 3.2). The highlighted cost figure is based on national average energy costs, and must be displayed on a scale illustrating the range of operating costs among competing brands. In addition, the label must display a cost grid that shows how an appliance’s annual operating costs would vary over a range of six different local utility rates. This range allows consumers to better estimate their personal costs to operate the appliance.

Figure 3.2: Label Displaying Estimated Annual Cost of Operation



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## Unresolved Concerns Exist About the Effectiveness of Labeling Rules

Although concerns about the information content and design format of appliance energy labels have been voiced to FTC since the early 1980s, the rules have remained largely unchanged. For example, a manufacturing association informed FTC in the early 1980's that furnace manufacturers should have the option to display energy efficiency information in a directory rather than in the required fact sheets.

On June 13, 1988, FTC initiated a review of the label content and format required under its appliance labeling rules. On October 2, 1992, FTC announced in the Federal Register that it expected to complete its comprehensive review of the appliance labeling rules by May 1993. However, on February 1, 1993, agency officials estimated that a final rule implementing changes in its labeling rules would not be expected until October 1993. According to FTC officials, their efforts to update appliance labeling rules have been hampered by a growing workload and limited resources.

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## Review Initiated in 1988 Has Been Repeatedly Delayed

In June 1988, FTC issued a notice of proposed rulemaking (NPR) that set forth 10 options for modifying labeling rules for various appliances. According to a Washington state official who commented on the proposed rule, an FTC official told her in March 1991 that FTC planned to solicit additional comments and issue revised label formats for public comment during the spring or summer of 1991. In July 1992, FTC staff members told us that they hoped to issue a second NPR in the summer of 1992—before they drafted a final rule—in order to obtain additional comments.

On October 2, 1992, the FTC announced, in the Federal Register, that by May 1993, it would publish a final rule that would implement changes in its labeling rules. However, the estimated date of issuing the final rules has been delayed. On February 1, 1992, FTC officials informed us that the final rule would likely be issued in October 1993. They said this would allow FTC staff the time to (1) issue a new NPR in March 1993, (2) solicit public comments for 45 days, (3) hold public hearings, (4) analyze the comments received and the results of the hearings and make any resulting changes to the draft rules, and (5) brief the Commission on the proposed final rules. FTC officials said that this time is also needed for the Commission to review the proposed final rules.

FTC staff explained that its efforts to complete the comprehensive review of the appliance labeling program have been hampered by resource limitations, a growing workload, and competing priorities. FTC officials

stated that the agency's workload has increased while the budget and staffing have not increased. Thus, FTC has had to delay completing efforts such as amending the labeling rules in order to complete other rulemakings. In addition, FTC staff told us that it is difficult to specify a completion date because the rulemaking process is "flexible" and can vary because of unanticipated circumstances, including the need to meet requests from the public to extend the public comment period for a hearing and other statutory rulemaking deadlines. For example, FTC's effort has been interrupted by other statutorily-mandated rulemakings, including those to issue new labeling rules for types of appliances that were not previously included in the labeling requirements.

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### Periodic Reviews Could Help Assure Labeling Program Effectiveness

Periodic reviews of the labeling program could improve the effectiveness of appliance labels in informing consumers about appliance energy use, efficiency, and costs. Such reviews could spur label improvements in response to changes in appliance technologies and/or consumer buying habits. FTC could amend the labeling rules to reflect the results of the periodic reviews.

According to FTC officials, FTC has maintained an informal policy to review the appliance labeling rules whenever necessary in light of (1) changes in the technology of appliances, (2) increasing burdens on industry as a result of the rules or new energy conservation measures sponsored by government or by utilities, or (3) difficulties experienced by FTC in administering a rule or communicating it to the public.

Responses to the 1988 NOPR, statements made by manufacturing officials, and a recent report by the Office of Technology Assessment (OTA) all indicate that concerns continue to exist about the effectiveness of FTC's labeling rules in informing consumers about the energy use, cost, and efficiency of appliances, and that these concerns suggest the need for periodic assessments of these rules.

- FTC acknowledged that displaying the estimated annual operating cost on some appliance labels may be confusing and inappropriate, and the agency solicited comments on whether another energy disclosure would more effectively convey information to consumers. In responding to this solicitation, the Coalition for Energy Efficient Appliance Labeling<sup>2</sup> stated in 1988 that FTC understood that energy cost information may undermine the

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<sup>2</sup>A coalition of state and municipal offices, utilities, and manufacturing, environmental, and other groups.

credibility and usefulness of labels in the eyes of consumers. The coalition noted that providing consumers with energy use information on labels may provide them with outdated information because energy costs change yearly but appliance labels rarely change. Instead, the coalition favored expressing appliance energy use in terms of units of energy, such as kilowatt hours, used over the course of a year, as well as a range of efficiencies for similar products and a cost grid.

- In a 1992 report,<sup>3</sup> OTA noted that FTC criteria for determining the merits of labeling may be inadequate because they fail to assess potential technological and product improvements. OTA observed that the continued use of appliance energy labels could exert a greater market pressure toward spurring appliance efficiency improvements than updating the standards would; alternatively, continued use of labels could represent an unwarranted administrative cost in a market that may become relatively uniform in terms of appliance efficiency and operating costs.
- FTC has exempted certain products from its labeling rules. OTA noted that, although the exemptions for such appliances as televisions and kitchen ranges and ovens were well-founded, FTC's decision to exempt clothes dryers and heating equipment other than furnaces was based on information dating to 1979 about appliance efficiency and operating costs. Improvements in appliance operations, therefore, should be reflected in FTC labeling rules.

In responding to the 1988 NOPR, the Coalition for Energy Efficient Appliance Labeling commented that because of FTC's record of delaying completion of the review and amendment process, and because of concerns that existed about the effectiveness of the labeling rules, FTC should institute a periodic process, with specific deadlines, for reviewing the labeling rules. OTA also noted the benefits of regularly evaluating appliance labeling requirements. According to OTA, the value and impact of appliance labeling remains poorly understood because the program has not been regularly evaluated.

According to an FTC official, FTC believes that periodic reviews are necessary in order to ensure that the labeling rules remain current with changes in such factors as laws, market conditions, and technologies.

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## Observations

The purpose of the labeling program is to effectively assist consumers in making purchasing decisions. Because FTC has not systematically reviewed

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<sup>3</sup>Building Energy Efficiency, Office of Technology Assessment, OTA-E-518, (Washington, DC: GPO, May 1992).

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**Chapter 3**  
**FTC Has Not Resolved Concerns About the**  
**Effectiveness of the Labeling Program**

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the program, it has little assurance that the program is achieving this purpose. Although FTC has long been aware that concerns exist about the effectiveness of the appliance labeling rules, its efforts to respond to these concerns have been repeatedly delayed. Completing the rulemaking initiated in 1988 may result in modifications to appliance labels that would more effectively provide information to consumers about appliance energy efficiency and costs.

# Efforts to Assure Accuracy of Appliance Efficiency Ratings Can Be Improved

DOE and FTC are responsible, respectively, for ensuring that appliances sold in the United States comply with federal appliance energy efficiency standards and that the energy efficiency information on appliance labels is accurate. However, neither agency systematically tests or verifies the accuracy of the appliance efficiency data claimed by appliance manufacturers. Instead, the agencies rely primarily upon appliance efficiency certification programs administered by manufacturing associations that validate the accuracy of energy efficiency claimed by manufacturers.

Manufacturing association programs, however, do not certify the energy efficiency of all types of appliances that are subject to performance efficiency standards. We did not attempt to determine the extent of noncompliance with performance efficiency standards; however, we found that cases investigated by the DOE, the California Energy Commission, and others have shown that claimed energy efficiency ratings either did not conform to federal efficiency standards or were otherwise inaccurate.

## DOE and FTC Verification Efforts Are Limited

Although the Energy Policy and Conservation Act grants DOE specific powers to enforce compliance with federal efficiency standards and grants FTC specific powers to promote accurate reporting of energy efficiency information, neither DOE nor FTC have systematic means of monitoring and investigating the accuracy of claimed appliance energy efficiency ratings or ensuring that appliances comply with federal efficiency standards. Except in one instance, DOE and FTC have learned of cases where appliances did not satisfy efficiency standards or of inaccurate label efficiency information only after being alerted by other organizations, such as competing manufacturers and state energy offices.

## DOE and FTC Do Not Independently Verify Efficiency Claims

Under the act, both FTC and DOE may exercise specific authorities in order to ensure compliance with federal efficiency standards and to promote accurate reporting of appliance energy efficiency and use information. Specifically, FTC requests, and manufacturers furnish, appliance energy consumption data that was derived from DOE-approved test procedures. The Secretary of Energy may require manufacturers to submit to DOE reports on appliance energy efficiency and energy use in order to assist DOE in ensuring compliance with the act, and to help analyze prospective standards and revise test procedures. Both DOE and FTC officials may observe ongoing appliance testing by manufacturers and may inspect documentation of test results. In addition, DOE can request, and

manufacturers must furnish, a reasonable number of units of an appliance for testing. (Manufacturers furnish appliances at their expense, while the federal government pays for the testing.)

Although authorized to do so by the act, we found that DOE and FTC have never independently monitored and investigated the accuracy of the appliance energy efficiency claimed by manufacturers. In addition, FTC and DOE officials have never conducted on-site inspections of appliance testing for enforcement purposes. Agency officials said they are not aware of many instances of noncompliance with federal appliance efficiency standards or inaccurate energy efficiency claims. DOE officials also said that they do not have the necessary staff and budget resources to undertake more vigorous enforcement programs. The Director, DOE Office of Codes and Standards, said that in his view using his scarce resources to analyze and select stricter efficiency standards is more important than conducting expanded enforcement activities.

FTC officials responsible for the appliance efficiency labeling program also cited a lack of resources. According to these officials, the FTC division that is responsible for labeling rules has staff of no more than 12; this division is also responsible for such rules as those pertaining to advertising through the mail, home insulation values, used car sales, door-to-door sales, and packaging and textile labeling. An FTC official responsible for appliance labeling rules noted that with no increase in staff, FTC has had to take on additional rule-makings in other areas.

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### **DOE and FTC Rely on Manufacturing Association Certification Programs**

Rather than relying on extensive in-house programs to ensure compliance with federal appliance standards and accurate reporting of appliance energy use and efficiency information, DOE and FTC rely upon manufacturing association certification programs that validate the accuracy of appliance energy efficiency claimed by manufacturers. In order to calculate the claimed energy efficiency of their appliances, manufacturers first apply DOE-approved appliance test procedures. Manufacturers use the test results information to prepare appliance efficiency labels and to make claims about the energy efficiency of their appliances in product catalogues and in advertisements.

Subsequently, partly as a self-policing mechanism to ensure the accuracy of manufacturers' claims about energy efficiency, manufacturing associations implement certification programs to independently test the energy efficiency of randomly selected appliances at ETL Testing

Laboratories, Inc. Most appliance manufacturers belong to appliance manufacturing associations such as the Gas Appliance Manufacturers Association, the Air Conditioning and Refrigeration Institute, and the Association of Home Appliance Manufacturers. Manufacturing association certification programs are paid for through an assessment on each appliance shipped. The certification programs focus on new appliances, but test older or existing models on a cyclical basis. For example, one manufacturing association certifies the claimed energy efficiency of about 1,200 new and existing models of central air conditioners and heat pumps per year.

The associations publish catalogues that contain information about the products manufactured by their member companies, including energy use and efficiency data. The catalogues indicate instances in which ETL test results are found to be inconsistent with a manufacturer's claim for a product. These catalogues are sent to DOE and FTC to inform these agencies about appliances' claimed efficiencies.

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### DOE and FTC Also Rely on Reports From Competitors and State Organizations

In detecting possibly inaccurate claimed efficiency information or noncompliance with federal appliance efficiency standards and labeling requirements, DOE and FTC rely on ad hoc reports from parties like competing manufacturers and state energy offices. For example, according to FTC officials, FTC has conducted investigations on five separate occasions of alleged instances of inaccurate claimed energy efficiency information or noncompliance with labeling rules. However, in four of these cases, FTC personnel discovered the alleged violations after being informed by two consumers, a trade association, and the responsible manufacturer when it found that it had committed inadvertent errors in applying labeling rules. According to an FTC official, in one case she discovered that a label for a water heater was inaccurate after she purchased an appliance that did not perform as advertised on the label.

Similarly, DOE officials identified six alleged instances of inaccurate claimed efficiency information or noncompliance with federal efficiency standards that they became aware of after being informed by outside sources such as competing manufacturers, consumers, and the California Energy Commission.

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## Current DOE and FTC Efforts Do Not Ensure Compliance With Standards

Although manufacturing association programs are potentially effective deterrents to inaccurate efficiency claims, these programs do not systematically ensure that appliances meet federal efficiency standards. We did not attempt to determine the extent of noncompliance with performance efficiency standards; however, we found cases that were investigated by DOE, the California Energy Commission, and others, which show that claimed energy efficiency information either did not conform with federal efficiency standards or was otherwise inaccurate.

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## Association Programs Do Not Provide Comprehensive Information

Manufacturing association programs can help to ensure that, for the appliances they cover, claimed energy efficiency information is accurate and appliances are as efficient as required by federal appliance efficiency standards. However, these programs do not cover all appliances that are regulated by DOE performance standards. Also, they do not directly test the efficiency of all appliances they cover or certify the accuracy of the claimed efficiency of these appliances. Moreover, DOE does not currently receive the actual ETL test results.

## Programs Do Not Cover All Appliances

Manufacturing association certification programs currently cover only five of the eight types of appliances that are subject to performance standards: (1) central air conditioners and heat pumps, (2) direct heating equipment, (3) furnaces, (4) water heaters, and (5) fluorescent light ballasts. For these appliances, ETL actually tests a sampled unit's energy consumption or efficiency level and compares the ETL test results with the manufacturer's claimed energy efficiency. Manufacturing association officials said that they do not certify the claimed energy efficiency of all products affected by performance standards because there have been few complaints about inaccurate claimed efficiency information.

For refrigerator-freezers and room air conditioners, which are also covered by the act's performance efficiency standards, ETL technicians verify only the key components that affect an appliance's energy efficiency, rather than verifying the actual energy efficiency for the manufacturing association program. Manufacturing association officials stated that beginning in 1993, ETL will test room air conditioners to measure actual energy efficiency. However, for refrigerator-freezers, ETL only measures the refrigerated volume or total shelf area. ETL then arithmetically estimates the tested unit's energy efficiency level. According to the catalogue for refrigerator-freezers, the manufacturing association only certifies the accuracy of total refrigerated volume for refrigerators and upright freezers, and only certifies the accuracy of total refrigerated

volume ratings for chest freezers. The catalogue states that the manufacturing association's seal of certification does not indicate that other features or performance factors (including annual energy consumption) have been certified. Pool heaters, which are also subject to performance standards, are not covered at all by manufacturing association certification programs, according to manufacturing association officials; however, the officials said that the association would be willing to include pool heaters.

During our review, we found instances in which appliances not subject to direct energy efficiency testing by manufacturing association certification programs were found to have inaccurate claimed energy efficiency information, including one type of appliance that did not satisfy federal efficiency standards. For example, in a 1992 study of refrigerator-freezer energy efficiency, the Empire State Electric Energy Research Corporation,<sup>1</sup> among others, determined that in 12 cases the claimed efficiency level overstated actual energy efficiency by amounts ranging from less than 1 percent to over 11 percent. In 11 other cases, the claimed efficiency understated actual appliance energy efficiency by amounts ranging from 1.43 percent to 10.9 percent. (One refrigerator-freezer model was determined to have accurate claimed energy efficiency.) Overall, the average claimed efficiency of all 24 refrigerator-freezers was overstated by 5.67 percent. In another example, the California Energy Commission found in a 1992 test that only 4 of 15 pool heaters tested passed the federal efficiency standard of 78 percent thermal efficiency. DOE's Office of Codes and Standards has not taken action regarding this finding.<sup>2</sup>

**Programs Do Not Provide DOE  
With Actual Test Results**

DOE does not receive the test data from manufacturing association tests, but rather the claimed energy efficiency of appliances that are conveyed to them in manufacturing association product catalogues. The efficiency level claimed in the catalogs (and on labels) is what the manufacturing association programs are intended to verify.

According to DOE and manufacturing association officials, the testing programs allow deviations of up to 5 percent of the efficiency level claimed by the manufacturer. As long as the ETL-tested value falls within this 5 percent margin, the manufacturer is not required to revise the appliance's claimed efficiency. Manufacturing association officials explained that some differences in test results are to be expected because

<sup>1</sup>The research and development arm of New York state electric utilities.

<sup>2</sup>FTC is not yet responsible for the accuracy of labeling information for pool heaters because it has not issued rules requiring labeling for these devices.

(1) even with quality assurance techniques, all units or components of a particular model are not identical in performance, and (2) efficiency measurements differ from one laboratory to the next, and from one test to another, even if the tests are conducted at the same laboratory. According to a manufacturing association official, the 5-percent margin of error is based on historical practices for addressing these types of deviations.

However, because of the tolerance margin, cases could exist in which manufacturing association certification programs do not publicly identify a tested efficiency level that does not meet federal standards—albeit by a very small amount. (This would probably only occur in instances in which the claimed efficiency level equals, or just exceeds, the federal minimum efficiency standard.)

According to the DOE official responsible for the appliance standards program, viewing test results data could help identify patterns or recurrent instances of test values that might not meet federal standards. This information could potentially identify cases that DOE should investigate to help assure compliance with the standards. Officials from two manufacturing associations said that they would be amenable to supplying some form of test results data. Officials from one manufacturing association did not favor supplying this data to DOE.

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### Effectiveness of Reliance on Reports From Outside Parties Is Unknown

In promoting compliance with federal efficiency standards and accurate claimed energy efficiency information, DOE also relies upon *ad hoc* reports from such sources as competing manufacturers, consumers, and the California Energy Commission to detect and report inaccurate appliance efficiency claims. In our view, although these measures may be effective deterrents to inaccurate efficiency claims, the measures are neither systematic nor necessarily comprehensive. DOE receives these reports sporadically; thus DOE has no systematic coverage of all appliances that are subject to appliance standards.

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### Conclusions

Although the extent of noncompliance with federal appliance energy efficiency standards is unknown, current DOE and FTC practices do not systematically ensure compliance. DOE relies upon industry certification programs to promote accurate reporting of energy efficiency, but the programs (1) are not designed primarily to ensure compliance with federal standards and (2) do not certify the claimed energy efficiency of all appliances covered by the standards. DOE's ability to detect cases where

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appliances do not satisfy federal efficiency standards would be enhanced if the programs provided DOE with actual test result data.

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## **Recommendation**

To help ensure compliance with federal appliance energy efficiency standards and accurate reporting of efficiency levels, we recommend that the Secretary of Energy ask manufacturing associations to test and certify the claimed energy efficiency levels of all appliances that are subject to performance efficiency standards. To assist DOE officials in identifying patterns or recurrent instances of test values that do not meet federal standards, we recommend that the Secretary ask the manufacturing associations to provide DOE with actual test results data.

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# History of the Appliance Standards Program

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The 1975 Energy Policy and Conservation Act (P.L. 94-163) required DOE's predecessor organization, the Federal Energy Administration (FEA), to establish energy efficiency targets for 13 types of household appliances. With 1972 energy efficiency levels as a baseline, the targets were to result in a 20-percent energy efficiency gain by 1980. Manufacturers were encouraged, but not required, to meet the target standards in the aggregate for the 13 types of appliances. However, the FEA Administrator was authorized to prescribe mandatory energy efficiency standards if the Administrator determined that appliances were unlikely to meet the voluntary targets.

The 1978 National Energy Conservation Policy Act (P.L. 95-619) amended the act by requiring DOE to prescribe mandatory energy efficiency standards for covered household appliances if, among other things, efficiency standards would result in a substantial, technically feasible, and economically justified improvement in energy efficiency. According to the Director, DOE Office of Codes and Standards, the administration and the Congress supported the enactment of P.L. 95-619 because of the oil price increases of the 1970s. In fiscal year 1980, the appliance standards program was funded at about \$11 million dollars.<sup>1</sup>

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## Mandatory Standards Were Questioned

Reflecting a belief that rising energy prices and federal tax credits alone would encourage appliance manufacturers to produce more efficient products, for fiscal years 1982 and 1983, the DOE budget proposed no funding for the appliance efficiency standards program. However, the Congress continued to fund the program, albeit at reduced levels (from fiscal years 1982 to 1992, funding ranged from about \$2 million to \$3 million in constant 1992 dollars).

In 1982, DOE issued what came to be called the "no-standard standard," a determination that no appliance efficiency standard would meet the criteria specified in the act as amended—that is, would result in significant energy savings and would be economically justified. Environmental organizations and state energy offices opposed the "no-standard standard," and in 1983 they filed suit against DOE in the U.S. Court of Appeals, District of Columbia Circuit. In 1985, the Court ruled against DOE, stating that when the Congress passed and amended the act, it intended for DOE to investigate all technologically feasible improvements in appliance efficiency, to fairly assess the economic benefits and burdens of these

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<sup>1</sup>Expressed in 1992 dollars.

improvements, and to prescribe standards that would result in significant savings.<sup>2</sup>

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**Existing Legislation  
Establishes Specific  
Efficiency Standards and  
Time Frames**

In the absence of federal standards in the mid-1980s, some states—including New York and California—implemented statewide standards for appliances. According to DOE, manufacturing association, and state officials, the Congress enacted the National Appliance Energy Conservation Act of 1987 (P.L. 100-12) in part to avoid conflicting state standards and to revitalize the federal program. This law further amended the act by (1) establishing specific, mandatory appliance efficiency standards for 12 categories of household appliances<sup>3</sup> and (2) requiring DOE to periodically review the standards and to make them more stringent if the Secretary of Energy determines that more stringent standards are technically feasible and economically justified. The Secretary may not make the standards less stringent. The National Appliance Energy Conservation Amendments of 1988 (P.L. 100-357) added standards for fluorescent lamp ballasts.

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<sup>2</sup>Natural Resources Defense Council, Inc. v. Herrington, 768 F.2d, 1355, 1433 (D.C.Cir. 1985).

<sup>3</sup>The legislation also requires DOE to determine if efficiency standards are needed for televisions but it does not establish such standards.

# Types of Appliances, Standards, and Deadlines for Amending Standards Under the Energy Policy and Conservation Act

Type of appliance	Are there standards specified in the act?	Effective dates of standards specified in the act	Deadlines for DOE to amend appliance standards
Refrigerator-freezers	Yes.	Jan. 1, 1990	By July 1, 1989. But if standards were established after Jan. 1, 1990, then the California standards could not be preempted by the federal standards.
Furnaces	Yes, except that DOE had to issue entirely new standards for small furnaces.	Jan. 1, 1992 for most furnaces; Sept. 1, 1990 for mobile home furnaces.	For small furnaces: Jan. 1, 1989, and after Jan. 1, 1997 but no later than Jan. 1, 2007. For mobile home furnaces: Jan. 1, 1992, Jan. 1, 1994, and after Jan. 1, 1997 but no later than Jan. 1, 2007.
Dishwashers, clothes washers, and clothes dryers	Yes, design standards.	Jan. 1, 1988	New standards by Jan. 1, 1990, to be updated in 5 years.
Pool heaters, direct heating equipment, and water heaters	Yes.	Jan. 1, 1990	Jan. 1, 1992, and Jan. 1, 2000.
Room air conditioners	Yes.	Jan. 1, 1990	Jan. 1, 1992, to be updated in 5 years.
Fluorescent light ballasts	Yes.	Effective for certain types of ballasts made on or after Jan. 1, 1990, that are sold on or after April 1, 1990.	Jan. 1, 1992, to be updated in 5 years.
Kitchen ranges and ovens	Yes, design standards.	Jan. 1, 1990	New standards by Jan. 1, 1992, to be updated by Jan. 1, 1997.
Central air conditioners and heat pumps	Yes.	Jan. 1, 1992 for split 1, 1993 for package systems.	By Jan. 1, 1994, and after Jan. systems, Jan. 1, 1994 but no later than Jan. 1, 2001.
Television sets	None—DOE may issue new standards at its discretion.	None.	None.

# Types of Appliances, Standards, and Deadlines for Amending the Standards Under the Energy Policy Act of 1992

Type of appliance	Are there standards specified in the act?	Effective dates of standards specified in the act	Deadlines for DOE to amend appliance standards
Commercial and industrial climate control equipment, including large and small package and split air conditioning and heating equipment, warm air furnaces, package boilers, instant water heaters, and unfired hot water storage tanks	Yes.	Jan. 1, 1994, except Jan. 1, 1995 for large package air conditioners and heating equipment.	None, unless the American Society of Heating, Refrigerating, and Air Conditioning Engineers amends its efficiency standards.
Commercial and industrial electric motors	Yes.	5 years after law is passed.	2 years after standards in the law go into effect.
General service fluorescent and incandescent reflector lamps	Yes.	18 or 36 months after law is passed, depending on type of model.	Within 54 months and then within 9.5 years after the law is enacted.
Plumbing products including showerheads, faucets, water closets, and urinals, excluding safety showerheads	Yes.	Jan. 1, 1994 in general. However, effective dates are Jan. 1, 1994 or Jan. 1, 1997 for some types of water closets or urinals.	None specified in the act. However, if the American Society of Mechanical Engineers or American National Standards Institute amend their standards, then DOE shall publish standards within 12 months.
High discharge lamps and distribution transformers	None specified. However, if DOE determines that standards are needed, then DOE issues test rules 30 months after law is passed, and standards 3 years thereafter. DOE also issues labeling rules.	3 years after DOE issues standards.	None, except DOE is to report to Congress on the need for more efficient transformer designs 18 months after law is passed.
Small electric motors	None specified. However, if DOE determines that standards are needed, then DOE issues test rules 30 months after law is passed, and standards 18 months thereafter. DOE also issues labeling rules.	60 - 84 months after standards are issued.	None.

# DOE Methodology for Determining Appliance Efficiency Ratings

The Energy Policy and Conservation Act, as amended, specifies that DOE prescribe test procedures for manufacturers to use that are “reasonably designed” to measure energy efficiency, energy use, or estimated operating costs of appliances, yet not “unduly burdensome” to conduct. (Testing the energy use and efficiency of some appliances can be very expensive. Testing central air conditioners, for example, can cost as much as \$6,300 per unit.) In attempting to satisfy this provision, DOE has established procedures that allow manufacturers to test as few as two units. According to appliance manufacturing association officials, testing small samples can yield accurate efficiency ratings because industrial production techniques assure that little variance exists between units of a particular model.

DOE procedures also provide manufacturers with the method for calculating the measure of energy consumption values, regardless of sample size. Generally, the procedures allow manufacturers to choose between the actual mean value of a sample, or the adjusted mean value, as follows.

1. A sample of units of a specific model is selected and each unit is tested. A simple average of the values is calculated; this is the actual mean value of the sample.
2. An adjusted mean value of the sample is calculated by dividing the upper confidence limit of the true mean by a divisor (D).
3. If the measure of energy consumption is one for which consumers would favor lower values—such as estimated annual operating cost or annual energy consumption—then the manufacturer’s claimed value must be no less than the higher of the actual mean of the sample or the adjusted mean.
4. If the measure of energy consumption is one for which consumers would favor higher values—such as energy efficiency—then the manufacturer’s claimed value must be no greater than the lower of the actual calculated mean of the sample or the adjusted mean (in this case, the lower confidence limit of the true mean divided by divisor “D”).
5. The manufacturer may sample additional units of the same specific model in order to gain greater confidence about the precision of the rating, still selecting either the calculated mean or the adjusted mean described above.

The following hypothetical example illustrates how a refrigerator manufacturer might apply the DOE procedures to estimate annual electricity consumption of two units. In this case, because the relevant measure of energy use is kilowatt-hours consumed per year, the consumer would favor a lower numerical value.

1. The test results of two units show that unit 1 will annually use 820 kilowatt-hours while unit 2 will use 806 kilowatt-hours.

2. The actual sample mean ( $\bar{X}$ ) is 813 kilowatt-hours:

$$\bar{X} = \frac{(820 + 806)}{2} = 813.$$

3. The standard deviation (S) is 9.9 kilowatt-hours:

$$S = \sqrt{\frac{(820-813)^2 + (806-813)^2}{(2-1)}} = 9.9.$$

The standard deviation is an indicator of how close the actual (tested) measures of energy consumption of additional units are likely to be to the actual sample mean (or, stated another way, how likely the actual sample accurately represents all other units).

4. Using standard statistical techniques, the upper confidence limit (UCL) is calculated to be 857 kilowatt-hours.

At the 95-percent confidence level and N = 2 units, t = 6.314:

$$UCL = 813 + \frac{(6.314 \times 9.9)}{\sqrt{2}} = 857.$$

The t-statistic is used to test hypotheses when sample sizes are very small and the standard deviation of the population at large is unknown.

5. The UCL is divided by the divisor (D) to calculate the adjusted mean value:

$$\frac{UCL}{D} = \frac{857}{1.1} = 779.$$

6. Because in this case the adjusted mean (UCL/D = 779 kilowatt-hours) is less than the actual sample mean ( $\bar{X}$  = 813 kilowatt-hours), the manufacturer claims that the refrigerator model will annually consume 813 kilowatt-hours of electricity. In this case, no further testing is required.

If the adjusted mean had been greater than the sample mean, then the adjusted mean would be the measure of annual electricity consumption. Again, no further testing would be required. However, the testing of additional units would probably result in a lower value for UCL and thus for UCL/D. This would yield a lower value for the estimated annual electricity consumption.

# List of Organizations Contacted by GAO

<b>Federal Agencies</b>	Environmental Protection Agency Federal Trade Commission U.S. Department of Commerce, National Institute for Standards and Technology U.S. Department of Energy
<b>Appliance Manufacturing Associations</b>	Air Conditioning and Refrigeration Institute Association of Home Appliance Manufacturers Gas Appliance Manufacturers Association Certified Ballast Manufacturers
<b>Consumer Organizations</b>	Consumer Federation of America Consumers Union National Consumers Law Center National Consumers League
<b>Environmental and Energy-Efficiency Groups</b>	Alliance to Save Energy American Council for an Energy Efficient Economy Natural Resources Defense Council
<b>Laboratories</b>	ETL Testing Laboratories, Inc. Lawrence Berkeley Laboratory, University of California
<b>State Energy Agencies and Related Organizations</b>	California Energy Commission Coalition for Energy Efficient Appliance Labeling Massachusetts State Energy Office National Association of State Energy Officials National Association of Regulatory Utility Commissioners New York State Energy Office Washington State Energy Office
<b>Utility Groups</b>	American Gas Association Edison Electric Institute Electric Power Research Institute Pacific Gas and Electric Company

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**Appendix V**  
**List of Organizations Contacted by GAO**

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**Standards Development  
and and Accreditation  
Organizations**

**American National Standards Institute**  
**American Society of Heating, Refrigeration, and Air Conditioning  
Engineers**

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