10. Energy Programs and Policies that Complement Labels and Standards

Guidebook Prescriptions for Designing Comprehensive Energy Programs and Policies

1. **Combine labels and standards with other policy instruments, including incentives, financing, government buying power, marketing, and consumer education.**
2. **Find the right mix of these policy tools to match energy-efficiency objectives and market conditions, and then continue to adjust that mix as conditions change and lessons are learned.**
3. **Draw on the same infrastructure—technology and market information, analyses, and energy testing/rating—to support labels and standards as well as other policy instruments.**
4. **Create well-planned strategies to permanently transform specific markets toward increased sales of energy-efficient products. Consider energy-efficiency labels and standards as part of the overall strategy, and be sure to include an exit strategy that phases out government intervention.**

10.1 Developing a Program Portfolio: Regulatory Plus Market-Based Programs

This chapter discusses how labels and standards interact with other energy-efficiency policies and programs and how best to combine and sequence these programs to create an effective, sustainable market-transformation process. We do not attempt to provide a comprehensive listing of the many possible policy instruments to help increase efficiency and transform markets, nor do we intend to provide a "how-to" manual for designing or implementing any of the policy measures discussed. We do not even suggest priorities or an order of adoption because these depend heavily on local situations. Instead, we select a few promising policy examples and illustrate for implementers of efficiency labels and standards the value of designing them to help facilitate other measures.

10.2 Policy Objectives

Government policy instruments, including efficiency labels and standards, can be designed to achieve any of six sub-objectives that support the overall objective of accelerating the penetration of energy-

efficient technology in the marketplace and meeting other national goals. The sub-objectives correspond to six steps in the flow of energy-consuming products from manufacturers to users. These steps include:

- technology advances
- product development and manufacturing
- supply, distribution, and wholesale purchasing
- retail purchasing
- system design and installation
- operation and maintenance

The matrix in Table 10-1 summarizes how eight policy instruments can address each of the six sub-objectives. The table not only shows the linkages between the policy instruments and the objectives but also the organization of this chapter. First, the sub-objectives are discussed in subsections 10.2.1 through 10.2.5. Then, the policy instruments are discussed in subsections 10.3.1 through 10.3.8.

Table 10-1 **Policy Objectives and Program and Policy Instruments**

This matrix summarizes how various policy instruments can influence key policy objectives.

	Research and Development	Pricing and Metering	Incentives and Financing	Regulatory (Labels, Standards)	Voluntary Programs	Government Purchasing	Energy Audits, Retrofits	onsumer Education, Information
Stimulate new technology*	H	L	M	M	M	M	—	—
Influence development and manufacturing	H	M	M	H	M	M	—	M
Influence supply, distribution, and wholesale purchasing	—	—	H	H	M	M	L	M
Influence retail purchasing	—	M	H	H	M	L	L	M
Influence system design, installation		L	—	—	L	L	H	L
Influence operation and maintenance	—	M	—	—	L	L	H	M

**improve performance or lower production costs*

Notes: *H = high potential M = medium potential L = low potential*

Usually, governments will use several policy instruments; a combination of measures is often most effective. A concept that has become important in the United States (U.S.), the European Union (E.U.), and some other countries is market transformation, which calls for specific interventions for a limited period, leading to a lasting shift in market structure and to greater energy efficiency (Suozzo and Nadel 1996). This subject is addressed in subsection 10.4.1 below. There is growing interest in applying market-transformation principles to energy efficiency in developing countries (MMEE 1999).

10.2.1 Stimulating New Technology

Although most market transformation programs and policies focus on increasing the use of today's commercially available technologies, it is also important to stimulate the introduction of improved technologies. Desirable new technologies may be more energy efficient than current ones, or less costly with similar efficiencies, or better adapted to local conditions. They may also perform well in non-energy terms that are attractive to buyers (e.g., reliability, safety, low maintenance). Policy strategies that can help speed the introduction of new technologies include:

- support for research and development to create new products or their components
- design (or revision) of energy-test methods to reflect and accommodate technical innovation
- organization of buyer demand to expand the market for available high-performing products and induce manufacturers to introduce new products

The second of these policy instruments, test procedure design/revision, may be a step in a standards-setting or labeling program or it may be undertaken to support other energy-efficiency programs. Either way, the considerations are the same and are discussed in Chapter 4. The third policy instrument, often termed "technology procurement," is best undertaken by setting a target for efficiency improvement. Although there is no set formula for the third policy strategy listed above (a technology procurement project), such projects typically involve organizing a group of large-volume buyers who, with the assistance of a technical organization, define technical performance and cost specifications for a new product they would like to see made available. Such specifications might focus on exceeding the minimum standard by, say, 30%, as in the example of Sweden's NUTEK refrigerator program. The buyers' group's interest in the new product is communicated to potential suppliers via an open solicitation for proposals. The suppliers then compete for the opportunity to supply the product to the initial buyers' group as well as others. This process helps reduce the risk to suppliers of introducing a new product and allows buyers to specify exactly what they are willing to buy without being limited to products already on the market. (See insert: *Technology Procurement: A Tool to Speed Introduction of a New Technology* on next page.)

10.2.2 Influencing Product Development and Manufacturing

Buyers can only choose to buy energy-efficient products that someone else has decided to produce and offer for sale. In many developing countries or subsectors of the economy, efficient products may not even be offered or may be available only as a custom order, as an imported option with long delivery

Technology Procurement: A Tool to Speed Introduction of a New Technology

A number of countries have used technology procurement to speed the introduction of new energy-efficient technologies to their markets. Technology procurement uses the aggregated buying power of several large-volume purchasers to establish market demand for new products and to clearly communicate this demand to potential suppliers. Technology procurement for energy-efficient products was pioneered and refined by the Swedish National Board for Industrial and Technical Development (NUTEK), now the Swedish Energy Administration (STEM) and subsequently used by a number of countries, including the Netherlands, Finland, and the U.S.

Examples:

1. As early as 1989, the Swedish Energy Authority, later NUTEK, formed a group of housing companies (municipality-owned social housing and cooperatives and a major part of the leading privately owned market) for a multi-year program which would use technology procurement to inspire innovation and introduce more-efficient products and systems. Over a number of years, NUTEK's housing companies purchased energy-efficient products, starting with energy-efficient refrigerators (30% more energy efficient than current models, CFC-free, and with labels showing actual energy use) and followed by electronic ballasts for lighting, energy-efficient clothes washers and dryers, and efficient windows that save 60% more energy than standard triple-glazed Swedish windows (Westling, 2000, 2001).

2. Starting in 1995, the New York Power Authority cooperated with the New York City Housing Authority and other public-housing authorities to create a technology procurement project for new refrigerators that would use 30% less electricity than those already on the market. The aggregated demand of several public-housing authorities convinced Maytag Corporation, the winning bidder, to invest in new refrigerator manufacturing capacity for its high-efficiency models.

3. The International Energy Agency's Annex on Demand-Side Management has sponsored technology-procurement projects for electric motors, heat-pump dryers, light-emitting diode (LED) traffic signals, and digital multifunction office copiers.

4. The U.S., Pacific Northwest National Laboratory evaluated six technology-procurement projects in the U.S, including government purchases and related government-utility partnership projects, and analyzed the successes and setbacks (Holloman 2002). The projects involved the Super-Efficient Refrigerator Program (SERP), Apartment-sized Refrigerator Purchase, High-Efficiency Clothes Washer Program, U.S. DOE Sub-compact Fluorescent Lamp, High-Efficiency Unitary Air Conditioner Technology Procurement, and Recessed Downlight Fluorescent Fixtures. Five project design lessons from these projects are widely applicable (Ledbetter 2000):

- A two-phase solicitation was useful, including an initial phase to identify potential suppliers and buyers and to solicit feedback on appropriate specifications
- Modest-volume procurements worked well to achieve incremental improvements
- Long start-up times helped programs that depended on sales to large-volume buyers, particularly government agencies
- The participation of public agencies recognized for objectivity, consumer interest, and technical expertise was critical for program success
- The flexibility to take advantage of technology improvements during implementation helped the programs

time, or at significantly higher cost than other models, and these products may enjoy little or no customer support. Manufacturers may be reluctant (or financially unable) to invest in developing a new energy-efficient product and the manufacturing capacity for it unless they are assured of adequate, sustained buyer demand; they may also be fearful of losing their market share to competitors.

Standards that prohibit the manufacture, sale, and import of inefficient products offer the most certain way to encourage manufacturers to shift toward more energy-efficient product lines. This may require coordinated actions on both the demand and supply sides of the market, including:

- creating initial demand within the public sector
- offering loans or loan guarantees to manufacturers who retool to produce efficient products
- providing rebates to manufacturers to reduce the incremental cost of efficient products at the wholesale level
- stimulating competition among manufacturers by identifying the most efficient brands and models (using both labels and product listings)

In developing countries, domestic manufacturers often make products that are less efficient than some imports. In these situations, special programs and attention, such as the phased timing of standards and technical and financial assistance, may be justified to help domestic manufacturers upgrade their product lines.

10.2.3 Influencing Supply Distribution and Wholesale Purchases

Providing rebates for efficient products can influence wholesale and retail stocking decisions, bring down the first costs of the products, and stimulate buyer interest. Rebate programs targeted at wholesale and retail distributors need to be of long enough duration, perhaps several years, to effect a lasting change in market/consumer behavior. However, it is important to eventually phase out subsidies so that they are not provided longer than needed to transform purchase habits. The criterion for earning a rebate is often defined by an endorsement label or keyed to a standard. Successful rebate programs require advance coordination with distributors and careful planning of timing to avoid problems such as initial supply shortages, which can drive up prices and offset the rebate's intended effect. Educational campaigns specifically targeted at distributors can also play an important role by emphasizing how the sale of efficient products can increase market share and bottom-line profit. Public recognition can be given to distributors who show leadership in offering efficient products, as is done in the U.S. ENERGY STAR Partners program, which gives distributors a marketing advantage while increasing public awareness of efficient products.

10.2.4 Influencing Retail Purchases

At the heart of an energy-efficiency strategy are the choices made by consumers, private firms, and public agencies when they buy products that either use energy directly (e.g., refrigerators, air conditioners,

office copiers) or affect its use (e.g., windows). The critical first step in influencing purchases is to provide labels that give buyers information on the energy use and therefore the long-term energy costs of the different product choices. Broad-based marketing and information campaigns can also draw attention to and explain the meaning and significance of energy labels.

Although labels can promote energy-efficient choices, the added first cost of making these choices may be a barrier to buyers. This barrier can be reduced by:

- rebates
- attractive loan financing or leasing
- tax credits
- government purchasing policies

10.2.5 Influencing System Design and Installation

Achieving real energy savings requires more than purchasing a product that performs its primary function efficiently; that product must be properly selected and correctly installed. Too often, efficiency programs have focused only on individual pieces of equipment while ignoring how each component fits into an overall system. A common example is the potential energy savings from office equipment (computers, monitors, printers, and copy machines) that automatically lower their standby power when the equipment is idle (see insert: *Transforming the Office Equipment Market to Reduce Unnecessary Standby Losses with ENERGY STAR and Energie-2000 Labels*). The power management controls built into individual personal computers and other office equipment may not operate properly when connected to an office-wide system unless users or system managers check when the units are installed to see that all the software and hardware settings are properly enabled. Similarly, proper installation of residential heating and cooling systems (including correct equipment sizing and good design of air-distribution ducts) can save even more energy than can be achieved by choosing an efficient air conditioner or furnace.

10.2.6 Influencing Operation and Maintenance

Not only does an efficient product need to be appropriately selected, purchased, and installed in order to actually save energy, it must be properly operated and maintained to perform well throughout its lifetime. Too rarely do efficiency programs focus on operation and maintenance (O&M) needs and practices. As noted in the previous section regarding potential energy savings from automatic standby power, the power-management controls built into individual personal computers and other office equipment have to be set properly when the units are installed; moreover, users or system managers need to regularly check to see that all the software and hardware settings remain enabled. Standards-setting and labeling programs only ensure that appropriate products are in place. Other programs are needed to ensure that they are appropriately used.

10.3 Program and Policy Tools

Program and policy tools that can help ensure positive outcomes from energy labeling and standards programs include: research and development (R&D), energy pricing and metering, financing and incen-

Transforming the Office Equipment Market to Reduce Unnecessary Standby Losses with ENERGY STAR and Energie-2000 Labels

In most offices, PCs, monitors, printers, and copy machines are left on all day (and sometimes even at night), consuming substantial energy when not actually in use. Many of these products use significantly more energy in the standby mode than is necessary for the standby functions. To address this problem, the U.S. EPA worked with equipment manufacturers to develop the ENERGY STAR label for equipment that automatically shifts to a low-power mode (e.g., 30 Watts or fewer for a PC) when not in active use. Manufacturers found that they could use very inexpensive power-management controls to switch equipment to low-power standby. Industry interest in the ENERGY STAR label, limited at first, grew rapidly following an executive order requiring federal government agencies to purchase PCs and other office equipment that qualify for the label. At the same time, utility programs helped raise customer awareness of energy wasted by office equipment in standby mode. As a result, by 2000 about 95-97% of the computer/monitors, 90% of the copiers, and 99% of the faxes sold in the U.S. qualified for the ENERGY STAR label (U.S. EPA 2003, Fanara 1997).

These exceptionally large market shares were achieved because of the rapid rates of technical innovation and product replacement in the electronics industry, the very low cost of incorporating power management when designing a new microchip, and other marketable advantages of power management, such as quieter PCs, reduced internal heat build-up, and lower air-conditioning loads in equipment-intensive offices. As a result of these attractive features, it was relatively easy to convince manufacturers to make power management a standard feature on most or all models. U.S. EPA attributes its success to its focus on creating ENERGY STAR as a well-recognized national brand for energy efficiency, which combines the voluntary participation of a wide range of organizations with U.S. EPA's endorsement and extensive information disseminated to participating organizations and the public. However, despite high market penetration, continued efforts have been needed to make sure that manufacturers ship their products with the power-management features enabled, to educate consumers on the proper use of power management, and to update the ENERGY STAR criteria to keep pace with new technical developments.

The Swiss Federal Office of Energy (SFOE) has also combined voluntary standards, labeling, and government purchasing to promote energy-efficient office equipment. First, SFOE developed fleet-average targets for low-standby-power office equipment (and consumer electronics), which were designed to influence manufacturers' choices about which products would be manufactured for sale in Switzerland. If the industry failed to meet these target values by a specified date, SFOE had the statutory right to set mandatory minimum efficiency standards. In addition to establishing target values, SFOE developed the Energie-2000 label to help consumers identify models that are among the 25% most efficient on the market. SFOE also publishes a list of the qualified models each year and encourages large government and private-sector purchasers to buy Energie-2000 labeled products.

tives, regulatory strategies, voluntary activities (e.g., promotional campaigns), government purchasing, energy audits, and consumer education and information. These are discussed in the subsections below.

10.3.1 Research and Development

Government R&D programs are designed to directly stimulate the creation of new technology. On a global basis, they are important for maintaining continuing improvement in, among other features, the energy efficiency of energy-consuming products. Government intervention is warranted for technology improvements that serve a public interest but may have little commercial interest or be too large and risky for private investment. Individual countries may choose to participate in such public-interest R&D or leave it to other countries. Although this R&D is important, it may have little direct interaction with standards-setting and labeling programs in the short term and is therefore not described in further detail here.

10.3.2 Energy Pricing and Metering

Energy prices paid by consumers can affect the outcome of labeling and standards-setting programs in important ways. In fact, energy-pricing policies and metering and billing practices together provide a sound foundation for all energy policy, including energy efficiency standards and labels.

Market-based Energy Pricing

If electricity and fuel prices are subsidized (through taxes or price controls), this reduces the motivation for consumers to save energy. Below-market electricity or fuel prices decrease the effectiveness of labeling and standards-setting programs by causing life-cycle cost (LCC) analyses to dictate standards levels and other energy efficiency targets below the true economic optimum (see Chapter 6). Below-market energy prices can reduce the effectiveness of energy-efficiency labels by making energy consumption cheaper and thus not sending consumers the message that there is value in saving energy. This discrepancy is often an obstacle in developing countries where average electricity tariffs were less than $0.04/kWh during the first part of the 1990s even though the average cost of supply was around $0.10/kWh (Wohlgemuth and Painuly 1999).

Two possible solutions that are available to policy makers to address subsidized energy prices are to transition to a free market with cost-based energy prices, or, when this is not feasible or during a transition period to cost-based prices, governments can use “shadow prices” (energy prices calculated as if there were no subsidies) to determine economically justified levels for energy-efficiency standards.

Metering and Billing

In some developing countries, billing for electricity and pipeline gas may be infrequent or inaccurate, providing poor market signals to consumers. Reliable metering, frequent meter reading and billing, and reduced “technical losses” (stolen or unbilled energy) are needed to provide an incentive to save energy. In several countries, significant energy savings were achieved simply by installing submeters

in previously master-metered apartment buildings and by adding heat meters to individual buildings served by district heat (Philips 2003, Hirschfeld 1998). In some countries, metering and billing may be the most important issues to address in introducing energy-efficiency programs directed at consumers. The cooperation of utility companies is necessary for successful introduction of metering and billing programs.

10.3.3 Financing and Incentives

A range of financing and incentive programs has been used to overcome the barrier of higher first cost that often restricts the purchase of energy-efficient technologies. The most common incentives are consumer rebates or grants, tax credits or accelerated depreciation, loan financing (including shared-savings or performance-based contracting), and equipment leasing. Energy labels and standards are an important foundation for these programs because labels and standards provide a verified baseline for judging enhanced performance and establishing appropriate incentives. Incentive programs can use product listings available from the labeling program to establish which products meet higher efficiency levels and to identify the models qualified to receive incentives.

Rebates, Grants, and Tax Policies

In most cases, either a government agency or a utility sponsor offers financial incentives directly to end users. Sometimes incentives are provided to manufacturers or builders to encourage them to supply more-efficient products with the assumption (or requirement) that at least some of the incentive will be reflected in a lower price to the final buyer.

Two programs that used manufacturer incentives are the Super-Efficiency Refrigerator Program (SERP), a pioneer "Golden Carrot" program initiated through a collaboration of electric utilities, non-governmental organizations (NGOs) and government agencies in the U.S.; and the Polish Efficient Lighting Project (PELP), developed by the International Finance Corporation (IFC) and funded by the Global Environment Facility (GEF). SERP sponsored a competition among manufacturers to develop a super-efficient refrigerator; the winner, Whirlpool, was awarded $30 million in guaranteed purchases of the new refrigerators from a consortium of participating utilities. PELP stimulated manufacturers who were exporting compact fluorescent lamps (CFLs) to produce more, cheaper, and better CFLs and to market them within the country (Ledbetter 1998, Hollomon 2002) (see insert: *Manufacturer Incentives Reduce Electricity Distribution Investments; CFLs Go International* on next page).

Some countries have reduced import duties or sales taxes on energy-efficient equipment, sometimes distinguishing between locally produced and imported products. In Pakistan in 1990, for example, the import duty on CFLs was reduced from 125% to 25%, cutting retail prices almost in half and increasing sales. Because import duties or sales/excise taxes may be an important source of revenue for a country, another approach that should be considered is a "revenue-neutral" tax incentive or "feebate" for efficient products. The idea is to keep the total amount of tax revenue about the same

Manufacturer Incentives Reduce Electricity Distribution Investments; CFLs Go International

The Poland Efficient Lighting Project (PELP), developed by IFC and funded by the GEF, was developed in 1995 to demonstrate to the Polish electric utility industry the benefits of using efficient lighting to reduce peak-power loads in geographic areas with inadequate distribution-grid capacity to meet existing or projected loads.

One major component of the program was an incentive payment to CFL manufacturers, which reduced wholesale prices by about US$2 per CFL. During a two-year period, the project subsidized the sale of more than 1.2 million CFLs. An aggressive CFL discount coupon/promotion program in three Polish cities led to very high CFL installation levels (two to nine CFLs per household) in the target neighborhoods and 15% peak demand reductions for substations serving purely residential loads; there was no adverse impact on power quality as a result of the CFL ballasts. The program was also highly cost effective for the utility compared with traditional approaches to upgrading grid capacity; residential peak demand savings averaged 50% over five years and 20% over 10 years.

PELP was an early demonstration that private-sector energy-efficiency projects are often more cost effective than supply-side investments. Other countries contacted IFC, so it asked GEF to support a $15-million Efficient Lighting Initiative (ELI) in seven countries: Argentina, the Czech Republic, Hungary, Latvia, Peru, the Philippines, and South Africa. GEF approved the request in 1998. ELI has accelerated the deployment of efficient lighting by working with manufacturers, electric utilities, government and education institutions, and NGOs. In 2003–2004, ELI worked with its international partners to make the transition to a self-sustaining lighting-product quality-certification program. The program is built around the ELI logo, which is already carried by more than 150 products.

Sources: Ledbetter et al. 1998, Ledbetter et al. 1999, International Finance Corporation 2004, Efficient Lighting Initiative 2004.

but to vary the tax rate so that the import or excise tax is lower on an efficient product and higher on a less-efficient one. The performance testing and rating information developed for product energy labels can provide the basis for these differential tax policies. The Netherlands applied this strategy in its Energy Premium Scheme (EPR), which raised money from households through an energy tax to use for rebates on energy-efficient appliances, building facilities, and renewable energy production. EPR offered rebates for appliances with an "A" label or better (see insert: *Netherlands Rebate Scheme for A-Rated Appliances*). Started in 2000, the EPR helped transform the market. The sales of A-labeled appliances increased by about 70% in 2001 and even more in 2002 (Siderius 2003).

Financing of Energy-Efficiency Investments: Loans, Leases, Performance Contracts, Vendor Financing, and Utility Financing

Providing financing for both the manufacture and purchase of energy-efficient equipment overcomes the barrier of lack of capital by spreading the initial costs over time. This financing can come in several forms.

Loans. Although development banks have historically been a major source of funds for energy-efficiency investments in developing countries, commercial banks and other lenders are an important and largely untapped funding source. Commercial financing includes loans and lines of credit, leasing, trade finance, consumer credit, vendor finance, mortgage finance, and project finance (Hagler-Bailly 1996).

Netherlands Rebate Scheme for A-Rated Appliances

In the Netherlands, E.U. energy labeling, introduced in the 1990s to improve the energy efficiency of appliances, was perceived as not sufficient by itself to substantially transform the market. One reason was that A-labeled appliances were more expensive than appliances in other label categories. Therefore, a financial incentive was thought to be necessary to induce consumers to buy energy-efficient appliances. This financial incentive started in January 2000 and was called the "energiepremie" (energy rebate); the program was called "Energiepremieregeling (EPR)" (Energy Premium Scheme).

In practice, the EPR works as follows. The consumer buys an energy-efficient product (an appliance or a building upgrade) in a shop or by mail order. In the shop, the consumer can get a form (or order the form from a utility), which, when completed and sent in with a proof of purchase, results in a rebate payment by the utility. The rebate for appliances was set at 45–50 euros for most A-rated appliances and 100 euros for better than A-rated appliances, with the exception of A-rated clothes dryers and washer-dryers, for which a higher rebate applied.

An extensive campaign was set up to communicate the EPR message to consumers, including a TV show, advertisements in national newspapers and magazines, and information on local media (radio, TV, newspapers, magazines). At the beginning of the campaign (in early 2000), 40% of consumers knew about EPR; in November 2001, this percentage had doubled to 82%. In addition, 76% of the people who had not used the EPR as of November 2001 were aware of the program. About one third of consumers knew how the EPR was financed (i.e., through the energy tax), 80% had a positive opinion of this way of financing, 10% had a negative opinion, and 10% had no opinion.

The effects were impressive. In 2000 (the first year of the scheme), more than 50% of washing machines and dishwashers sold were A-rated products. This statistic increased further in 2001, when the market share for A-rated washing machines rose to 88%.

The EPR has been a huge success in transforming the market for household appliances (not including dryers) in the Netherlands. Today it is difficult not to buy an A-labeled appliance in a shop in the Netherlands. However, the EPR was very costly, more than 50 million euros per annum at its height, which has led to a critical investigation into the program's overhead costs.

Source: Siderius 2003

Leasing. Leasing of energy-efficient equipment allows the user (lessee) to avoid expending capital up front to acquire an asset. To date, leasing has been used for purchasing energy-efficient products, particularly office equipment and automobiles, primarily in industrialized nations.

Performance contracting. Performance contracting (or third-party financing) has been widely used to finance energy-efficiency projects in the U.S. and Europe. In performance contracting, an end user obtains efficient equipment or other facility upgrades from an energy service company (ESCO). The ESCO pays for the improvements and receives a share of the savings as a performance-based incentive fee. There are two common models of performance contracting: guaranteed savings (where an ESCO

or other partner guarantees the customer a minimum level of energy or cost savings) and shared savings (where the ESCO and customer agree beforehand on a formula for sharing whatever savings are realized). Variants and combinations of these basic approaches are also common. Performance contracting through an ESCO transfers some technology and management risks from the end user to the ESCO. It also minimizes or eliminates the requirement for an initial cash outlay by the customer and reduces other transaction costs and demands on staff. In the U.S., transaction costs of performance contracting are high at 20–40% of total project costs; therefore, ESCOs are only interested in large projects (one-half million to several million U.S. dollars) (Lin 2004).

Vendor financing. Vendor financing often targets energy-efficient products that are newly introduced or at least new to a market segment in a country or region. Vendor financing is typically used for sales of common equipment with large numbers of end users (e.g., industrial motors, commercial lighting).

Utility financing programs. Utilities can be allies or barriers to energy-efficiency programs. They have the potential to be strong allies because of their regular contact with their customers, their reservoir of trained energy specialists, and their potential to aggregate the consumer market and reduce acquisition costs. However, to become allies, they must embrace corporate values that are consistent with the goal of energy efficiency. In the past, the goal of utilities has been to promote sales as profits were linked to sales. For this linkage to change, regulators must award utilities for their performance in delivering the least-cost mix of supply- and demand-side programs. And, for these programs to be effective, utility executives must show the same dedication to energy efficiency that they have shown in the past to increasing energy supplies.

If utilities embrace this change, they can assume one of three roles in financing energy efficiency: facilitator, collection agent, or direct provider of financial services. In all cases, the utility's role needs to be approved by the applicable regulatory authority or governing body. The financing role could also be delegated to an unregulated subsidiary in countries where deregulation or utility restructuring is under way.

- *Facilitator.* As a facilitator of loan financing, the utility is a broker, helping bring together end users (its customers), energy-efficiency businesses, and lenders.
- *Collection agent.* If a utility collects customer loan payments through its regular monthly bills, this can help reduce transaction costs (especially for smaller projects) and also lower credit risk.
- *Direct provider.* Utilities can be direct providers of financial services (e.g., direct loans, equipment leases), using the market advantages of their customer relationships, access to capital, and existing billing systems.

The links between utility financing programs and labels and standards may be stronger than when financing is offered by other institutions. Utilities generally have a more direct interest in the outcome: cost-effective energy savings, improved customer relations, customer retention in an increasingly competitive market, satisfied regulators, and a future energy demand that is consistent with their energy supply plans.

10.3.4 Regulatory Programs

Four main types of regulatory programs can influence appliance and equipment energy efficiency:

- mandatory energy labels (or manufacturer declarations of energy performance even without a physical label on the product)
- efficiency standards for appliances and equipment (either at a minimum required level or as a class average for all products sold)
- energy-efficiency requirements in building codes
- government requirements that private utilities offer energy-efficiency programs

The first two programs are the subjects of previous chapters. The third, energy-efficient building codes, is an important means of assuring efficiency in both new construction and major renovation. Building energy codes, common in the U.S., Europe, Southeast Asia, and several other countries, usually specify performance levels for the building envelope and heating and cooling equipment and also specify overall lighting levels. Codes generally do not set standards for plug-in appliances or for replacement equipment in existing buildings. Code requirements are typically expressed either in energy-performance terms (e.g., maximum lighting power, in W/m2, to deliver a specified level of illumination) or as prescriptive requirements (e.g., ceiling and wall insulation of a certain thickness or R-value). Efficiency labels on heating and cooling equipment and performance labels for windows can make it easy for building inspectors to check for compliance with energy codes.

Some countries, including the U.S., have both mandatory equipment-efficiency standards and mandatory building-energy codes that cover some of the same products. In this situation, the credibility and effectiveness of both programs depend on effective coordination between those responsible for equipment standards and those responsible for the building code.

The fourth type of regulatory program, prominent in the U.S. during the 1980s, is quite different from the previous three. It requires private electric and natural gas utility companies to conduct demand-side management (DSM) programs to help their customers use energy more efficiently and to better manage peak loads. Many government-run public utilities also have undertaken DSM programs. As will be discussed in Section 10.4, more comprehensive market-transformation programs are now replacing utility DSM programs in the U.S.

10.3.5 Voluntary Programs: Quality Marks, Targets, and Promotional Campaigns

Voluntary programs, led by both government and industry, encourage manufacturers, distributors, installers, and customers to produce, promote, or purchase energy-efficient products and services. These programs may include:

- quality marks or labels that distinguish products based on superior energy and environmental performance (see Chapter 5)

- voluntary targets that set guidelines for an industry to strive for
- marketing and promotional campaigns (see Chapter 7)

Quality marks or labels are part of the labeling and standards-setting activities that are the primary focus of this guidebook. So are marketing and promotional campaigns that are targeted at standards and labels. Industrial programs that set voluntary targets are closely aligned to the labeling and standards-setting activities, as are marketing and promotional campaigns that target programs other than standards and labels. They often have exactly the same objectives as efficiency standards and labels programs—communicating information to consumers and setting performance goals—and rely on similar information and analyses.

Voluntary programs often enlist private firms as partners with the sponsoring government agency. The U.S. ENERGY STAR program, for example, introduced by the U.S. Environmental Protection Agency (EPA) in 1992 and addressed in more detail in Chapter 5, illustrates how such partnerships can help these programs grow in their coverage of products, numbers of partners, and national and international impact. An entire industry sector may also establish voluntary targets for energy-using products or processes—to promote best practices and increase competitiveness and profitability within the industry, to gain public relations benefits, or to anticipate regulatory pressures and minimize the likelihood of future regulation. Such voluntary targets can be based on either a single target value for efficiency that everyone must meet or a fleet-average efficiency for all products sold by each firm or by the industry as a whole. The success of a voluntary program for office equipment and consumer electronics in Switzerland shows the importance of both government leadership and active involvement from manufacturers (see insert: *Transforming the Office Equipment Market to Reduce Unnecessary Standby Losses with Energy Star and Energie-2000 Labels* on page 260).

10.3.6 Government Purchasing

Government purchasing power can have enormous influence in stimulating the diffusion of energy-efficient products. In their day-to-day activities, public agencies purchase large numbers of energy-using appliances and equipment for use in government offices, public schools, universities, hospitals, street lighting, water and other utilities, military/defense facilities, and state-owned enterprises. Harnessing the power of routine purchasing by government and other institutional buyers can be a powerful way to stimulate the market for energy-efficient products while setting an example for corporate buyers and individual consumers. This strategy also bypasses much of the need to raise new capital for energy-efficiency investments, making use of funds already budgeted to purchase or replace equipment and directing this spending toward energy-efficient products. The government's influence also can be exercised through "indirect purchasing," requiring contractors who provide design, construction and maintenance services to offer energy-efficient equipment and follow energy-efficient practices.

The U.S., led by DOE and EPA, was an early promoter of energy-efficient purchasing at all three levels of government: federal, state, and local (www.eere.energy.gov/femp/program/equip_procurement.cfm;

www.energystar.gov/index.cfm?c=government.bus_government). The U.S. federal government by itself is the world's largest single buyer of energy-using products, spending more than US$10 billion on such purchases each year (McKane and Harris 1996). Including purchases by state and local government agencies, the public sector represents at least one of every 10 dollars spent in the U.S. on energy-using products.

The program was strengthened by a 1999 Executive Order directing that all federal agencies purchase energy-using products that are life-cycle cost-effective, including products with ENERGY STAR labels or, where the label is not available, products in the upper 25 percent of energy efficiency in their product class. In addition, to defang what he called "energy vampires," President Bush issued a 2001 Executive Order directing all federal agencies to buy products with low standby power requirements (1 watt or less where possible) (Harris et al. 2003).

A recent review of U.S. state and local government purchasing policies identified a growing number of jurisdictions that are adopting purchasing requirements based on the same federal efficiency criteria, i.e., ENERGY STAR-labeled products or those in the top 25th percentile of efficiency (Harris et al. 2004). The study concludes that: "Aggregating public sector demand sends a powerful market signal to manufacturers and vendors that some of their largest customers are looking for suppliers who offer good prices and overall value for products that meet a well-defined efficiency target."

An international review performed in 1997 found that, although a few countries had recently instituted energy-efficient purchasing programs, the potential for such programs was largely ignored (Borg et al. 1997). A more recent survey in 2002 reached the same conclusion, estimating, based on the government-sector share of GDP or employment, that governments represent 10-25% of the energy market in industrial, developing, and transition countries alike. Although the study found that a few additional countries had initiated energy-saving programs in government buildings since the previous study, the potential for government purchasing power to lead and transform markets was still rarely recognized (Van Wie McGrory et al. 2002).

Some countries are, however, starting to link the government's purchasing power with energy-efficiency standards and labeling programs. Developing and transition countries have an enormous potential to use standards and labels as a guide to save energy and money in their own government-sector purchases and to stimulate savings throughout their economies. Although many countries have been slow to grasp this potential, there are a few important exceptions, in addition to the U.S. These include Europe, Denmark, Japan, Korea, China, and Mexico, as detailed below.

Europe has recognized the power of the public purse to promote energy efficiency. Europe's public sector could save 12 billion /year in energy costs, according to a recent multi-country study by the European Commission's SAVE program (www.eceee.org/library_links/prost.lasso). The study, "PROST—Public Procurement of Energy Saving Technologies in Europe," found that: "If the public sector all over Europe were to systematically procure energy-efficient products and buildings using very much the same

performance criteria, the market transformation towards more efficient and sustainable products and building practices of the whole market beyond the public sector would be boosted significantly" (Borg et al. 2003). The study's recommendations included energy efficiency A-class appliances and ENERGY STAR office equipment. The study found no significant legal barriers to procuring energy-efficient products. The major barriers were lack of political priorities and policies, lack of motivation or incentives, and outmoded routines that failed to reflect energy and environmental priorities.

The Danish Electricity Savings Trust (DEST), a governmental agency created in 1996, organized a group of large institutional buyers, including social housing companies and local governments, to jointly procure—at a very favorable bulk-purchase price—up to 10,000 energy-efficient refrigerators that qualified for the top efficiency rating (A) on the E.U. appliance label. DEST has expanded its program to other volume purchases for high-efficiency appliances, consumer electronics, office equipment, and CFLs (Karbo 1999).

In Japan, the "Basic Policy on Promoting Green Purchasing" contains specific provisions for government procurement of energy-efficient and environmentally preferable products, including the use of ENERGY STAR labeling criteria for office equipment (www.env.go.jp/en/lar/green/2.pdf). In Korea, there is a similar government policy favoring purchases of energy-efficient appliances and equipment that are above the minimum energy performance standards (MEPS) (www.pepsonline.org/workshop/downloads/Byun%20Chun%20Suk%20presentation.pdf).

Projects currently under development in China and Mexico are creating government purchasing policies linked to energy-efficiency endorsement ("seal of approval") labels: in Mexico the Sello FIDE and ENERGY STAR labels, and, in China, the certification label issued by the China Certification Center for Energy Efficiency Products (CECP).

By adopting energy-efficiency criteria to guide their own purchasing, government agencies save energy and money, set an example for other buyers to follow, and send a strong market signal to product suppliers and manufacturers. Energy testing and rating systems already in place to support efficiency labels and standards provide a baseline for establishing these energy-efficient purchasing criteria.

10.3.7 Energy-Audit Programs

Many end users do not have the time, expertise, or resources to hire experts to recommend energy efficiency improvements and strategies to reduce energy costs. Free or subsidized energy audits can help end users identify and prioritize energy-saving opportunities. In many countries, energy audits are a central element of efficiency programs in the industrial sector and in the building sector for homes, commercial buildings, and public facilities.

Audits typically identify generic energy-saving options, including O&M improvements, as well as site-specific options for capital investments in efficient equipment and systems. Some programs offer

in-depth energy audits conducted by experts skilled in a particular industrial process or building type and may address industrial waste-reduction or other environmental measures as well as energy efficiency. Standards-setting and labeling programs can complement auditing programs by providing reliable performance and cost information on major elements of the audits. For building audits, these elements include window systems and heating, cooling, lighting, and other energy-using equipment. In industrial audits, electric motor improvements are an attractive target, including improved efficiencies and correct sizing and controls.

In recent years, a number of developing and transition countries have adopted or are considering mandatory audits for all facilities whose energy consumption is greater than a defined threshold. Experience with these programs has shown mixed results. A requirement for mandatory audits by themselves has led to perfunctory, low-quality audits performed just to meet the legislative requirement. Auditors may avoid recommending any measures that would require mandatory investments. Experience shows that it does little good to provide energy audit recommendations without some way to assure the customer will implement the recommended measures, and that the measures will often require some form of financial assistance (World Bank 2004).

An early example of combining audits and financing is the Technology Transfer for Energy Management (TTEM) program in the Philippines (Rumsey and Flanigan 1995). This program, sponsored by a grant from U.S. AID, addressed two major constraints: a lack of reliable information on energy-efficient technologies and reluctance on the part of industrial managers and lenders to fund efficiency upgrades. Through a Demonstration Loan Fund, accredited banks made five-year loans for energy-efficiency upgrades at below-market rates. Loan financing for 16 demonstration projects produced energy savings with an average 41% internal rate of return. TTEM also provided free technical assistance to more than 120 companies, seminars for 1,100 attendees from private firms and financial institutions, and technical training for the staff of the Philippines Office of Energy Affairs (OEA). Program staff believed that technical assistance, even more than financing, was the key to the program's success.

10.3.8 Consumer Education and Information

In the long run, developing and maintaining an energy-efficient economy requires that private citizens, corporate managers, government officials, professionals, and retail outlets all share at least a basic understanding of how energy is used, the economic and other (environmental, social) costs of energy production and use, and the main opportunities to improve energy efficiency. This basic "energy literacy" must begin with elementary and secondary schooling and continue as part of professional and technical training for those whose jobs will involve energy-related decisions. Consumers need access to information about how their homes or businesses use energy, what energy-saving opportunities are open to them, and which products are energy-efficient and cost-effective choices.

Energy-efficiency labels can play an important role in this consumer education. As described in Chapters 5 and 7, surveys and focus groups to help design energy-efficiency labels provide important information

about consumer motivation. Subsequent training and educational campaigns to support the energy labels target not only the final consumer but also those who have direct contact with customers, including retail sales staff, contractors/installers, and maintenance/service personnel, all of whom should understand the benefits of efficient products and can personally profit from promoting these products to end users. The growing number of websites addressing standards and labels and presenting an increasing depth of information is making a significant contribution to the education of consumers (See insert: *Information and Education Websites*).

As emphasized in Chapter 7, governments typically engage in consumer education campaigns that go beyond those focused on endorsement labels and other aspects of standards and labels programs. Coordination among parallel education programs is necessary so all programs communicate a uniform message and are thus most effective.

Information and Education Websites

Central and Eastern European Countries Appliance Policy (CEECAP): Information on extension of standards and labeling systems into Central and Eastern European countries. www.ceecap.org

Collaborative Labeling and Appliance Standards Program (CLASP): Standards and labels information clearinghouse. www.clasponline.org

Consortium for Energy Efficiency (CEE): Information on residential, commercial, and industrial programs; evaluation and research; and government, multi-family housing and gas programs. www.cee1.org

Efficient Lighting Initiative (ELI): Information on International lighting program funded by GEF and managed by IFC. www.efficientlighting.net

Energy Standards Information System (ESIS): Website developed by APEC and co-sponsored by CLASP serves as a clearinghouse for information on energy-efficiency standards in APEC economies and beyond, including access to standards in place, e-mail notification of new proposed standards, a list of experts and key contacts, links to related websites, and dynamic comparisons and benchmarking. www.apec-esis.org

ENERGY STAR: Website sponsored by the U.S. EPA and U.S. DOE; includes products, home improvement, new homes, business improvement, partner resources, news, and links to other sites. www.energystar.gov

European Union Energy Efficiency Action plan. europa.eu.int/scadplus/leg/en/lvb/l27033.htm Energy labeling of household appliances. europa.eu.int/scadplus/leg/en/lvb/l32004.htm

Homespeed: Pan-European database for energy-efficient appliances for household equipment (white goods), consumer electronics, and office equipment. www.homespeed.org

U.S. Department of Energy: Website provides information on energy efficiency, ENERGY STAR, and Building Technologies Program: Appliances and Commercial Equipment Standards. www.doe.gov

10.4 New Strategies to Transform Markets

Governments can invite, coax, require, or directly sponsor any of the program and policy tools described in Section 10.3. As mentioned previously, in many parts of the world the design of energy-efficiency programs is changing—largely in response to electric utility industry deregulation and the related move toward cost-based energy pricesto focus more on lasting transformation of markets.

Until recently, energy-efficiency programs and policies were most often independently conducted by government agencies, utility companies, private consultants, and large building owners or industrial firms themselves. However, these programs typically targeted efficiency improvements at a specific site or for a given type of energy-using equipment. Market-transformation strategies focus more broadly on how products are manufactured and flow through markets to consumers. These approaches change the behavior of market participants in a lasting way to increase the adoption of energy-efficient technologies and services (Suozzo and Nadel 1996, Suozzo and Thorne 1999).

A coordinated strategy for market transformation might focus on a single technology, energy end use, or a well-defined market segment. Like any well-designed energy-efficiency program, this strategy should include a careful analysis of market conditions to identify specific barriers to development, introduction, purchase, and use of the energy-saving measure. The market-transformation strategy will use that information to prepare a clear statement of the specific objectives for each market segment and a practical plan for transitioning from intensive interventions toward a largely self-sustaining market process—i.e., an exit strategy.

10.4.1 National Market Transformation Programs

China's CFC-Free Energy-Efficient Refrigerator Project is a good example of a market transformation program (see insert: *China Comprehensively Reforms Refrigerator Market* on next page). Coordinated strategies also have been used to move high-efficiency products into the light commercial air-conditioner market (Lowinger et al. 2002).

The United Kingdom's (U.K.) Market Transformation Programme (MTP) supports a structured, public-domain sector-review process, conducted in partnership with businesses, consumers, experts, and others. It focuses on improving the delivered energy performance of domestic and non-domestic energy-consuming appliances, equipment, and components. The program is broad, with reviews in 12 major sectors, covering 27 product types and representing 75% of U.K. electricity consumption, including all major domestic energy-consuming appliances and traded goods in the commercial sector. It uses the internet to provide information and encourage public awareness and scrutiny of current policy thinking, promoting openness, and transparency. A key feature of MTP is the use of market projections and policy scenarios to help “reality test” explicit market-transformation policy rationales against consumer expectations and industry's own business plans. MTP supports the U.K.’s work in all aspects of its energy-efficiency portfolio, including Eco-labeling, buyers’ guides, standards, and green procurement.

China Comprehensively Reforms Refrigerator Market

The CFC-Free Energy-Efficient Refrigerator Project, China's first comprehensive market-transformation project, improved the efficiency of a common consumer product and pioneered the introduction of standards and labels with a huge, rapidly growing domestic appliance market. The project originated in 1989 as a joint effort by the U.S. EPA and China's National Environmental Protection Agency (NEPA—now SEPA, the State Environmental Protection Administration). The project took advantage of the planned phase-out of CFC refrigerants to also increase the energy efficiency of Chinese refrigerators, achieving both environmental goals with a single retooling of manufacturing plants. The participating agencies worked with industry to incorporate non-proprietary technologies in a prototype CFC-free refrigerator that used 45% less energy and had design features appropriate for wide application in China (Fine et al. 1997).

The next step was to focus on manufacturing, distribution, and sales, to ensure that manufacturers would produce and dealers would stock and promote the new, efficient refrigerator models and that consumers would buy them. GEF sponsored research on consumer attitudes, market trends, efficiency standards, sales channels, pricing, compressor efficiency, and other topics in order to develop a comprehensive approach to market barriers. The GEF-funded market-transformation project included revised efficiency standards, a mandatory appliance energy label, dealer training and consumer education, manufacturer training in refrigerator design and modeling, and a manufacturer incentive program.

The project unfolded against a background of monumental growth in appliance ownership and production in China. In 1981, fewer than 1% of urban Chinese households owned refrigerators; by 1998, that number had increased to more than 75%. Similar increases have occurred for television sets, clothes washers, and air conditioners. Since 1980, China's infant appliance industry has grown to become one of the largest in the world, surpassing US$14.4 billion in 2000 (Lin et al. 2002).

This project exemplifies a multi-staged approach to a comprehensive market-transformation project. China's first set of minimum efficiency standards, initiated in 1989, was strengthened by the Energy Conservation Law in 1997, which put end-use energy efficiency and standards and labels at the center of its new energy-conservation strategy. To further enhance savings, China developed endorsement labels, including a refrigerator label for products that are 30% more efficient than the mandatory standard. Manufacturers responded quickly, and a majority of the refrigerators qualified for the label in 2000. China currently is strengthening its standards and label requirements. The program is achieving a substantial increase in refrigerator efficiency, saving money for consumers, easing power loads on an already strained electricity grid, and significantly reducing emissions of CFCs, CO_2, and other air pollutants.

Outreach activities go beyond national borders and include, for example, a collaborative project with the Dutch Ministry of Economic Affairs (www.mtprog.com).

Market transformation typically includes activities designed to:

- eliminate the availability of energy-wasting products through mandatory standards
- stimulate the development and market introduction of new, energy-efficient models
- ensure that energy labels are in place to provide the information consumers need to make well-informed choice
- raise the awareness by all participants in the product-distribution chain regarding new products and relevant information
- change consumer purchasing practices to increase market penetration of efficient products so that these products become well established in the market
- stimulate accelerated replacement and early retirement of existing products

The appropriate tools for market transformation depend in part on how mature a technology or practice is (Nadel 2002, Hinnells and McMahon 1997, Suozzo and Nadel 1996). For example, demonstration projects and technology procurement efforts may be employed in the early stages to stimulate the introduction of new, energy-efficient technologies. Rebates/loans and volume purchasing by large buyers, along with consumer education and labeling and marketing campaigns, may be used to increase market penetration. Where feasible, building codes and minimum efficiency standards are used to complete the transformation process by removing inefficient products and practices from the market. As part of a market-transformation effort, energy-efficiency standards-setting is a dynamic process with periodic updates to ensure continuing progress in saving energy (see insert: *How Market Transformation Makes New Technologies Available: Resource-Efficient Clothes Washers,* next page). Market transformation has little hope of being successful if it employs just one approach. Using a market-transformation approach, several program and policy tools are combined to achieve permanent changes in the market. Labeling and standards-setting programs are an essential part of most market-transformation strategies.

10.4.2 Multinational Trends

The energy and environmental benefits of standards and labels, combined with the growth in the global economy, have led to an increasing number of new, multinational approaches.

The North American Energy Working Group (NAEWG) was established in 2001 by the governments of Canada, Mexico, and the U.S. to advance their common interests on energy-related issues. Although electricity and gas interconnections were a driving force, NAEWG also gave a high priority to the harmonization of standards and labels in North America. The Lawrence Berkeley National Laboratory, representing CLASP, was funded by the U.S. DOE to analyze the standards, labels, and test procedures of the three countries. The report identified 46 energy-using products. Three of them—refrigerator/

How Market Transormation Makes New Technologies Available: Resource-Efficient Clothes Washers

Clothes washers offer major energy-savings opportunities. More than 70% of American homes have clothes washers, which use significant amounts of electricity or gas for water heating and drying and smaller amounts for motors. In 1991, the savings potential from clothes washers drew attention when U.S. DOE conducted a standards rulemaking under the National Appliance Energy Conservation Act (NAECA) and set a standard requiring only a modest efficiency gain of 10%. That decision continued U.S. reliance on vertical-axis, agitator-based models and marginalized the potential for horizontal-axis clothes washers, such as those commonly sold in Europe and Japan, which use about half the water and one-third the energy of conventional U.S. models.

U.S. DOE's 1991 decision drew serious attention from utilities, NGOs, federal agencies, states, manufacturers, and retailers. In particular, U.S. DOE caught the attention of manufacturers by saying that it would consider horizontal-axis machines in its next rulemaking. Utility groups in the western states and New England discussed strategies for supporting advanced clothes-washer designs, and NGOs joined the effort. The newly formed Consortium for Energy Efficiency (CEE), a utility-based group, was asked to play a coordinating role. CEE prepared draft specifications for a highly efficient clothes washer, prepared a program description, solicited participation by utilities through subsidies and/or marketing campaigns, and met with manufacturers to seek their participation. Manufacturer support was gained through specifications that did not prescribe any specific feature, such as horizontal-axis drums, but were performance-based, which gave manufacturers freedom in creating designs to meet the imminent, stringent new requirements. The U.S. DOE/EPA ENERGY STAR program reinforced the CEE specifications by adopting the same criteria for its clothes-washer labels. In 2000, U.S. DOE announced that an agreement had been reached to increase the federal minimum standards for residential clothes washers, to take effect in 2004 and 2007, by 22% and 35% above the current standard, respectively.

Despite a premium price, the new models have captured 6% of the national market and nearly 20% of the sales in regions with active programs. When the initiative was launched in 1995, it had commitments of support from 27 participating utilities and energy organizations. Now that number has grown to more than 240. When the initiative began, high-efficiency clothes washers were a niche market and were available only from foreign manufacturers. Now the U.S. market has 21 different brands, including at least one from every major domestic manufacturer, and more than 80 different models.

Sources: CEE 2001, Suozzo and Thorne 1999, Gordon et al

freezers, room air conditioners, and three-phase electric motors—have identical MEPS and test procedures. Ten other products exhibit some differences in MEPS and test procedures but are early candidates for harmonization. NAEWG is planning further harmonization of test procedures, mutual recognition of test results, and perhaps extending the ENERGY STAR program to Mexico (Wiel et. al. 2002).

The extension of energy standard and label programs into central and eastern Europe is the goal of an initiative launched in 2002. The IEA's Climate Technology Initiative (CTI) laid the groundwork for the extension project with a report on the status of appliance policies in central and eastern European

countries and their inherent barriers and opportunities. The IEA and the Dutch government provided initial funding for the Central and Eastern European Countries Appliance Policy (CEECAP) project in anticipation of future support from the E.U.'s Intelligent Energy for Europe (IEE) program. A driving force for the initiative is the E.U.'s interest in the effective implementation of its appliance policies in new member states and the accession countries with spillover impacts on other central and eastern European countries. The project moved into a new phase in 2004, with expert training and in-country assistance in the new member states (CEECAP 2004).

The Asia-Pacific Economic Cooperation (APEC) forum is a vehicle for advancing discussion of energy efficiency among the Pacific Rim countries, with special emphasis on incorporating standards and labels in each economy's energy efficiency portfolio and harmonizing members' efficiency policies. APEC operates on the basis of dialogue and non-binding commitments, so its role would not be to create a program, but to create conditions that advance inter-governmental actions. The 21 members of APEC represent about 60% of world GDP, so this role can be significant. In 2000, an APEC report, "Cooperation on Energy Standards in APEC," provided useful baseline information, particularly on the importance of common test procedures, laboratory capacity, and transparency to support standards and labels (APEC 2000). For more than a decade, the Experts Group for Energy Efficiency & Conservation (EGEE&C) of APEC's Energy Working Group (EWG) has placed major focus on energy-efficiency standards and labels. It has conducted workshops on both, and has developed an Energy Standards Information System interactive database, called APEC-ESIS, to track and update information on energy-efficiency performance standards that are either in use or under development (www.apec-esis.org). APEC-ESIS, now co-sponsored by CLASP, includes a Standards Notification Procedure for informing energy policy officials, manufacturers, and other interested parties about new energy standards and regulations being developed or revised in APEC economies.

The 10-member Association of South East Asian Nations (ASEAN) adopted a Plan of Action for Energy Cooperation 1999-2004 that identifies Energy Efficiency and Conservation Promotion as one of its key programs. The implementing body of this program is the Energy Efficiency and Conservation Subsector Network (EE&C-SSN). The activities of the EE&C-SSN are facilitated and coordinated by the ASEAN Center for Energy (ACE), an intergovernmental organization established by the ASEAN member countries. The activities of the program include exploring development of a harmonized ASEAN energy-labeling system.

These multinational efforts have a theme that is similar to their parallel bilateral and national efforts. All of the activities described in this chapter target the development of a long-term, sustainable global energy sector that stimulates socio-economic growth and the accompanying improvement in living conditions with reduced environmental harm worldwide. All of the activities described in this chapter have their place, along with energy-efficiency standards and labels as the flagship program, in every country's portfolio of energy-efficiency programs. The people responsible for the standards and labels program will maximize their country's achievements by coordinating closely and cooperatively with their counterparts in the other energy-efficiency programs.