2.3 Household Appliances

In this section, we examine the policies enacted by Japan and Philippines to enhance the energy efficiency of appliances. For each economy, we describe and review the various regulations enacted in order to boost appliance energy efficiency. We also compare how the regulations in Japan and Philippines fare against each other.

Globally, improving the energy efficiency of appliances and equipment is now recognized as one of the most effective ways of reducing energy consumption as well as cutting down on greenhouse gas (GHG) emissions. Energy savings from energy efficiency improvements can be particularly dramatic for appliances. The Lawrence Berkeley National Laboratory estimates that energy efficient standards and labeling (EES&L) programs aimed at improving the energy efficiency of equipment (including both appliances and lighting) can potentially lead to savings of 3,860 TWh of electricity and 1,041 TWh of fuel per year by 2030 (McNeil et al., 2008) – to put that in context, the world's total electricity generation in 2010 was 21,325 TWh (BP, 2011). Notably, the mitigation potential from EES&L programs is the greatest in Asia and North America (McNeil et al., 2008), underscoring the potential that exists for improving the energy efficiency of appliances in APEC economies.

Energy efficiency improvements in appliances in industrialized economies in the past 30 years have been driven primarily by efficiency standards, labeling, and incentive schemes (Geller, 2005), suggesting that government policies and regulations will be central to any concerted improvements in the energy efficiency of appliances in the future. In the past two decades, there has been a proliferation of EES&L programs around the world, rising from only 12 in 1990 (largely concentrated in industrialized economies) to more than 60 in 2005 (including many in developing economies) (McNeil et al., 2008). Almost all of the member economies of the International Energy Agency have minimum energy performance standards (MEPS) and associated labeling programs for appliances, and all of them have policies in place to increase energy efficiency in lighting (International Energy Agency, 2009). Given this context, it is important for APEC economies to critically assess their own policies relating to appliance energy efficiency. This section contributes to that discourse by looking at policies aimed at appliance energy efficiency in both a developing economy (Philippines) and an industrialized economy (Japan) within APEC.

It should be noted that "appliances," in the context of this section, is taken to include lighting equipment in addition to appliances such as refrigerators and air-conditioners. This may be different to some treatments of energy efficiency in which lighting is considered separately from appliances, but our approach is conceptually simpler since the policies used to improve lighting energy efficiency tend to be quite similar to those used to improve energy efficiency in other appliances and equipment. A second point is that while we treat energy efficiency of appliances and that of buildings separately, the two are interlinked in the sense that building energy codes (that specify energy efficiency standards for buildings) typically set energy efficiency requirements for appliances and equipment used for heating, ventilation, and air conditioning (HVAC) as well as for lighting equipment. Thus, in practice, how energy-efficient these appliances are will be determined not just by the policies considered in this section (that specifically target appliances), but also by the economy's policies targeting energy efficiency in buildings.

2.3.1 Energy Efficiency in Household Appliances in Japan

Key findings

- Appliances (including lighting) account for 41% of Japan's household energy use. Thus, achieving its target of a 30% improvement in its energy efficiency by 2030 will require Japan to increase appliance energy efficiency.
- Japan's policy approach to increasing appliance energy efficiency combines appliance standards (i.e. the Top Runner program), a number of labeling programs, and fiscal and financial incentives.
- Japan's appliance energy efficiency policies are estimated to have led to significant energy savings, though it is unclear whether these were achieved in a cost-effective manner. Policymaking is flexible and transparent and the various authorities involved are well-aligned with each other.

Costs, benefits and promotion

- In general, the formulation of standards does not seem to consider life-cycle analysis of economic costs and benefits, so that there is no guarantee that the standards will result in societal net benefits.
- Estimated cumulative energy savings from the Top Runner program by 2010 are in the range of 110-150 TWh by 2010, or between 16-25% of Japan's energy conservation target of approximately 610 TWh by 2010. However, the costs of achieving these energy savings may be significant.
- The Top Runner program transforms the entire market and thus encourages R&D and green investments for all products in the market, including those that are already energy-efficient. However, the Top Runner program encourages incremental rather than innovative changes and R&D.
- The potential benefits from labeling and information programs is likely to be somewhat limited by their lack of alignment with standards, their comparatively limited coverage and the fact that they are not universally mandatory.

Scientific integrity

- There is evidence that the formulation of the Top Runner standards takes into account scientific evidence and analyses. However, the performance of the most energy-efficient product, which is used to formulate the standards, may not always be a suitable proxy for the energy performance level that is technically and economically feasible.

Flexibility

- Japan has revised and adjusted its appliance standards over time, developing the Top Runner program in response to the flaws of earlier appliance standards.

- The Top Runner standards are based on current energy efficiency levels and expected technological progress, meaning they automatically respond to changing market circumstances. There is, however, limited discretion on the policymaker's part to adjust the standards.

- The Top Runner program imposes standards on a weighted average of each manufacturer's products and thus allows manufacturers the flexibility to choose the products on which to focus their energy efficiency efforts, enhancing the cost-effectiveness of the standards.

Transparency

- Representatives from industries, consumer groups, and trade unions are involved in the decision-making at every level of the hierarchical decision-making structure for the formulation of the Top Runner standards and associated labels

- In general, information on various policies are readily available to the public.

Alignment

- The decision-making structure for standards and labeling programs is hierarchical and centralized, facilitating alignment and coordination among authorities.

- Regulations are not always well-aligned with one another, with labels typically not introduced in conjunction with standards and label programs often being voluntary, lessening their effectiveness at complementing the Top Runner program.

A. Size and Significance

Appliances account for a significant proportion of Japan's energy use, with 41% of household energy use in Japan accounted for by lighting and appliances (Sunikka-Blank et al., 2011). The proportion of energy used in appliances has been growing in recent years. While the energy consumption of Japan's industrial sector has remained steady since 1990 and its final energy consumption is expected to level off by 2030 (Hong et al., 2007), energy use by the commercial and residential sectors has jumped in the corresponding period. Between 1990 and 2005, final energy consumption increased from 45 Mtoe to 62 Mtoe in the commercial sector, and from 38 Mtoe to 55 Mtoe in the residential sector. Nearly half of Japan's commercial energy consumption is for heating and cooling, with appliances and heating forming the next major energy load. Growth in residential energy use, on the other hand, has been driven largely by increasing penetration of appliances (International Energy Agency, 2008).

B. Policy Formulation

(i) History and Background

Improving energy efficiency forms one of the cornerstones of Japan's energy policy. Initially, energy efficiency policies were motivated by the desire to reduce the economy's dependence on energy imports – Japan relies on imports for over 80% of its primary energy supply and 99.7% of its petroleum (Hong et al., 2007). The oil crises of the 1970s adversely affected Japan's economy prompting the enactment of the Energy Conservation Law in 1979. It is this law that forms the basis of many of Japan's future energy efficiency and conservation policies (Ministry of Economy, Trade and Industry, Japan, 2010a).

More recently, other factors have combined to provide further impetus to energy efficiency policies. After the Kyoto Protocol was issued in 1997, environmental concerns (particularly the issue of greenhouse gas emissions) began to assume greater importance in Japan's energy policy-making. In the 1998 review of Japan's Long-Term Energy Supply and Demand Outlook, which is meant to guide Japan's energy supply and demand through to 2030, environmental concerns were accorded a higher priority than before. The review identified a need for greater energy conservation, among others. In light of this review, the Ministry of Trade and Industry's (METI) 2000 review of Japan's energy policy included a strong emphasis on energy conservation measures in the industrial, residential/commercial, and transport sectors. After the Kyoto Protocol came into force in 2005, Japan established a new National Energy Strategy with the two key "pillars" are to improve Japan's energy security and to reduce its CO_2 emissions. Energy efficiency was once again identified as one of the key measures to achieve these objectives (Hong et al., 2007).

In the long-term, Japan has set a target of improving the efficiency of its energy consumption by at least 30% by 2030 (International Energy Agency, 2008). In the near-term, it set a goal of reducing its energy consumption by approximately 2.2 EJ/year (exajoules per year) by 2010.[103] To put this into context, this targeted reduction equals about 14% of total energy consumption in 2001, and is slightly greater than the amount of energy consumed every year by the nation's households (Geller et al., 2006).

Achieving its energy conservation targets will require Japan to restrict the growth in energy use of the commercial and residential sector. This in turn will require a concerted effort to improve the energy efficiency of appliances, whether it is air-conditioners and other heating and cooling equipment, electrical appliances, or lighting equipment. A recent study suggests that Japan's energy efficiency and conservation efforts could lead to potential energy savings of 57 Mtoe in the year 2030, an 11.3% reduction from Japan's Business-as-usual (BAU) consumption in that year. The key contributor, in gross terms, is the "Others" sector (which includes both the commercial and residential sectors) with 22.5 Mtoe of energy savings (Kimura, 2011).

(ii) Policy Description

MANDATES

Standards for appliances and lighting

Japan's approach towards enacting standards for appliances and lighting has undergone significant changes over the years, and it is instructive to look at the drivers of change. After the Energy Conservation Law was enacted in 1979, Japan introduced energy performance standards for refrigerators and room air-conditioners in 1983, which were later upgraded in the early to mid-1990s. Specific penalties for non-compliance were introduced in 1993 (Geller et al., 2006) and in 1994, the coverage of the standards was significantly expanded, with central air-conditioners, fluorescent lamps, televisions, copying machines, computers and magnetic disk units now included. Refrigerators, though, were not included – the manufacturers were already occupied with eliminating

[103] Using a conversion factor of 1 kWh = 3,600 kJ, 2.2 EJ is equivalent to 610 TWh.

chlorofluorocarbons (CFCs) and were temporarily given some leeway when it came to energy efficiency improvements (Nakagami et al., 1997).

The distinctive feature of Japan's earlier standards is that they were not minimum energy performance standards of the kind widely used elsewhere in the world (including the Philippines), which dictate minimum energy efficiency requirements that every product must meet. Instead, the standards applied to the shipment-weighted average efficiency level of each manufacturer – individual products were allowed to fall short of the standard provided that this was compensated for by greater efficiency levels (relative to the standards) in other appliances produced or imported by the manufacturer. The standards were set by the Ministry of International Trade and Industry (MITI), relying on proposals made by an Advisory Committee tasked with studying and developing the standards (Nakagami et al., 1997).

The earlier standards met only with modest success. Although the average efficiency level of refrigerators increased by 15% between 1979 and 1997 (Geller et al., 2006), energy efficiency in air-conditioners only increased by 6% on average by 1990 (Nakagami et al., 1997).[104] Even though the program was expanded in 1994, the required improvements in energy efficiency were very small and typically achievable either with existing technology or with only minor technological progress (Nakagami et al., 1997).

In 1998, therefore, after the revision of the Energy Conservation Law, the earlier system of performance standards was overhauled and replaced by the Top Runner program (Ministry of Economy, Trade and Industry, Japan, 2010a). Under the Top Runner program, the minimum standard that all manufacturers must meet by the end of the target period is determined by the most energy efficient product in the market at the beginning of the target period (i.e. at the time that the standard is set). The minimum standard is therefore based on market data, but also takes into account the technological potential for efficiency improvement in the future i.e. if there is a high potential for energy efficient improvements in the future due to technological change, irrespective of whether the standards are imposed, the standard of energy efficiency set will be higher than the energy efficiency of the current Top Runner.

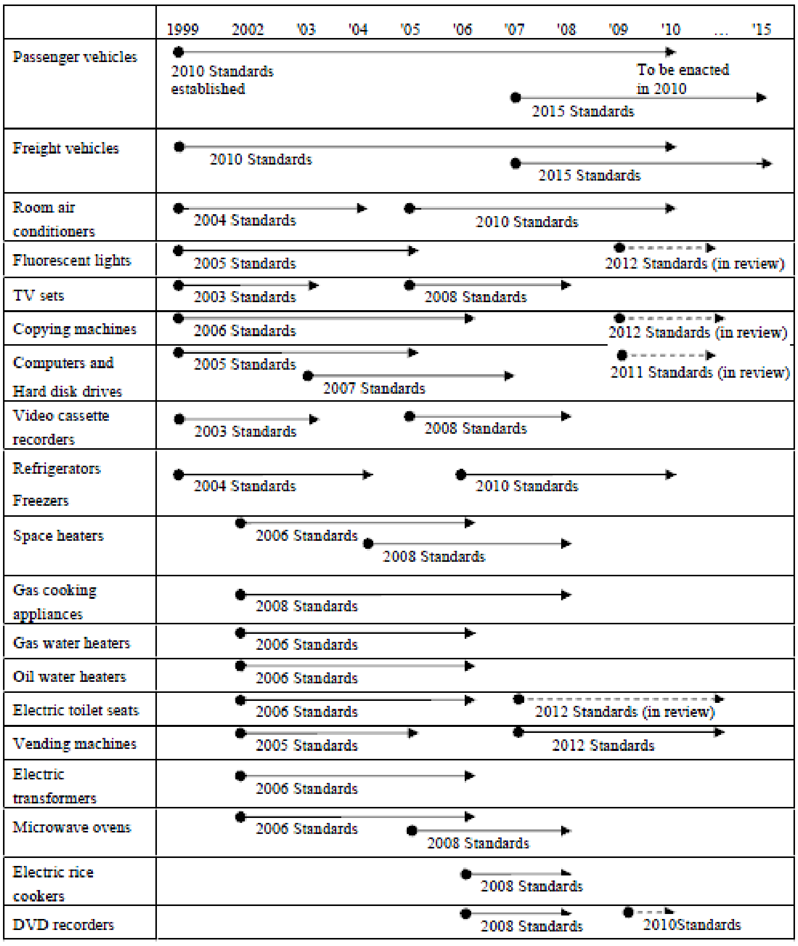
In addition, the Top Runner program does not impose a uniform standard on all products within a specified category. Instead, the exact standard imposed on a particular product depends on various parameters such as size, weight, and technology type, all of which can affect the energy efficiency of a product irrespective of the manufacturer's efforts to improve efficiency. Finally, similar to the earlier standards, the Top Runner standard does not apply to every product produced by the manufacturer. The manufacturer instead has to ensure that the weighted average of all the products it sells in a particular category in a particular year (e.g. all of its refrigerators sold in 2007) achieves the Top Runner standards (Kimura, 2010).

The targets are mandatory, though penalties for noncompliance are based on an unusual "name and shame" approach. If a manufacturer does not comply with the standard, The Ministry of Economy, Trade and Industry first issues a recommendation to the producer to improve the energy efficiency of its products. If the producer continues not to comply, the Ministry makes the recommendation public and finally orders the manufacturer to comply with the recommendations

[104] Although refrigerators were eventually not included in the standards program of the early 1990s, energy efficiency improvements in refrigerators had already taken place since manufacturers had expected standards to be enacted for refrigerators as well (Nakagami et al., 1997).

(Kimura, 2010). The "name and shame" approach is also utilized by Japan in enforcing its building energy codes, as we saw in the Japan Buildings Case Study.

Figure 2.3.1 ***Scope and target year of the Top Runner Standards***



Source: Kimura, 2010.

Initially the Top Runner program applied to 13 products, most of which were appliances and lighting equipment: gasoline passenger cars, diesel passenger cars, gasoline and diesel trucks, air-conditioners, heat pumps, fluorescent lamps, refrigerators, TVs, computers, VCRs, magnetic disc drives, and copying units (Geller et al., 2006). By 2001, vending machines and electric toilet seats had been incorporated into the Top Runner program (Ministry of Economy, Trade and Industry, Japan, 2010a). All of these products were required to achieve energy efficiency improvements, according to the benchmark set by the Top Runner product, within a target year that lay between 2003 and 2007 (varying depending on the product category). Coverage has been expanded even further for the next target period – the Top Runner program currently comprises 23 product categories (see Figure 2.3.1). Product categories are included in the Top Runner program if they satisfy three basic criteria: 1) the machinery and equipment is used in large quantities in Japan, 2) the machinery and equipment consumes considerable amounts of energy while in use, and 3) the machinery and equipment requires considerable effort to improve its energy consumption efficiency (Ministry of Economy, Trade and Industry, Japan, 2010a).

INFORMATION PROGRAMS

Appliance Labeling

Unlike Philippines and many other economies, where appliance standards and labeling programs were introduced and developed concurrently, labels and standards have evolved at different rates in Japan. While standards have been around since 1983, energy efficiency labels are a relatively recent addition to Japan's policy approach towards raising energy efficiency in appliances.

The most important among the labeling programs is the Energy Saving Labeling Program that was launched in 1998, around the same time that the Top Runner program was introduced. Under this scheme, labels come in two colors – green if the product has already met the Top Runner standard, and red if it hasn't. Since 2002, the label also displays the performance of the product relative to the Top Runner (Geller et al., 2006), so that consumers can find out from the label not just whether the product has met the standard, but also the extent to which it has done so.

Currently, the label shows four items – the performance relative to the Top Runner program, energy saving standard achievement rate, energy consumption efficiency, and the target fiscal year. Participation in the scheme is voluntary for manufacturers of the products covered (Ministry of Economy, Trade and Industry, Japan, 2010a). However, according to Article 20 of the Energy Conservation Law, all producers of the products targeted under the Top Runner program are required to provide information on the energy efficiency of their products (Swedish Environmental Protection Agency, 2005). Thus, manufacturers have to display the information. They can only choose how to provide the information, whether by participating in the Energy Saving Labeling Program or in some other way.

While the Top Runner program initially covered 13 product categories, only 5 of these were initially covered under the Energy Saving Labeling Program – air-conditioners, refrigerators, freezers, televisions and fluorescent lights (Geller et al., 2006; Ministry of Economy, Trade and Industry, Japan, 2010a). The range of products covered by the labeling program has increased considerably since then, with 16 product categories covered as of July 2010 (see Table 2.3.1 below). In addition to the original five, the coverage now includes space heaters, gas cooking appliances, gas water heaters, oil water heaters, electric toilet seats, computers, magnetic disk units, transformers, microwave ovens, jar rice cookers, and DVD recorders (Ministry of Economy, Trade and Industry, Japan, 2010a). However, the extent of coverage is still by some degree lower than that achieved by the Top Runner program, which currently covers a total of 23 product categories.

In addition to requiring manufacturers to provide information, Japan has, since 2006 (when the revised Energy Conservation Law came into effect), required retailers to provide information on the energy efficiency of the products they sell, the rationale being "the importance of retailers' role as an interface to customers" (Ministry of Economy, Trade and Industry, Japan, 2010a). Under the Label Display Program for Retailers, retailers are required to use the Uniform Energy-Saving Label when displaying air-conditioners, electric refrigerators (freezers) and TV sets (the products with wide variation in energy-saving performance) in their shops; the label includes the multistage rating (that uses one to five stars to represent the relative position of the product in the market with respect to energy-saving performance), the expected electricity bill as well as the information displayed on the Energy-Saving Label.

For eight other products covered by the Energy-Saving Labeling Scheme, retailers are required to display the expected annual electricity bill (or expected annual fuel usage for gas/oil equipment) together with the Energy-Saving Label. Finally, under the Energy Efficient Product Retailer Assessment Program, retail outlets that provide information on energy efficiency and conservation of their products or actively promote energy-efficient appliances are selected as "Outlets that Excel at Promoting Energy-Efficient Products" and the results are publicly announced through newspapers, magazines, etc. (Ministry of Economy, Trade and Industry, Japan, 2010a).

Table 2.3.1 ***Product categories covered by Energy Saving Labeling Program and Label Display Program***

Target Products Covered by the Labeling Program			
Top Runner target machinery and equipment	Energy-Saving Labeling Program	Expected annual electricity bill	Uniform Energy-Saving Label
Air conditioners	●	●	●
TV sets	●	●	●
Electric refrigerators	●	●	●
Electric freezers	●	●	
Electric rice cookers	●	●	
Microwave ovens	●	●	
Lighting equipment	●	●	●
Electric toilet seats	●	●	●
DVD recorders	●	●	
VCRs		●	
Space heaters	●		
Gas cooking appliances	●	● (Fuel usage)	
Gas water heaters	●	● (Fuel usage)	
Oil water heaters	●	● (Fuel usage)	
Computers	●		
Magnetic disk units	●		
Transformers	●		
Copying machines			
Vending machines			
Passenger Vehicles			
Freight Vehicles			
Routers*	▲		
Switching units*	▲		

[shaded] Products covered by label display program for retailers: * Routers and Switching units are scheduled for addition within 2010.

Source: (Ministry of Economy, Trade and Industry, Japan, 2010a)

Separately, office equipments in Japan are also covered by the international Energy Star program. Personal computers, displays, printers, facsimile, and copying machines that meet the Energy Star standards can affix the Energy Star logo (Geller et al, 2006). The Energy Conservation Centre, Japan, administers this program on behalf of the METI (ENERGY STAR, n.d., *International Partners*).

FISCAL AND FINANCIAL INCENTIVES

Most of the fiscal and financial incentives used by Japan to encourage energy conservation in buildings are likely to simultaneously encourage efficiency improvements in appliances, given that energy efficiency in buildings is linked to the energy efficiency of its appliances. A detailed discussion of these incentives can be found in the Japan Buildings Case Study.

Japan has implemented some incentive schemes that are specifically targeted at appliances. From May 2009 to March 2011, the Japanese government developed the Eco-Point system, as part of a stimulus package in response to the financial crisis of 2008. Essentially, the system rewards consumers with "eco-points" for purchases of digital terrestrial broadcasting (DTB) televisions, air conditioners, and refrigerators that are energy-efficient and have eco-labels indicating four stars or more. These eco-points can then be redeemed for gifts cards, prepaid cards, or other goods and services including LED bulbs (Ministry of the Environment, Japan et al., 2011). Points could be earned for between 5% and 10% of the total product price, up to US$ 410 (Vare, 2010). The budget for the program was 693 billion yen (approximately US$ 6.9 billion) (Ministry of the Environment, Japan et al., 2011). In addition, the Japan Electro-Heat Centre, Toshi-gas Shinko Center, the Conference of LP Gas Associated Organizations, and Petroleum Association of Japan all provide subsidies in support of projects that introduce high efficiency water heaters (Asia Energy Efficiency and Conservation Collaboration Center, 2010).

C. Regulatory Review

ECONOMIC EFFICIENCY AND EFFECTIVENESS

(i) Costs, Benefits, and Promotion

The Top Runner program does not include an economic life-cycle analysis that goes into the formulation of the standards. This is in part because, by design, the policymakers do not have the discretion to set the standards, since the standards set depend on the energy-efficiency performance of existing products and certain exogenous parameters such as the expected rate of technological progress. While the Top Runner program guarantees an increase in the energy efficiency of the targeted appliances up to the level of the current Top Runner product, there is no guarantee that socially optimal outcomes will necessarily be achieved, as standards may be too lax or too stringent (International Energy Agency, 2003) and may result in product prices that are too high (Kimura, 2010).

Even though the policymakers do not retain a great deal of control over the standards that are ultimately set, the fact that ex-ante life-cycle analysis of the standards is typically not carried out by the competent authority (METI) is potentially undesirable. The full economic implications of the program remain unknown when a given set of standards is adopted (International Energy Agency, 2003). Even if the standards themselves cannot respond to such information, other policies could be adjusted or formulated in response to ex-ante analysis of the impact of the Top Runner program. For example, if prices are expected to increase to high levels due to the standards, suitable mitigation measures could then be adopted by the government.

Whether the Top Runner program helped to maximize benefits and minimize costs can be assessed by looking at a combination of different criteria:

1) Coverage and compliance

A wide range of appliances were covered by the Top Runner program at its very inception, and coverage has only increased in recent years, with 23 product categories now included. These include most of the appliances and equipment that are major users of energy use, such as air-conditioners, refrigerators, electronic appliances and lighting equipment (where there are standards for CFLs, electronic, and magnetic ballasts as well as a variety of different fluorescent lamps – see Ministry of

Economy, Trade and Industry, Japan, 2010a). As a result, as much as two-thirds of residential energy use is thought to be covered under the Top Runner scheme (Nordqvist, 2006).

2) Energy efficiency targets

Another way of assessing the program is to quantify the extent to which the energy efficiency targets set for individual products have been achieved, thus far. How different product categories fared for the first assessment period (with target periods between 2003 and 2007) can be seen in Table 2.3.2 below.

As Table 2.3.2 shows, all of the products in the Top Runner program, on average, exceeded their energy efficiency targets. Some of them did so by a considerable margin, in particular copying machines and refrigerators which exceeded their targets by an order of 2 (approximately). For refrigerators, computers, copying machines, air-conditioners, VCRs and magnetic disk units, efficiency gains of more than 50% were achieved over the target period. Moreover, as indicated by the fact that no manufacturer has so far been advertised as noncompliant (Kimura, 2010), compliance rates are high, indicating that energy efficiency improvements were achieved not just by a few manufacturers but by the market as a whole.

Table 2.3.2 *Energy efficiency improvements- actual vs. Top Runner target*

Product category	Energy efficiency improvement (result)	Energy efficiency improvement (initial expectation)
TV receivers (TV sets using CRTs)	25.7% (FY 1997 → FY 2003)	16.4%
VCRs	73.6% (FY 1997 → FY 2003)	58.7%
Air conditioners * (Room air conditioners)	67.8% (FY 1997 → 2004 freezing year)	66.1%
Electric refrigerators	55.2% (FY 1998 → FY 2004)	30.5%
Electric freezers	29.6% (FY 1998 → FY 2004)	22.9%
Gasoline passenger vehicles *	22.8% (FY 1995 → FY 2005)	22.8% (FY 1995 → FY 2010)
Diesel freight vehicles *	21.7% (FY 1995 → FY 2005)	6.5%
Vending machines	37.3% (FY 2000 → FY 2005)	33.9%
Fluorescent light equipment *	35.7% (FY 1997 → FY 2005)	16.6%
Copying machines	72.5% (FY 1997 → FY 2006)	30.8%
Computers *	80.8% (FY 2001 → FY 2007)	69.2%
Magnetic disk units *	85.7% (FY 2001 → FY 2007)	71.4%
Electric toilet seats	14.6% (FY 2000 → FY 2006)	10.0%

Source: Ministry of Economy, Trade and Industry, Japan, 2010a

Note: For the product categories marked with *, energy efficiency standard values are defined by the energy consumption efficiency (e.g. km/l), while the standard value for categories without * are defined by the energy consumption (e.g. kWh/year).

It is not immediately apparent whether the energy efficiency gains in Table 2.3.2 are as a result of the Top Runner program. Kimura (2010) argues, using the examples of room air-conditioners and passenger vehicles, that the Top Runner program most likely had a significant positive impact on the energy efficiency of the products covered. With room air-conditioners, for instance, energy efficiency improvements had stagnated in the early to mid-1990s, but energy efficiency began to grow rapidly after the Top Runner program was introduced in 1998, all the way until 2006 (even after the first target year of 2004 had passed, indicating the continuing effectiveness of the Top Runner standards for air-conditioners).

3) Energy savings

There is sparse literature on the subject of the energy savings actually achieved by the Top Runner program. There are, however, a number of estimates of the net energy savings *anticipated* from the Top Runner program. In general, they suggest that the Top Runner program can be expected to produce significant energy savings, consistent with the rise in energy efficiency highlighted earlier.

The International Energy Agency (2002) estimated energy savings from the Top Runner program to reach 0.35 EJ (= 97 TWh) by 2010. This is approximately 16% of Japan's target of reducing its energy consumption by 2.2 EJ (= 610 TWh) by 2010 or 17.5% of Japan's total annual household energy consumption of approximately 2 EJ (= 555 TWh) (Geller et al., 2006). Nordqvist (2006) estimated that energy savings from the Top Runner program by 2010 could be even more significant, reaching roughly 0.4–0.55 EJ (= 110–150 TWh) by 2010 (with 0.2 EJ [= 56 TWh] of savings from the residential sector and 0.2-0.35 EJ [= 56-97 TWh] of savings from the commercial sector). The Top Runner program alone, therefore, was anticipated to contribute between 16–25% of Japan's energy conservation target of approximately 2.2 EJ (= 610 TWh) by 2010. A definitive conclusion on how much the Top Runner program actually contributed to energy savings (as opposed to the expected energy savings) is, however, yet to be reached.

4) Costs and benefits

There is no guarantee, from a welfare-maximizing perspective, that the Top Runner standards will be set at the optimal level; the standards might be either too stringent or too lax. The argument could be made that since the compliance rates are high and efficiency improvements have on average significantly exceeded, the targets set by the Top Runner program are too lax. However, comparing energy efficiency standards across Japan, Europe, and the US (for those products where comparison is possible), a 2003 study by the Energy Conservation Center, Japan found that Top Runner standards set in Japan compare favorably, when it comes to stringency of targets, to standards set in the US and Europe, with the energy efficiency of Japanese refrigerators and air-conditioners the highest among the 3 (cited in Swedish Environmental Protection Agency, 2005).

It is even possible that the targets are too stringent for some appliances, leading to the promotion of appliances that are energy-efficient but not cost-effective. Kimura (2010), for instance, estimated payback periods for energy efficient air-conditioners sold in the winter of 2006 in Japan and found that many of the efficient models require more than 10–15 years for payback, which implies a payback period greater than the lifetime of a typical air-conditioner. This would suggest that in many cases, the consumer's gains in terms of lower energy costs are outweighed by the higher price of the efficient air-conditioner, yet such models remain in the market since more cost-effective air-conditioners are 'weeded' out by the Top Runner program.

As there is no guarantee that the Top Runner program will lead to a socially optimal outcome, the fact that ex-post analysis of the full economic implications of past standards is typically not carried out is unfortunate, since it forgoes the opportunity to properly evaluate whether the Top Runner framework should be in place and how it can be improved in order to maximize net social benefits.

5) Incentive for R&D and green investments

By pushing manufacturers of a variety of appliances and equipment to invest in greater energy efficiency of their products, the Top Runner product can be said to have encouraged R&D and green investments in Japan. The high compliance rate of manufacturers suggests that the Top Runner program has achieved greater energy efficiency in a 'positive' way by encouraging greater green investments by manufacturers, rather than in a 'negative' way by driving out manufacturers who fail to meet the standard.

A purported favorable aspect of the Top Runner program over minimum energy performance standards for appliances, is that it transforms the entire market (since by definition, all the appliances in the market will have to achieve some level of energy efficiency gains) and thus universally encourages R&D and green investments. With minimum standards, by contrast, the standard set may lie well below that of the most energy-efficient product, meaning that is the standards provide little incentive for producers that already exceed the standard to carry out further green investments or R&D into energy efficiency.

However, the Top Runner program encourages incremental rather than innovative change, since the ambition of the standard set is limited by the energy efficiency of appliances already on the market. The unique structure of the Top Runner program also creates possibilities for collusion, with manufacturers potentially colluding either tacitly or overtly to restrain energy efficiency improvements so as to receive more lax targets in the future (International Energy Agency, 2003).

There are possible disincentives for green investment and R&D by manufacturers of products that are already very energy-efficient and at or near the Top Runner level, since if they achieve further energy efficiency gains, their new levels of energy efficiency will simply be used as the benchmark for the succeeding period. On the other hand, the Top Runner program might also encourage such manufacturers to increase the energy efficiency of their products even further so as to increase the stringency of the Top Runner targets in the following period and thus drive out competitors.

Labeling and information programs are comparatively recent and there is a lack of quantitative estimates of their impact on societal welfare. In general, such programs work best when they complement mandatory standards. The Top Runner program ensures that manufacturers work to improve energy efficiency, but labels can augment that effect even further by increasing consumer demand for energy-efficient appliances. Energy Saving Labels, since their introduction, have been effective in providing consumers, retailers as well as manufacturers with a simple benchmark for evaluating appliance energy efficiency, thus potentially boosting manufacturers' incentives to comply with the standards (Swedish Environmental Protection Agency, 2005).

On the other hand, it is probable that the gains from such labeling programs could be even higher. As already pointed out, their coverage is incomplete, with many Top Runner programs not yet covered. Moreover, their voluntary nature impedes their potential effectiveness. Admittedly it is still mandatory for manufacturers to indicate their products' energy efficiency level, but a key benefit of Japan's labeling programs, such as the Energy Saving Labeling Program and the Label Display Program for Retailers, is that they give consumers information such as *relative* energy efficiency and expected electricity bill that might well be a better guide to decision-making than simply the energy efficiency level. The voluntary nature of these schemes means that if a manufacturer decides not to use these labels and display only the energy efficiency level of its products, the benefits of greater information provision will be significantly diminished. Increasing the coverage of the labeling programs and making them mandatory would, however, also lead to higher costs incurred by manufacturers and retailers in complying with the labeling requirements, and hence would be justified only if the additional benefits outweighed these costs.

The Eco-Point system has contributed to significantly increased sales of the three types of energy-efficient as well as increased purchases of energy-efficient LED bulbs (which is one of the items eco-points could be exchanged for). The market penetration of energy-efficient home appliances has also increased considerably since the program was enacted. The Eco-Point system is likely to have saved significant amounts of energy, as the associated reductions in CO_2 emissions have been estimated at 2.7 million tons per year (Ministry of the Environment et al., 2011). However it is unclear whether the energy savings and environmental benefits, as well as other benefits such as the stimulus effect on the macro-economy, are justified at the program cost of US$6.9 billion. In addition, DTB TVs are large and use up more energy (even if the energy is used more efficiently), and it is not clear whether replacing inefficient smaller TVs with more efficient but larger DTB TVs actually led to major energy savings (Vare, 2010).

Some of the ways the existing measures can be improved are:

1) For both the Top Runner program and the various labeling schemes, ex-ante analysis of the potential economic and environmental impacts should be carried out in order to better ground the policies as contributing to maximizing welfare, while ex-post analysis of costs and benefits is needed to improve evaluation of past policies. This is particularly critical for the Top Runner program, where there exist particular risks for a sub-optimal outcome by having too stringent standards that lead to energy efficiency improvements that are not cost-effective (as might be the case for air-conditioners).

2) The Top Runner program should also be modified so as to reward energy efficiency improvements from manufacturers that are close to the efficiency level of the Top Runner. One possible way to do so is to reward the Top Runner at the beginning of each target period.

(ii) Scientific integrity

There is evidence that the formulation of the Top Runner standards takes into account scientific evidence and analysis. The standards are differentiated across various products based on a number of relevant parameters that affect the appliance energy efficiency, such as size, weight and technology (Kimura, 2010). Differentiation is also carried out by dividing products into separate categories where possible, with the targets for individual categories distinct from one another (e.g. DVD recorders are categorized as “HDD” or “VCR”) (Ministry of Economy, Trade and Industry, Japan, 2010a). This ensures that the target for a given product is one that is applicable to that product and technically feasible. In addition, the standards are updated on a regular basis, meaning they are unlikely to be out-of-date at any given point in time.

One potential disadvantage of the Top Runner standards, from a scientific standpoint, is that they are based on the energy performance level of the most energy-efficient product that already exists in the market, rather than the highest energy performance level that is technically and economically feasible, but may not yet have been realized by any product in the market. The regulatory process for the formulation of the standards does, however, take into account expected technological progress. If there exists significant technological potential for improvements in energy efficiency for a given product, the target is adjusted accordingly and made more stringent (Ministry of Economy, Trade and Industry, Japan, 2010a), though it is unclear how exactly the adjustment is made.

(iii) Flexibility

Japan has demonstrated a willingness to revise and adjust its appliance standards program over time. The relative lack of effectiveness of its earlier standards led Japan to expand the program in 1994. When the standards continued to have only a moderate effect on the energy efficiency of appliances in Japan, they were completely overhauled in 1998 and replaced with the Top Runner program. The Top Runner methodology for determining the standards was both developed and implemented in a relatively short time, demonstrating flexibility in policymaking.

One of the key strengths of the Top Runner program is its built-in flexibility. By imposing standards on a weighted average of the manufacturer's products, the program gives manufacturers the flexibility to decide how to achieve the energy efficiency target, and if necessary respond to changing circumstances by increasing their energy efficiency efforts in some products and reducing them in other products. Moreover, the fact that the Top Runner program sets differentiated targets for different producers depending on a number of exogenous parameters increases the extent to which the program is flexible.

The Top Runner program is also responsive when it comes to updating of the standards. Because future standards under the program are based on current energy efficiency levels and current projections of technological progress, any standards set take into account the actual market scenario faced by manufacturers, meaning that the Top Runner standards are responsive to changing circumstances. In addition, the process for setting standards is flexible enough that consultative deliberations for determining future standards can be re-opened even before the target year (Nordqvist, 2006).

Against all this, however, is the fact that the Top Runner program risks being inflexible from the policymakers' perspective. Given that the procedure for determining standards is clearly defined as a function of a limited set of variables (such as energy efficiency of current appliances, technological progress etc), there is limited discretion on the policymaker's part to adjust the standards in response to a change in some variable other than the ones explicitly taken into account in the setting of the standards.

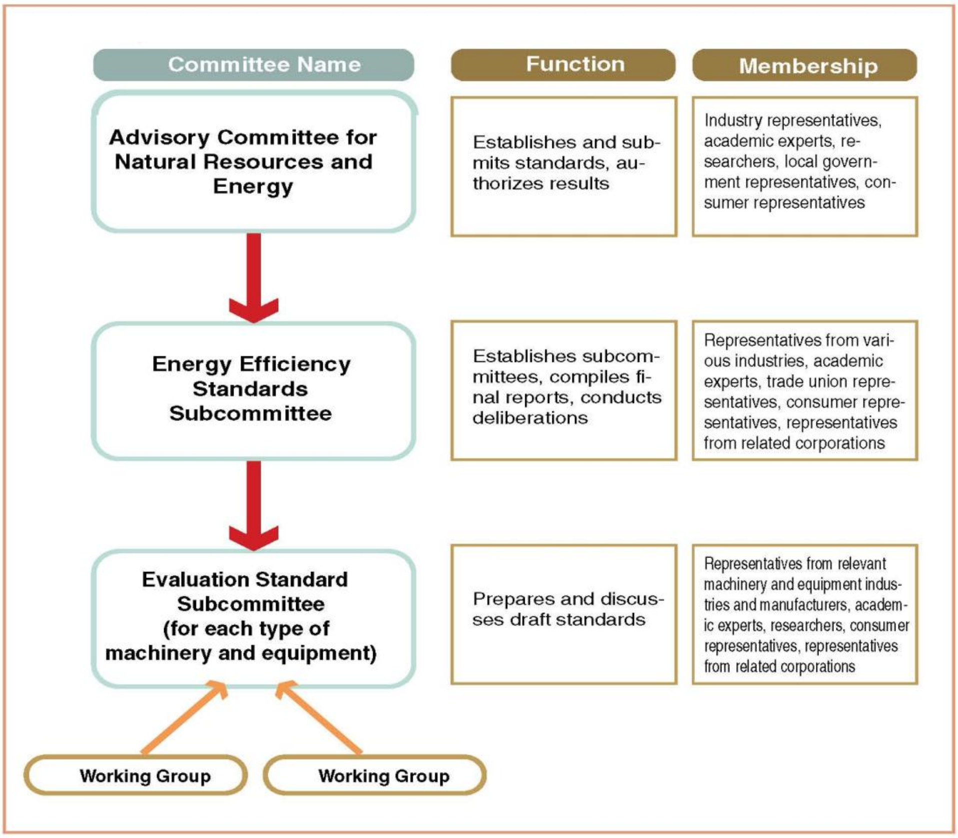
The voluntary nature of the Energy Saving Labeling Program means that it is inherently flexible for manufacturers. They can, for instance, choose to eschew the Energy Saving Label altogether if they can come up with an alternative way of displaying their energy efficiency. However, retailers who are covered by the mandatory Label Display Program for Retailers face a relatively inflexible obligation which may be difficult to fulfill if, for instance, the manufacturer does not provide the retailer with complete energy efficiency information on its products.

ADMINISTRATIVE AND POLITICAL VIABILITY

(iv) Transparency

The administrative process by which energy efficiency standards are established under the Top Runner program is depicted in Figure 2.3.2. The Ministry of Economy, Trade and Industry (METI) is the government authority ultimately in charge of determining standards (Kimura, 2010). The Advisory Committee for Natural Resources and Energy is an advisory body to the METI and deliberates on Japan's energy conservation policies. The Energy Efficiency Standards Subcommittee, within the Advisory Committee, deliberates on appliance standards, based on draft standards developed by Evaluation Standard Subcommittees, each of which is devoted to a specific product category. The same hierarchical structure also functions to deliberate on energy efficiency labeling, whether for manufacturers under the Energy Saving Labeling Program or for retailers under the Label Display Program for Retailers (Ministry of Economy, Trade and Industry, Japan, 2010a).

Figure 2.3.2 ***Process for establishing Top Runner standards and associated labels***



Source: Ministry of Economy, Trade and Industry, Japan (2010a)

There is scope for stakeholders' views to be reflected in the final Top Runner standards. The Ministry of Economy, Trade and Industry, Japan (2010a) points out how the regulatory process sometimes yields difficult deliberations regarding whether a particular type of equipment should be included under the Top Runner program. Even for products that are already in the Top Runner program, factors other than the energy efficiency of the Top Runner product – such as the differentiated parameters and the definitions and delineations of the various product groups – also impact on the final set of standards adopted and, since they are not necessarily fixed or pre-determined, may be adjusted to reflect stakeholder views. For labels, similarly, the authorities retain discretion over which products are to be included, meaning there is scope for stakeholders to have a say in the final list of products that are to be brought under the labeling program(s). A major indicator of stakeholder engagement is the fact that stakeholders (in particular, industry) have been accepting of the Top Runner program and have been active in cooperating with the authorities as well as in deliberating on the standards (Nordqvist, 2006).

Detailed information on the Top Runner program and the associated labeling & information programs (i.e. the Energy Saving Labeling Program, Label Display Program for Retailers and the Energy Efficient Product Retailer Assessment Program) is available in METI's publication "Top

Runner Program: Developing the World's best Energy-Efficient Program," which is available online at the METI website.[105] This publication, which is updated regularly to take into account changes in policies, contains an overview of the rationale for standards and labels, how they are designed, and how they work. In addition, the publication provides detailed information on the Top Runner standards for each of the products covered by the scheme, and includes pictorial representations of what the Energy Saving Label and the Uniform Energy-Saving Label look like so as to facilitate consumer recognition of the labels. Basic information on the Energy Star program is available from the Energy Star website,[106] while the Energy Conservation Center, Japan (ECCJ) maintains a website which details the manufacturers and their respective products that are registered under the Energy Star program.[107]

In addition, the ECCJ is responsible for disseminating information on energy conservation and plays an active role in informing the general public as well as commercial and industrial stakeholders on energy efficiency programs and policies, by subsidizing various promotional campaigns and advertising in the media (International Energy Agency, 2008). Thus the role played by the ECCJ further enhances the transparency of Japan's appliance energy efficiency policies.

(v) Alignment

As Figure 2.3.2 above illustrates, the decision-making process for standards and labels, while reflecting viewpoints from a variety of different stakeholders, is also highly centralized, with only one government ministry in charge (i.e. the METI), and has a clear hierarchical structure. Such a structure, by its very nature, facilitates alignment and coordination among authorities. Alignment is further boosted by the fact there is a clearly defined process for determining standards, with pre-established guidelines dictating much of the process (these guidelines can be found in Ministry of Economy, Trade and Industry, Japan, 2010b). One indicator suggesting that government authorities in charge of designing policies are well-aligned is the fact that the decision-making process for establishing standards tends to be relatively quick, usually taking about a year or two (Kimura, 2010). Indeed, this is one of the key reasons, according to the Ministry of Economy, Trade and Industry, Japan (2010b), behind the switch from its earlier system of energy efficiency standards to the current Top Runner system. By simplifying the process of establishing standards (since stakeholders can no longer explicitly bargain on what exactly the standard should be), greater alignment has arguably been achieved.

Evidence that regulations are aligned among each other is less conclusive. Unlike the Philippines, where standard-setting and labeling have often proceeded hand-in-hand, the same has not always been true in Japan. As noted earlier, standards in Japan were introduced in advance of labels, while labels do not cover all the products that are subject to standards under the Top Runner program. Moreover, the Energy Saving Labeling scheme, under which manufacturers have to indicate whether their products are satisfying the Top Runner standard and the extent to which they are doing so, is voluntary. Manufacturers are obligated (under the Energy Conservation Law) only to report the energy efficiency of their products, but that risks leaving the consumers uninformed about the product's relative performance under the Top Runner program. This lack of alignment could limit the potential gains from the Top Runner program. It is true that the Label Display Program obligates

[105] The publication can be found here: http://www.enecho.meti.go.jp/policy/saveenergy/toprunner2011.03en-1103.pdf.
[106] See http://www.energystar.gov
[107] See http://www.energystar.jp/index_esu.html

retailers to display information on, among others, the performance of the product with respect to the Top Runner, but its coverage of products is even more limited than that of the Energy Saving Labeling Scheme.

2.3.2 Energy Efficiency in Household Appliances in the Philippines

Key findings

- Increasing the energy efficiency of appliances (including lighting) in the Philippines could reduce cumulative energy consumption between 2010 and 2030 by as much as 150.3 TWh, which forms roughly 45% of Philippines' goal of achieving total energy savings of 10% by 2030.

- The Philippines' policy approach to increasing appliance energy efficiency combines mandates (including minimum energy performance standards for appliances, and lighting retrofits), information programs, and fiscal and financial incentives (including distribution of compact fluorescent lamps (CFLs), and a hire-purchase scheme for purchases of energy-efficient appliances).

- The Philippines' appliance standards and labels have led to significant energy savings in recent years at an unknown cost, while recently introduced policies under the Philippine Energy Efficiency Program and the Clean Investment Plan are expected to lead to net social benefits. The effectiveness of the policymaking process can be constrained by irregular policy updates, lack of flexibility, and lack of alignment among authorities.

Costs, benefits and promotion

- Appliance standards and labels led to energy savings of 7 TWh in 2009 and 9.1 TWh in 2010, which accounted for around 11% of the Philippine's energy conservation target. However the costs of achieving these savings are unknown. The formulation of standards could be improved if economic cost-benefit analysis is conducted.

- The National Residential Lighting Program, the Retrofit of Government Office Buildings and the Public Lighting Retrofit Program were expected to lead to net social benefits of $106 million over a 5-year period. Actual net social benefits are likely to be lower due to the delay in the distribution of CFLs under the National Residential Lighting Program.

- The Energy Efficiency Component of the Clean Investment Plan is expected to lead to net social benefits, with the present value of the energy saving benefits expected to outweigh the initial costs in less than 2 years.

- Only a few Energy Service Companies (ESCOs) operate in the Philippines. Policies aimed at improving energy efficiency in appliances have not been effective at incentivizing ESCOs. A number of barriers have impeded the development, including limited access to funds, lack of flagship projects, lack of technical evaluation and lack of awareness of end-users and business managers.

Scientific integrity

- While minimum energy performance standards in the Philippines are based on scientific evidence and analysis, they are not updated on a regular basis and the testing capacity is limited since there is only one accredited facility to check whether or not products comply with standards.

Flexibility

- Lags in policymaking and the rigidity of mandatory minimum energy performance standards constrain flexibility in the efforts to build proper energy efficiency policies.

Transparency

- Most of the Philippines' policies reflect a strong degree of stakeholder engagement in the formulation process, with manufacturers directly involved in the setting of standards and in projects such as the Efficient Lighting Initiative.
- Information on appliance standards and the labeling program is not easily available and occasionally outdated. Information on other policies relating to appliances is generally readily accessible.

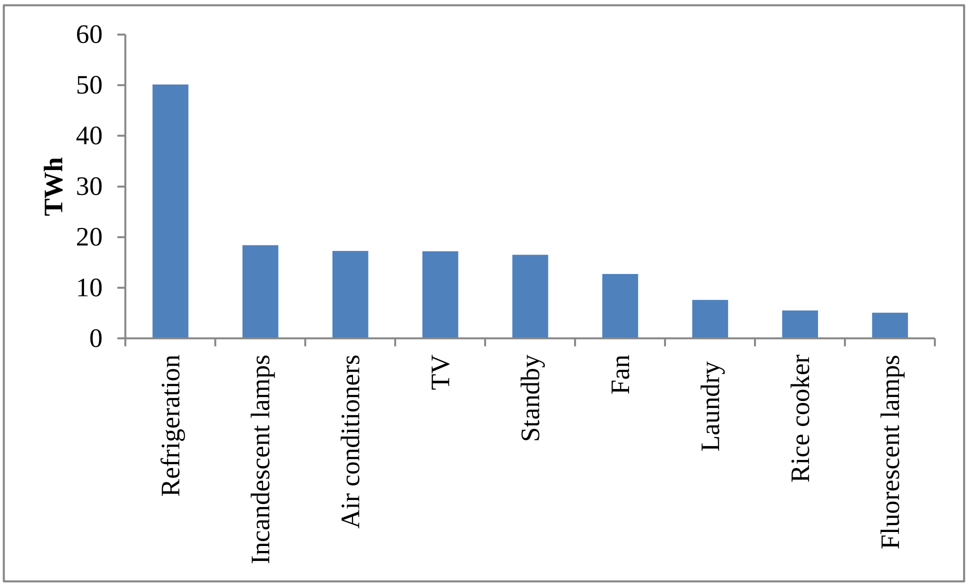
Alignment

- Alignment between the various authorities involved has been a challenge in certain cases. For example, coordination problems have contributed to delays in the distribution of CFLs under the National Residential Lighting Program as well as the cancellation of the plan to create a super ESCO.
- The Philippines' policies are generally well-aligned with each other, with labels implemented so as to complement appliance standards and the various incentive schemes designed so as to increase the effectiveness of standards and labels.
- Fiscal and financial incentives are also well-aligned with the standards and labeling program in the sense that they help to address market failure, capital market barriers, and information barriers.

A. Size and Significance

The potential for energy savings from appliances in the Philippines is considerable – a recent study estimated that between 2010 and 2030, the cumulative energy savings from implementing minimum energy performance standards and labels in Philippines could amount to as much as 150.3 TWh (APEC, Energy Working Group 2010). Figure 2.3.3 below illustrates the breakdown of such savings among different types of appliances.

Figure 2.3.3 ***Estimated cumulative energy savings potential, 2010 – 2030 (TWh)***



Source: APEC Energy Working Group, 2010

By far the greatest potential for energy savings lies in refrigeration at 50.1 TWh (one-third of the total energy savings potential of 150.3 TWh in appliances). Other appliances with significant potential for energy savings include incandescent lamps, air-conditioners, televisions and fans. It should be noted, however, that although by 2030 refrigeration will account for the greatest potential energy savings, improving the energy efficiency of lighting (in particular by replacing incandescent lamps) will lead to the largest energy savings (potentially) in the near-term (APEC Energy Working Group, 2010).

B. Policy Formulation

(i) History and Background

The Philippines is a net importer of energy, with 57% of its primary energy met from domestic sources (Rein and Cruz, 2011). This state of affairs has motivated the Philippine government to adopt a long-term goal of energy independence – a goal that underlies much of Philippine's energy policy discourse and has driven its efforts towards increasing energy efficiency and conservation. After frequent power shortages in the 1980s, the Philippine government committed to promoting energy conservation and this was recognized in the National Energy Plans set by the Department of Energy (Egan, 1999). Given the significant potential for energy savings from appliances, tackling energy efficiency in appliances forms a crucial element of the Philippines' efforts to achieve these energy conservation targets.

Recent iterations of the Philippine Energy Plan have included concrete targets for energy efficiency and conservation. The Mid-Term Philippine Energy Plan (2005a) included the National Energy Efficiency and Conservation Program (NEECP), with a target of 10% energy savings on total annual demand of all economic sectors by 2014. This amounts to total energy savings of 229 Million Barrels of Fuel Oil Equivalent (MMBFOE) (= 146 TWh) in the 2005-2014 period (Department of Energy, Philippines, 2005a). The Long-Term Philippine Energy Plan (2009) sets a similar target of 10% energy savings on total annual demand of all economic sectors by 2030 (Department of Energy, 2009). This amounts to total energy savings of around 524 MMBFOE (=334 TWh) in the 2009-2030 period (Suryadi, 2011). In addition to setting the energy saving targets, the National Energy Efficiency and Conservation Program also includes appliance standards and appliance labels, two of the major policy tools utilized by the Philippines in order to enhance energy efficiency in appliances.

In addition to the Philippine Energy Plan and the National Energy Efficiency and Conservation Program, the other major policy framework that forms the basis of the Philippine's energy efficiency policies in the appliance sector is the Philippine Energy Efficiency Project (PEEP). The Philippine Energy Efficiency Project started in February 2010 and is being led by the Department of Energy, with financial assistance from the Asian Development Bank (ADB). The project is the successor to the Philippine Efficient Lighting Market Transformation Program (PELMATP), which operated from 2005 to 2009 and was aimed at removing the barriers to the widespread use of energy efficient lighting systems (Department of Energy, 2005b; Verdote, 2009). Along with energy shortage problems and the problem of greenhouse gas emissions that form the rationale for much of the remainder of Philippine energy policy as well, three factors have been crucial in motivating the PEEP:

a) In the Philippines, the peak demand for electricity is in the evening and driven by lighting. Widespread use of inefficient lighting not only increases total electricity demand, but it also tends to increase peak demand and thus raises the cost of electricity, since peak demand has to be met by generating electricity using expensive diesel/fuel oil.
b) Despite the attractive opportunities that exist for energy service companies (ESCOs) to invest in energy-efficiency projects, there are few operating ESCOs in the Philippines.[108]
c) Replacement of fluorescent lamps with more energy-efficient compact fluorescent lamps (CFLs) carries with it the risk of mercury pollution from the disposal of the older lamps.

The PEEP consists of an assortment of policies and regulations aimed at addressing these issues, out of which three are relevant to the improvement of energy efficiency in appliances. The Efficient Lighting Initiative promotes energy efficient lighting technology, the Efficiency Initiative in Buildings and Industries aims to revitalize the market for Energy Service Companies (ESCOs) in the Philippines (among other objectives), while Communication and Social Mobilization aims to provide information and create awareness (Asian Development Bank, 2009).

The Philippines is currently considering the establishment of an Energy Efficiency and Conservation Bill that is to serve as the legal policy framework for its energy efficiency policies (Department of Energy, 2012). The Department of Energy is currently in the process of finalizing the Bill and incorporating stakeholder view that were obtained through a process of public consultation, and will submit the Bill in July 2012.[109]

[108] The ESCO market in the Philippines is discussed in more detail in the regulatory review section.

[109] Based on interviews with staff from the Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy, The Philippines (16 April 2012).

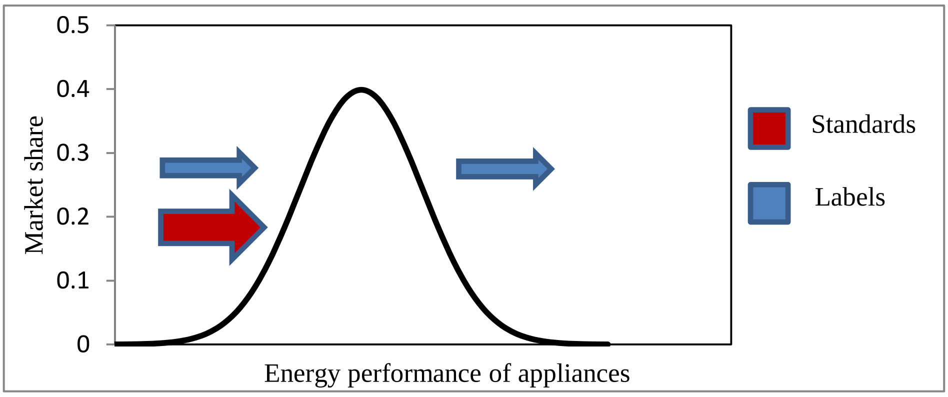
(ii) Policy Description

MANDATES

Appliance Standards

Appliance standards and labels are complementary policies that transform the energy efficiency of appliances in the market in quite distinct ways. Appliance standards "push" the market – they aim to improve the energy efficiency of new appliances by imposing minimum standards that serve to eliminate the least efficient appliances from the market. Appliance labels provide consumers with information on the energy efficiency of the products and thus serve to both "push" and "pull" the market (Egan, 1999); however, unlike standards, they may be not be able to fundamentally transform the market since inefficient products still remain in the market and it is possible that consumers' selection criteria may exclude considerations of energy efficiency (World Energy Council, 2008). This is schematically illustrated in Figure 2.3.4 below.

Figure 2.3.4 ***Standards and labels – "pull" and "push" factors***



Source: Authors' representation

Mandatory minimum energy performance standards were first introduced in the Philippines in 1993, covering only room air-conditioners (window type) at the time (Egan, 1999; CLASP, 2011). Subsequently, coverage was expanded to include split-type air-conditioners (2002), magnetic fluorescent lamp ballasts (2002), CFLs (2002), electronic ballasts (2010) and double-capped fluorescent lamps (2010) (APEC Energy Working Group, 2010; Xue et al., 2010; Harrington and Damnics, 2004; CLASP, 2011). Currently under consideration for inclusion into the minimum energy performance standards program are televisions and washing machines (CLASP, 2011) as well as refrigerators (Campanano, 2012). Standards are determined by the Department of Energy, while the Lighting and Appliance Testing Laboratory carries out energy efficiency testing on products to determine whether they satisfy the standards. Currently the laboratory has facilities for testing air-conditioners, small refrigerators and CFLs (Asian Development Bank, 2009).

Retrofitting of lighting

The Philippines has implemented a number of policies mandating the retrofit of lighting so as to promote energy efficiency in lighting. As part of the Philippine Efficient Lighting Market Transformation Program, Administrative Order No. 183 (the Palit-Ilaw Program) was issued in 2007 mandating the use of energy efficient lighting in government buildings (Asia Pacific Energy Research Centre, 2010). The Palit-Ilaw Program was also aimed at meeting a target of a 10% reduction in the energy consumption of government buildings that had been mandated by previous Administrative Orders.

Complementing the Palit-Ilaw Program is the Retrofit of Government Office Buildings program, which is a component of the Efficient Lighting Initiative under the Philippine Energy Efficiency Project (PEEP). With a US$3 million budget, this policy aims to retrofit 35 government office buildings in Manila by replacing older-style fluorescent lamps, incandescent lamps and inefficient magnetic ballasts with the energy-efficient alternatives of new fluorescent lamps, CFLs and electronic ballasts respectively (Asian Development Bank, 2009). The program has since been revised and the target now is to retrofit 100 government office buildings throughout the Philippines (Anunciacion, 2012).

The Philippine Energy Efficiency Project also includes the US$1.5 million Public Lighting Retrofit Program, which aims to achieve energy efficiency in public lighting by replacing incandescent bulbs with efficient CFLs, mercury vapor lamps with high-pressure sodium lamps, and incandescent lamps used in traffic lights with LEDs (Asian Development Bank, 2009). The scope of the project has recently been expanded, with the Philippines planning to carry out retrofitting of traffic lights as well (Anunciacion, 2012).

Energy Efficiency Testing

As part of the Efficient Lighting Initiative of the Philippine Energy Efficiency Project, the government plans to upgrade the Lighting and Appliance Testing Laboratory so as to enable it to test televisions, washing machines, large refrigerators, freezers, and a range of other products, in addition to the three products (air-conditioners, small refrigerators and CFLs) that it is already capable of testing (Asian Development Bank, 2009). The government also plans to buy calorimeter equipment for the air-conditioning unit of the laboratory.[110] The budget for upgrading the laboratory is US$2.5 million (Asian Development Bank, 2009).

INFORMATION PROGRAMS

Appliance Labels

Appliance labels, which like appliance standards are also mandatory, cover a much more comprehensive list of appliances and equipment. Currently, the appliances that are required to display energy efficiency labels include window air-conditioners (1994), split air-conditioners (2002), refrigerators (2000) and freezers (2000) as well as 5 different lighting types- magnetic ballasts (2002), CFLs (2002), single-capped and double-capped fluorescent lamps (2010) and electronic ballasts (2010) (CLASP, 2011; Xue et al., 2010; Pacudan, 2001; Hernandez, 2001). These labels display indicators of the energy efficiency performance of the appliance that is specific to the product in question. For instance, the air-conditioner energy label illustrates the energy efficiency ratio, while the label for CFLs displays indicators such as the light output, power consumption, efficacy and average life (Campanano, 2012).

The Philippines is currently considering the inclusion of televisions, washing machines, industrial fans and lamps (high-intensity discharge) into the labeling scheme (Campanano, 2012; CLASP, 2011;

[110] Based on interviews with staff from the Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy, The Philippines (16 April 2012).

Xue et al., 2010), while a new design for the air-conditioner energy label is under consideration as well (Campanano, 2012).

Efficient Lighting Initiative

The Efficient Lighting Initiative (ELI)[111] was implemented between 1999 and 2003 by the International Finance Corporation (IFC), supported by US$15 million of investment from the Global Environment Facility or GEF (International Finance Corporation, 2005). The initiative consisted of two components. The "green leaf" logo was a voluntary labeling scheme that encouraged lighting manufacturers to increase the energy efficiency of their products. In addition, the IFC also catalyzed regulatory change by building coalitions of regulators, manufacturers, utilities, and environmental and consumer groups in order to promote energy-efficient lighting. As such, the Efficient Lighting Initiative laid the groundwork not only for lighting standards and labels that started operating from 2002, but also for other programs directed at lighting.

Philippine Efficient Lighting Market Transformation Project

The Philippine Efficient Lighting Market Transformation Project (PELMATP) was led by the Department of Energy with support from the Global Environment Facility (GEF) as well as the United National Development Programme (UNDP). The objective of this project, which operated from 2005 to 2009, was to remove the barriers to widespread use of energy efficient lighting systems (Department of Energy, 2005b; Verdote, 2009). The project primarily operated through capacity building, information provision, and policies enhancing consumer awareness, though it did include mandates such as the Palit-Ilaw program. The project consisted of five components: Energy Efficient Lighting (EEL) policy, Standards and Guidelines Enhancement Program, EEL Application Consumer Awareness Program, EEL Initiatives Financing Assistance Program, and EEL System Waste Management Program- the latter is meant to address the problem of mercury waste from the disposal of lights (Asia Pacific Energy Research Centre, 2010). Some of the key achievements of the PELMATP included setting up Guidelines on Energy Conserving Design in Buildings (to ensure the adoption of energy efficient lighting in building design) and Guidelines on Roadway Lighting, setting up a Waste Management Guidebook, Guidelines and Info-Roster, and finally the issuance of Administrative Order No. 183 that mandates the use of energy efficient lighting in government buildings.

Communication and Social Mobilization

The Communication and Social Mobilization component of the Philippine Energy Efficiency Project aims to organize activities grouped into two streams: 1) communication for efficient lighting and 2) promotion of energy efficiency in everyday life. The objective of these activities is to promote and communicate information about each of the other policies implemented under the Philippine Energy Efficiency Project, such as the Retrofit of Government Office Buildings or the Public Lighting Retrofit Program (Asian Development Bank, 2009).

[111] Despite the confusing nomenclature, this policy is distinct from the Efficient Lighting Initiative that is part of the Philippine Energy Efficiency Project and was implemented much later in 2010.

FISCAL AND FINANCIAL INCENTIVES

National Residential Lighting Program

This program, which is one of the components of the Efficient Lighting Initiative under the Philippine Energy Efficiency Project, aims to distribute 13 million CFLs to households free of charge, in order to replace inefficient incandescent bulbs that are widely used, with many households having at least two incandescent 40-watt bulbs. The incandescent bulbs will be collected and used to claim carbon credits for the program. In addition, for households in off-grid areas, the program will provide light emitting diode (LED) lights to replace kerosene, candles, and other non-electric lighting alternatives that are currently used. The US$ 18 million program was launched in 2009 and planned to be completed by end-October 2011, though as of April 2012 the distribution had not yet been completed (Anunciacion, 2012).

Super Energy Services Company (ESCO)

The Efficiency Initiative in Buildings and Industries (under the Philippine Energy Efficiency Project) aimed to set up a Super ESCO as a subsidiary of the Philippine National Oil Company (PNOC). With a budget of US$ 8 million, the Super ESCO would target the revitalization of the ESCO market in the Philippines, both by developing public sector energy efficiency projects on its own and by supporting the development of other ESCOs that can then target energy efficiency projects in the private sector. The support to private sector ESCOs would consist primarily of financial support in the form of low-interest loans, with a revolving fund created so that loan repayments from ESCO projects supported in the past can be channeled towards funding new ESCO projects. It was also envisaged that the Super ESCO would provide technical advisory support to other ESCOs in the form of training materials, best practices, accreditation, etc. (Asian Development Bank, 2009). However, the Super ESCO project was formally cancelled in April 2011 due to a decision taken by the PNOC not to implement the project (Anunciacion, 2012), and there are as yet no indications that any other projects to set up a Super ESCO will be launched in the near future.

Energy Efficiency Component of Clean Investment Plan

In October 2011, an Energy Efficiency Component was added to the Philippine's Clean Investment Plan (CIP) under the Clean Technology Fund (CTF) (CTF Trust Fund Committee, 2011). This program was motivated by the existence of market failure in the market for energy efficient appliances in the Philippines, e.g. "efficient" light emitting diode (LED) and liquid crystal display (LCD) televisions (TVs) sold in the Philippines are less efficient than elsewhere in the world, while old and inefficient cathode ray tube (CRT) TVs are imported from abroad and dumped in the domestic market at "throwaway" prices. The Philippine government has identified lack of awareness about energy-efficient appliances and the high upfront costs of such appliances as the key factors behind the market failure. The program aims redress this market failure and accelerate the introduction of more energy efficient appliances, including LED and LCD TVs, computer monitors, fans, air-conditioners, and refrigerators etc. This will be done primarily through a hire-purchase scheme, whereby the project will purchase about 200,000 efficient air-conditioners, 150,000 refrigerators, 350,000 fans, and 100,000 televisions (with the prices reduced through bulk procurement) and consumers will be able to pay for the appliances over a 36-month hire-purchase scheme. In addition, a revolving energy efficiency trust fund will be established and consumer awareness will be raised (CTF Trust Fund Committee, 2011).

C. Regulatory Review

ECONOMIC EFFICIENCY AND EFFECTIVENESS

(i) Costs, Benefits and Promotion

The Philippine regulatory process for determining standards and labels does not ensure that the policies instituted maximize net social benefits. While the Philippine government has occasionally carried out ex-ante analysis of the possible impact of its standards and labeling program (Hernandez, 2001), such analysis has only looked at the potential benefits (in terms of expected energy savings) without also examining the costs. The analysis carried out by Hernandez (2001) took the existing standards as given, rather than comparing the lifetime economic impacts under different standard levels and then picking the optimum one (as recommended, for instance, by Egan et al., 1997).

Whether appliance standards and labels have actually maximized benefits and minimized costs has to be assessed based on ex-post analysis of their impact. The following criteria could be looked at in order to assess the benefits of the standards and labeling program:

Coverage and compliance

For standards and labels, the greater the breadth of products covered, the greater are the energy saving benefits. Coverage of the labeling program is fairly comprehensive, with refrigerators, air-conditioners and a variety of lighting equipment already included; given that there are plans to include TVs, washing machines and industrial fans as well, each of the appliances identified in Figure 2.3.3 above as a major source of energy savings until 2030 is either already covered or will soon be covered by the labeling scheme. The same is not true, however, for the minimum energy performance standards program, since the list of products currently covered by standards does not include refrigerators. Given that potential energy savings from improving energy efficiency in refrigerators (and freezers) dwarf the potential energy savings from improving the efficiency of any of the other appliances, the exclusion of refrigerators is likely to have restricted the energy savings from appliance standards. However, the Philippines is currently developing minimum energy performance standards for small and medium-sized refrigerators (with a size of up to 12 cubic feet) (Campanano, 2012).

Within each product category, the higher the level of compliance, the greater are the energy savings. For residential air-conditioners, there was a 93% level of compliance with the energy label requirement for the year 2000 (Hernandez, 2001). Prior to the imposition of minimum energy performance standards for room air-conditioners in 1993, only 50% of the small units, and none of the large units in the market, met the standard. All the inefficient models were weeded out after the first target year, indicating that targets were stringent (Egan, 1999). In addition, the standards for air-conditioners were gradually ratcheted upwards and made even more stringent with time, with the standards for small air-conditioners updated twice by 2001, and the standards for large air-conditioners updated thrice by 2002 (Hernandez, 2001). However, in the last decade or so, the process of updating standards has stagnated, with the standards currently in place for air-conditioners last updated in 2002 (Campanano, 2012; Gatdula, 2011). Thus, it is likely that the current air-conditioner standards are outdated.

Energy savings

In the first year after the minimum energy performance standards for room air-conditioners were introduced, the standards alone led to energy savings of over 17 GWh (Egan, 1999). By 1999, the annual energy savings from having both standards and labels on room air-conditioners had increased to as much as 224 GWh, jumping the following year to 283 GWh. Although no standards are in place for refrigerators, the introduction of labels for refrigerators and freezers soon led to energy savings of 44GWh in 2000.

Actual energy savings from the standards and labeling program (combining all appliances) increased to 616 GWh in 2005, though this was lower than projections made by the Bureau of Product Standards (in 2001) that energy savings from appliance standards and labels would reach 1 TWh by 2004 (Hernandez, 2001). However, the energy savings nearly doubled in 2006 to 1.28 TWh, with 704 GWh of the savings coming from the introduction of CFLs (Asia Pacific Energy Research Center, 2010).

In recent years, the energy savings from the appliance standards and the labeling program have increased considerably. In 2009 the energy savings were 7 TWh, increasing even further to 9.1 TWh in 2010 (Campanano, 2012). To put these numbers in context, the energy savings from the appliance standards and the labeling program in 2009 and 2010 alone account for around 11% of the Philippine's energy conservation target of reducing energy use by 146 TWh between 2005 and 2014. The energy savings from appliance standards and labeling in 2009 and 2010 were also much higher than earlier projections that put expected energy savings at 4.27 TWh in 2010 and 5.15 TWh in 2014 (Asia Pacific Energy Research Center, 2010).

There have been significant energy saving benefits, especially in recent years, from the appliance standards and the labeling program. To assess whether the level of coverage of the two programs is optimal and whether the standards have been optimally set, however, would require accounting for the full social benefits and costs of the programs. Discussion of costs is largely missing from the literature on the standards and the labeling program, while positive externalities potentially associated with the energy savings (such as environmental or energy security benefits) have not yet been measured. In the absence of such information, it is not possible to reach a definite conclusion on whether appliance standards and labels have achieved or maximized net social benefits.

Similarly, the earlier discussion on criteria such as coverage, compliance, and stringency of standards needs to be qualified as well. While increased coverage, greater compliance rates and more stringent standard levels will lead to greater energy saving benefits, it is not necessarily true that they will always lead to *net* social benefits, for example, if the implementation cost offsets the benefits.

The ADB carried out an ex-ante analysis of the expected impact of three of the policies under the Philippine Energy Efficiency Project, namely the Public Lighting Retrofit Program, the Retrofit of Government Office Buildings and the National Residential Lighting Program (which involves the distribution of 13 million CFLs as well as an unspecified number of LED lights). In terms of energy savings, the largest expected savings are from the National Distribution Lighting Program, with the ADB expecting the program to achieve energy savings of 534 GWh annually. The expected reduction in CO_2 emissions is 300,000 tonnes annually from reduced power generation.

Combining the expected benefits of the three programs with the investment cost involved (US$ 18 million for the National Residential Lighting Program, US$ 3 million for the Retrofit of Government

Office Buildings and US$ 1.5 million for the Public Lighting Retrofit Program), the ADB found that over a 5 year period, the expected net present value of the three programs, calculated by taking into account the investment cost and the benefits from reduced power generation, was positive at US$ 106 million. This is likely to underestimate the expected net social benefit, which would also factor in the environmental benefits of reduced power generation (e.g. reduced CO_2 emissions).

While the Philippine Energy Efficiency Project is still ongoing, the Energy Utilization Management Bureau of the Department of Energy has carried out an ex-post analysis of the impact that these programs have had so far (Anunciacion, 2012). The retrofit of public lighting has already been completed, while the retrofitting of traffic lights is yet to begin. The retrofit of government buildings has progressed more slowly, with only 7 out of a planned 100 buildings retrofitted so far. As mentioned before, the National Residential Lighting Program is behind schedule, with 4.46 million CFLs distributed so far, while the collection and disposal of incandescent lamps has not yet begun (Anunciacion, 2012). Since the distribution of CFLs accounted for the largest portion of the energy savings in the ADB's analysis of the expected impact of the three aforementioned programs, the delay in the distribution implies that the energy saving benefits from the three programs will accrue more slowly over time than expected, so that the actual net present value of the programs over 5 years is likely to be lower than the US$ 106 million projected by the ADB.

The Government of Philippines has estimated that the cost of implementing the Energy Efficiency Component of the Climate Investment Plan (involving the hire-purchase scheme for energy-efficient appliances) will be US$ 24 million (in initial investment costs), while the estimated energy savings are 250 GWh annually and the estimated greenhouse gas reductions are 125,000 tonnes of CO_2 annually (CTF Trust Fund Committee, 2011). Using the same methodology utilized by the ADB in assessing the three programs under the Philippine Energy Efficiency Project (Asian Development Bank, 2009), the economic benefit of the energy savings due to reduced generation costs amounts to US$ 19.8 million annually.[112] Thus, the project is likely to lead to net social benefits, since the expected benefits from the energy savings alone will outweigh the investment cost (in present value terms) in less than 2 years.

In assessing the Philippine's policies on appliance energy efficiency, it is also important to evaluate whether they have contributed to green investments, in particular the market for Energy Service Companies (ESCOs). While policies such as energy standards and labels have led to green investment in the form of energy efficiency improvements in individual appliances, ESCOs can improve energy efficiency at the system level and thus potentially achieve more fundamental improvements in energy efficiency. However, though the Philippines is in theory one of the most attractive places in the region for ESCO investments, since its high electricity tariffs provide a stronger incentive for energy-efficiency projects, only a few ESCOs currently operate in the economy. A number of barriers have impeded the development of the ESCO, including limited access to funds, lack of flagship projects, lack of technical evaluation capacity in commercial banks, and lack of awareness of end-users and business managers regarding energy efficiency investments (Asian Development Bank, 2009).

Measures that could help to improve the existing situation are:

[112] The ADB multiplied the average electricity price in the Philippines (US$ 0.0792/kWh) with the energy savings to calculate the economic value of those energy savings. We adopt the same method (and the same electricity price) here.

1) For standards and labels, ex-ante analysis of the potential economic and environmental impacts should be carried out in order to better ensure that the policies are contributing to maximizing benefits while minimizing costs, while ex-post analysis should look not just at the energy saving benefits but the costs and any positive externality benefits as well.

2) In addition to tackling appliance efficiency at the individual level, greater efforts should be put into re-energizing the ESCO market in order to drive energy efficiency at the systemic level.

(ii) Scientific integrity

The minimum standards that have been set for the various appliances are differentiated based on scientific analysis that takes a number of relevant variables into account. Standards for air-conditioners are differentiated based on their cooling capacity, while standards for the compact fluorescent lamps (CFLs) as well as the various types of linear fluorescent lamps are differentiated based on the input power of the lamp and the correlated color temperature (Campanano, 2012).

However, the fact that appliance standards are not updated on a regular basis (e.g. for air-conditioners) means that they are not responsive to technological change and may well be outdated for lengthy periods of time. Moreover, there does not appear to be a strong emphasis on scientific analysis in the regulatory process for the setting of standards. While this is elaborated upon in a later section, the standard-setting process in the Philippines is characterized by strong public-private cooperation with active participation from manufacturers. As such, the process tends to be consensus-based and regulators are unlikely to force manufacturers to comply with tough standards, even if compliance with such standards is technically and scientifically feasible.

Performance testing of appliances, to verify that they comply with standards and that their labels accurately display, is a key element in ensuring the scientific integrity of the standards and labeling program. However, manufacturers have to wait almost one year before their products can get tested and they are allowed to sell the appliances on the market. The lack of accredited testing facilities is one reason for the delay, with the Philippines currently only having a single laboratory, the Lighting and Appliance Testing Laboratory, to carry out energy efficiency testing (GEOSPHERE, 2011). Another reason is a lack of technical manpower.[113] In addition, the Lighting and Appliance Testing Laboratory currently only has facilities for testing air-conditioners, small refrigerators and CFLs. Though the government plans to upgrade the laboratory as one of the initiatives under the Philippine Energy Efficiency Project (as highlighted earlier), new testing facilities were yet to be installed as of December 2011 (Anunciacion, 2012).

(iii) Flexibility

The Philippine energy efficiency policy framework has been experiencing policy lags and inertia. This is exemplified by the fact that appliance standards are sparingly updated, with air-conditioner standards not having been updated for over a decade. Thus, standards are unlikely to be responsive to changing circumstances. There is evidence of policy lag in the Philippine Energy Efficiency Project as well, with the National Residential Lighting Program well behind schedule in its distribution of CFLs. Policy lags appear to exist at a broader level as well. The Philippines is currently planning to establish an Energy Efficiency and Conservation Bill, but a similar bill was proposed as early as 1993 and waited for four years for approval from the Senate (Egan, 1999), without eventually being passed. The

[113] Based on interviews with staff from the Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy, The Philippines (16 April 2012).

existence of policy lags means that the Philippine's appliance energy efficiency policies are unlikely to be flexible in adapting and responding to changing circumstances.

Mandatory minimum energy performance standards (MEPS) in the Philippines have elements of inflexibility embedded in them – manufacturers are obligated to meet the MEPS for each product, these standards are uniformly imposed on all manufacturers of that product, and once the standards are set for a particular year, there is little precedent for re-negotiating the assigned standards. Allowing manufacturers to meet an average standard over a basket of products (as is done in Japan) rather than a minimum standard for every product would allow energy savings to be achieved at a potentially lower cost. However, such inflexibility may have advantages too, since in the long-run it can lead to a more complete transformation of the market towards energy-efficient appliances by removing all inefficient products.

ADMINISTRATIVE AND POLITICAL VIABILITY

(iv) Transparency

A distinctive feature of the Philippine standards and labeling program is the extent to which manufacturer groups are involved in their design. At the very outset, the Philippine Appliance Industry Association (PAIA) was involved in the decision-making process that goes towards establishing and revising standards.[114] The PAIA is one of the four agencies that directly participate in the design of standards, together with the Department of Energy (which ultimately determines the standards), the Bureau of Product Standards (which administers and enforces the standards) and the Lighting and Appliance Testing Laboratory (which carries out energy efficiency testing on the products) (Egan, 1999; International Copper Association, 2010; Pacudan, 2001; Campanano, 2012). Other industry associations, such as the Philippines Lighting Industry Association, are also engaged in the process (Hernandez, 2001). As a result, the process for establishing standards and labels reflects the views of manufacturers, who are one of the key stakeholders in the entire process. This has led to desirable outcomes such as increased trust and goodwill between the regulators and the manufacturers, as well as the PAIA communicating the advantages of the standards and labeling program to its members, thus reducing potential opposition to the programs (Egan, 1999). The close co-operation between government and industry may well be one factor that has allowed Philippines to implement its standards and labels largely on a mandatory basis. However, stakeholders other than manufacturers, such as consumers, trade unions and retailers, are not relatively well represented and do not have a direct say in how the standards are enacted, meaning their views may not necessarily be taken into account.

Historically, many of the Philippine's other energy efficiency policies relating to appliances have been transparent in taking stakeholder views into account: as already highlighted, the Efficient Lighting Initiative between 1999 and 2003 was unique in that it involved building up coalitions of regulators, manufacturers and utilities as well as environmental and consumer groups in order to promote energy-efficient lighting. By contrast, the more recent Philippine Energy Efficiency Project appears to have a more centralized structure with the Department of Energy and the Asian Development Bank (which provides the bulk of the funding) making major decisions and stakeholder groups such as consumers and manufacturers not directly involved in the process.

[114] The organization was previously known as the Association of Home Appliance Manufacturers (AHAM).

The regulatory process for the design of the Energy Efficiency and Conservation Bill has also been characterized by a significant level of stakeholder engagement. The Department of Energy has sought views from a wide range of stakeholders that included citizens, non-governmental organizations, members from the House of Representatives and electric power companies and is currently incorporating stakeholder views while finalizing the Bill.[115]

As already discussed, the Department of Energy is in charge of the standards and labeling (S&L) program in operation in the Philippines. Its website contains a good overview of Philippines' overall energy policy framework, including a document containing highlights of the Philippine Energy Plan as well as websites describing the National Energy Efficiency and Conservation Program (NEECP).[116] However, general discussion of the appliance standards and the labeling program – why they were formulated, evidence of historical success, evolution of the programs over the years and broad targets for the programs – tends to be lacking or outdated.[117]

The DOE website does contains detailed and specific lists of refrigerators, air-conditioners, ballasts and CFLs that are certified under the labeling and/or standards scheme, with information on the energy efficiency performance of each model. In addition, the website contains "Consumer Talk" articles on labels for CFLs, air-conditioners and refrigerators explaining in layman terms what the information on the labels represents and how it should guide consumer purchases of appliances. However, when it comes to products that are covered under minimum performance standards, the lists of certified models do not indicate what the standard levels are, nor are the exact standards publicized anywhere else on the website of the Department of Energy. This makes it difficult for the public to find out the relative performance of a product relative to the minimum performance standard.

Information on the Philippine's other energy efficiency policies relating to appliances is generally readily accessible on either the website of the Department of Energy or the website of one of its partner organizations.[118]

(v) Alignment

With 3 government agencies and one manufacturer association involved in the design of appliance standards and labels, alignment among the various authorities has often been a challenge. Each authority has, in theory, a distinct and clearly delineated role. The Department of Energy determines the standards and administers the program, the Bureau of Product Standards enforces and administers the standards, the Lighting and Appliance Testing Laboratory (which is under the authority of the Department of Energy) carries out energy efficiency testing on the products and the Philippine Appliance Industry Association is part of the technical committee (Pacudan, 2001). In practice, though, the line separating out the responsibilities of the different agencies is not always

[115] Based on interviews with staff from the Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy, The Philippines (16 April 2012).

[116] The Department of Energy website is http://www.doe.gov.ph/. Highlights of the Philippine Energy Plan can be found here: http://www.doe.gov.ph/PEP/. The National Energy Efficiency and Conservation Program (NEECP) is described here: http://www.doe.gov.ph/EE/EE&C%20Plans%20and%20Programs.htm and here: http://www.doe.gov.ph/neecp/aboutus.htm.

[117] See http://www.doe.gov.ph/efficiency/standards.htm.

[118] See http://www.doe.gov.ph/efficiency/eli.htm for information on the Efficient Lighting Initiative, http://www.doe.gov.ph/pelmatp/ for information on the Philippine Efficient Lighting Market Transformation Project and http://peep.doe.gov.ph/ for information on the Philippine Energy Efficiency Project and its various component policies.

clear.[119] A further issue is that there is no central authority in charge of the programs,[120] as the Lighting and Appliance Testing Laboratory is under the Department of Energy while the Bureau of Product Standards is under the Department of Trade and Industry. However, the Department of Energy and the Bureau of Product Standards do coordinate with each other in the monitoring process (Harrington and Damnics, 2004). The Philippines is also currently considering handing over the responsibility of implementing the appliance standards entirely to the Department of Energy,[121] a move which would likely ease alignment problems.

When it comes to the Philippine Energy Efficiency Plan and the Department of Energy do have a shared vision on the goals and objectives of the Plan; however the extent to which they are able to coordinate and harmonize policies with respect to each other remains unclear. The distribution of CFLs, for instance, was delayed in Central Visayas due to what appears be a lack of coordination between the agencies (Baquero, 2011). During the CFL distribution, it was found that the Department of Energy lacked a waste facility for the disposal of incandescent bulbs and the risk of mercury pollution meant that the CFL distribution had to be delayed. Lack of alignment is also likely to have been a factor behind the shelving of the plan to create a super ESCO. While the Philippine Energy Efficiency Project drafted by the Department of Energy and the Asian Development Bank envisaged the establishment of a super ESCO as a subsidiary of the Philippine National Oil Company (PNOC) (Asian Development Bank, 2009), the Philippine National Oil Company – Renewables Corporation was unwilling to take on energy efficiency projects that did not have a renewable energy component to them.[122]

Alignment can also refer to how well alternative policies complement each other. Standards and labels appear to be very well-aligned with one another. Given the complementary role they play in enhancing energy efficiency, they are likely to be most effective when implemented in conjunction with each other. This has indeed been the case in the Philippines – whenever a product has been brought under the minimum energy performance standards scheme, it has also been brought under the labeling scheme, either at the same time or in advance. This has likely contributed to the considerable energy savings from standards and labels in recent years.

Fiscal and financial incentives are also well-aligned with the standards and labeling program in the sense that they help to address market failure, capital market barriers, and informational barriers that could otherwise prevent standards and labels from being most effective. The newly added Energy Efficiency Component of Philippine's Clean Investment Plan, for instance, proposes to use innovative financing schemes (such as hire-purchase) to increase the demand for energy-efficient appliances. If these are successful, standards and labeling programs will likely become more effective at reducing energy use, since the increases in energy efficiency of appliances brought about by the standards and labeling program will have a larger impact on gross energy use the greater the demand for more energy-efficient appliances is.

[119] Based on interviews with staff from the Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy, The Philippines (16 April 2012).
[120] Ibid.
[121] Ibid.
[122] Based on interviews with staff from the Energy Efficiency and Conservation Division, Energy Utilization Management Bureau, Department of Energy, The Philippines (16 April 2012).

2.3.3 Concluding Remarks

The most distinctive difference between Japan and the Philippines is in how they implement appliance standards, with Philippines adopting minimum energy performance standards (MEPS) and Japan adopting the Top Runner method. The Philippine policy approach is also characterized by a focus on improving energy efficiency in lighting.

To some extent, these differences are a function of the stage of development of the respective economies. In a relatively less advanced economy such as the Philippines, it makes sense to target highly inefficient appliances (e.g. incandescent lamps in Philippines) where the potential for energy savings is the greatest. This provides a rationale for using MEPS (which has the greatest impact on inefficient appliances that lie below the standard) and policies specifically directed at lighting. In a relatively more advanced economy such as Japan, where the most inefficient appliances have already been eliminated, the Top Runner approach may be more suitable by encouraging improvements in energy efficiencies for both inefficient and efficient appliances.

The Top Runner process has the advantage of simplifying and shortening the regulatory process leading up to the enactment of the standards (Ministry of Economy, Trade and Industry, Japan, 2010a). In particular, it is difficult for manufacturers to argue against the targets since they are based on the existing best performers (Nordqvist, 2006). A further advantage of the Top Runner standards from a flexibility perspective is that manufacturers are free to choose which appliances to focus their energy efficiency efforts on, as long as they ensure that the weighted average of all their products meets the standard.

By contrast, the regulatory process leading to the enactment of minimum energy performance standards in the Philippines can be drawn-out, and current standards have, in many cases, not been updated for over a decade. Moreover, minimum standards are relatively inflexible for manufacturers. The Philippines should consider adopting a more flexible and responsive policy approach, drawing from Japan's experience with the Top Runner program. For instance, the Philippines could modify its appliance standards so that they apply not to individual products, but to weighted averages of each manufacturer's products.

In both Japan and the Philippines, appliance standards are not determined using economic cost-benefit analysis, though in the Philippines ex-ante cost-benefit analysis has accompanied the introduction of policies such as the National Residential Lighting Program. To ensure a socially optimal outcome, ex-ante economic cost-benefit analysis should be carried out when formulating the standards in both economies.

The role of public-private partnerships (PPP) is a distinctive feature of policymaking relating to appliance energy efficiency in both Japan and Philippines. In both economies, manufacturer groups are very actively involved in policymaking and in particular in the setting of standards. While this has eased the process of implementation of the standards and their political acceptability, it has sometimes provided the opportunity to determine standards based largely on a process of negotiation rather than on economic analysis of projected outcomes that might be more likely to result in a socially optimal set of standards.

Finally, there is a stark contrast between the private market for energy efficiency in the two economies i.e. the market for Energy Service Companies or ESCOs. Japan has a robust ESCO market, with the size of the market reaching US$ 176 million in 2008 (Asia Energy Efficiency and

Conservation Collaboration Center, 2010), whereas the ESCO market in the Philippines is relatively stagnant. The difference is partly attributable to policy reasons. As discussed in the Buildings Case Study, fiscal and financial incentives have contributed significantly to the growth of the ESCO market in Japan. Incentive programs in the Philippines, by contrast, have typically not been aimed at incentivizing ESCOs, though inherent barriers such as limited access to funds, lack of technical evaluation and lack of awareness of end-users and business managers are also major reasons impeding the development of the ESCO market.

Overall, Japan's appliance energy efficiency policies are estimated to have led to significant energy savings, though it is unclear whether these were achieved in a cost-effective manner. The Philippines' appliance standards and labels have led to significant energy savings in recent years at an unknown cost, while recently introduced policies under the Philippine Energy Efficiency Program and the Clean Investment Plan are expected to lead to net social benefits. Policymaking in Japan is flexible and transparent and the various authorities involved are well-aligned with each other. By contrast, the effectiveness of the policymaking process in the Philippines can be constrained by irregular policy updates, lack of flexibility, and lack of alignment among authorities.

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