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Energy Efficiency Policies in Turkey: The Case for Standards and Labels

Özge Kama
Faculty of Economics and Administrative Sciences,
Yildiz Technical University, Turkey.
Email: okama@yildiz.edu.tr

Zeynep Kaplan
Faculty of Economics and Administrative Sciences,
Yildiz Technical University, Turkey.
Email: zkaplan@yildiz.edu.tr

ABSTRACT: Recently, Turkey is attempting to improve its energy efficiency policies. As the demand of energy is increasing in Turkey, improving energy efficiency can be considered as an efficient way to achieve its sustainable development goals. In this respect, government policies and program strategies must be designed to overcome persistent market barriers against energy efficient household appliances. Label and standard programs can be used as a strategy to improve energy efficient products. With this issue in mind, the aim of this paper is to provide a broad overview of appliance efficiency standards and labeling programs in Turkey. The paper consists of five sections: After a brief introduction on the subject, the second section deals with the market transformation for energy efficient products. In the third section, legal issues related to energy efficiency will be discussed. Then in the next section, current situation and challenges related to labeling appliances will be analyzed and the paper concludes with a brief summary.

Keywords: Electrical consumption, energy efficiency, market transformation, energy labelling
JEL Classifications: Q01; Q43; Q48

1. Introduction

Future prospects show that the rise in electricity demand will continue in both developed and developing countries. Moreover, the increase in its share is even higher than the growth rate of global economies. According to World Energy Council (2007), the global economy was growing approximately 3.3% a year, but the increase in electricity demand was 3.6% in the last thirty years. Due to technological innovation a slight decrease in the demand for electricity is expected but still there are no substitutes for electricity in many products like electrical appliances. As a consequence energy efficiency becomes a priority for many countries. It can be interpreted as the reduction of energy use for a given service or a level of activity. Energy efficiency is defined as the ratio of the desired output to the total energy input. Improving energy efficiency therefore means using less energy to produce the same desired output. Therefore accelerating the standards of the various household appliances will help us to decrease electricity and CO_2 consumption.

Energy efficiency policies have been on the top of the agenda in many countries. Such policies have become widely accepted in many countries – both developed and developing countries – since the first oil crisis in the 1970s. These policies are considered as a response to the challenges such as climate change, energy security and sustainable economic development which are faced by many countries. Developing countries around the world are projected to account for around 87 % of the world's primary energy demand growth by 2030 (United Nations, 2011:4). Thus, the issue is even more important for energy importing developing countries. Although developing countries consider economic growth as their priority area, a well-functioning energy efficiency strategy will not only allow them to achieve economic goal with lower energy consumption but also enable them to improve the standards of living. Additionally, energy efficiency can serve as a stepping stone for ensuring green growth, eco-efficiency, and sustainable development.

Energy efficiency strategies are by nature complex and articulated. Some strategies require a combination of technology development, market mechanisms and government policies that can influence the actions of millions of energy consumers which ranges from large factories to individual households. There are various programmes which aim to contribute to the improvements of household appliances for energy efficiency in different countries. Thus, comparing and evaluating the differences between countries in their relative energy efficiency strategies on labelling and standards and to identify potentials for improvement is crucial.

Energy consumption traditionally grouped into three sectors namely residential and commercial buildings, industry, and transportation. Energy in buildings is consumed by household goods and lighting and all in increasing numbers. The energy efficiency labeling and standards programs taken into account in this paper cover the household goods. In the year 2020, 31% of energy use in developing countries is expected to occur in residential and commercial buildings (Wiel and McMohan, 2003). The residential sector is responsible for more than one quarter of total electricity consumption and with the rise in residential sector this ratio is very likely to remain as such.

Energy efficiency labels and minimum energy performance standards are widely used throughout the world. In this context, the aim of this paper is to provide a broad overview of current labeling and standard programs for Turkey and selected case countries. By doing so, we aim to present the extent of the coverage and the different methods used in such efficiency programs implemented in different countries. The paper is structured as follows. The following section deals with the market transformation for energy efficient products by paying particular attention to demand pull and technology push policies. The next section introduces the energy efficiency standard and labels as a market transformation strategy. By doing so, selected country cases are taken into account to show different standard and label programs taken place in both developed and developing countries. Later, the study shed a light on the legal framework for label and standard programs in Turkey and discusses the current situation and challenges. And the final section concludes.

2. Market Transformation for Energy Efficient Products

The relationship between the markets and technology is complicated. Most of the energy efficiency programs around the world require a kind of market transformation in favor of energy efficient products. Providing market transformation for the required products is a kind of intervention to the market participants needs. Therefore understanding tastes and preferences of customers are important to give them the right incentive to change their values. Policies can transform markets by addressing barriers to unwanted products or setting incentives for the desired ones. Successful interventions can help to reduce the necessary time span for the needed market transformation.

Today, the concept of market transformation is highly related with clean energy products. With market transformation policies, the aim is to be able to change the structure and the functioning of the related market (Geller and Nadel, 1994). But the policies should be designed carefully because markets are social institutions and they do more than just allocating resources. For this reason, appraising the associated costs and benefits of the interventions should be calculated in details. Sophisticated relations in markets might cause adverse events or unexpected outcomes associated with the interventions. Then the main issue is finding the right way to motivate the market participants to contribute to targeted actions.

Properly designed policies would consider all key market players -manufacturers, distributors, retailers, and consumers- to achieve desired outcomes. Governments then can use policies to influence market participant on both supply and demand sides and many countries have chosen different kinds of mixed policies. Implementing a mixed policy affecting both consumers (the demand side) and manufacturers (the supply side) would help to distribute the economic burden more equally. According to Aebisher and Varone (2000), the explanatory variables for the choice of policy instruments include political and administrative factors as well as technical and economic factors.

Although energy efficiency strategies varies from country to country as indicated in IEA (2010:10) many countries had similar drivers for pursuing energy efficiency and faced similar barriers to energy efficiency implementation. These major drivers and barriers are represented in Table 1. The drivers are typically fall into four categories, while the barriers fall into five categories.

Increased consumer awareness leads individuals to participate more willingly to the efficiency programs for environmental concerns. Climate change is a very important issue for all countries especially because of the side effects like acid rain which also have a negative impact on human

health. In order to contribute to decrease global emission, many countries have taken measures in line with Kyoto obligations. To reduce imported energy is another important key driver. Unfortunately, energy efficiency improvement is often hampered by market, financial, informational, institutional and technical barriers. Especially financing is important for the sustainability of the program but since public agencies are restricted with government budget, there might be some cuts in the government funds. These kinds of barriers exist in all countries, and it is a general concern for all countries that's why most energy efficiency policies specifically design to overcome them.

Table 1. Drivers of government energy efficiency policies

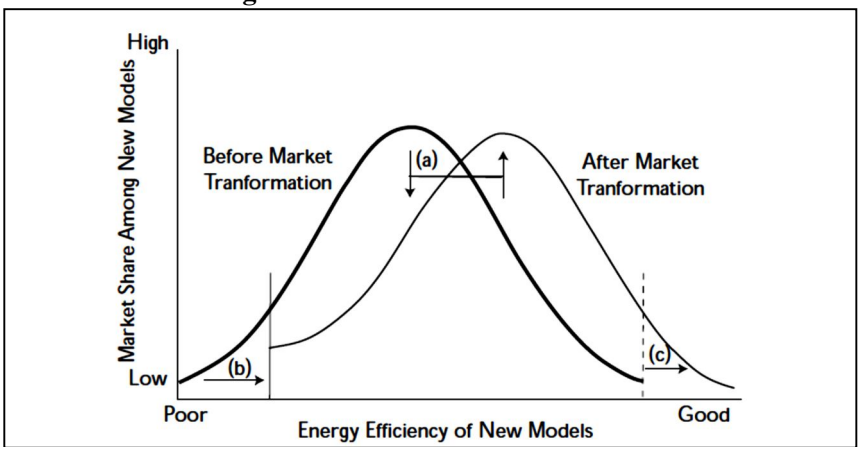
DRIVERS	***OBJECTIVES***
Energy security	Reduce imported energy
	Reduce domestic demand to increase exports
	Increase reliability
	Control energy demand growth
Economic development and competitiveness	Reduce energy intensity
	Improve industrial competitiveness
	Reduce production costs
	More affordable energy customer costs
Climate change	Contribute to global mitigation and adaption efforts
	Meet international obligations under the UN Framework Convention on Climate Change UNFCCC
	Meet supranational regulations such as the EU accession requirements or directives
Public health	Reduce indoor and local pollution
BARRIERS	***EXAMPLE***
Market	Market organization and price distortions prevent customers from appraising the true value of energy efficiency.
	Split incentive problems created when investors cannot capture the benefits of improved efficiency
	Transaction costs (project development costs are high relative to energy savings).
Financial	Up-front costs and dispersed benefits discourage investors
	Perception of energy efficiency investments as complicated and risky, with high transaction costs
	Lack of awareness of financial benefits on the part of financial institutions.
Information and awareness	Lack of sufficient information and understanding, on the part of consumers, to make rational consumption and investment decisions.
Regulatory and institutional	Energy tariffs that discourage energy efficiency investment (such as declining block prices).
	Incentive structures encourage energy providers to sell energy rather than invest in cost-effective energy efficiency.
	Institutional bias towards supply-side investments.
Technical	Lack of affordable energy efficiency technologies suitable to local conditions.
	Insufficient capacities to identify, develop, implement and maintain energy efficiency investments.

Source: IEA (2010) Energy Efficiency Governance Handbook, Second Edition, p.10-11 http://www.iea.org/publications/freepublications/publication/gov_handbook-1.pdf

Some might think that market transformation for energy efficient products will materialize with technological improvement. There is no need to intervene to the markets. But barriers in the markets against energy efficient products show that technological innovation is not enough for the necessary transformation. Consumers (individuals) do not have a high priority to replace their electrical appliances with more efficient devices because of their higher initial purchase prices. Low energy prices are considered to be the biggest barrier toward higher energy efficient products. Public policies, tax policy, standards, regulatory policy and informed consumers are all important factors affecting transformation. Prahl and Schlegel (1993) stress that the evaluation must include changes in

awareness, values, and behavior of various market actors. So, technology-push and demand-full strategies are as important as regulatory policies for realizing a successful transformation. Still market transformation needs time according to Suozzo and Nadel (1996); it will take five to ten years before a market is significantly transformed.

Figure 1. Market Transformation



Source: IEA (2000) Energy Labels & Standards: Energy Efficiency Policy Profiles, France pp.51

As shown in Figure 1 the aim is to increase the market share of energy efficient products with the inefficient ones. The figure represents different market transformation strategies of various products. The market is composed of a great variety of products that have different energy efficiency levels and in order to increase the market share of more efficient levels diverse strategies should be implemented. For example in (a) labels, fiscal incentives, government directives and other customer focus on increasing the average energy efficiency will be used, in (b) minimum efficiency standards that push the market to higher efficiency and prevents markets from inefficient products will be appropriate. And in (c) technological innovation, public purchasing or financial support of private R&D that pull the market to higher efficiency and more efficient products are introduced to the market. Apparently, here technological innovation is crucial to create even more energy efficient products.

This classification shows that governments have a dominant role in the market transformation process. Within this process in order to sustain competitiveness, governments should be focusing on providing the necessary institutional and economic factors in providing a better environment for technological innovation. Literature on technological change indicates that innovations are triggered by technology-push and demand-pull strategies (Dosi, 1982; Rennings, 2000; Taylor et al., 2005). Thus focusing on these two factors would help to design better policies. Although, Mowery and Rosenberg (1979) claimed that it is complicated to distinguish these two from each other, it is crucial to put emphasis on both strategies in the context of market transformation.

(i) Demand-pull policies: Demand-pull theory is based on the idea of recognizing the needs of the market and to fulfill those needs through technology. Increase in demand for a particular good creates an incentive to innovate. As a result firms would try to fill the gap in the market demand. Within the scope of energy efficiency, examples of demand-pull policies include consumer education, subsidies and rebates for consumers of new technology, buy-back/recycling programs and carbon tax. Even though at first sight demand side looks like they have a significant influence on the market it may not be as expected. The main reason for their limited influence is their boundaries defined by the nature of technological paradigms (Dosi, 1988: 227). In 1993, Thailand government launched a five-year demand side management program. Instead of using subsidies to promote the program they relied on manufacturer collaborations and public promotions (Birner and Martinot, 2003). For refrigerator labeling, they first introduced voluntary labeling and a few years later they continued with a mandatory labeling program. As a result, the average energy use of single-door refrigerators participating in the program had decreased from 435kWh/year in 1995 to 389kWh/year in 1998. Generally rebate programs are normally seen as a successful strategy in demand-pull policies. Providing a rebate program will influence the net present value or payback time and which in return will have impacts on the consumer decision.

(ii) Technology-push policies: Technology push refers to the key role that science and technology play in developing technological innovations and adapting to the changing characteristic of the industry structure (Di Stefano et al., 2012). Knowledge accumulation is the most important driver of firm innovation. Therefore, science and technology seemed to be the source for the vast majority of innovations. Technology-push policies generally affect the national innovation policies however with the increased interaction between countries and competitive pressures technology will have a spillover effect. As it is evident, manufacturers or suppliers are the focal point in these policies. Thus, all the policies that are designed to give incentives to manufacturers will benefit to technological improvements. Normally this idea has strong connections with Schumpeter's creative/destructive theory.

The global trade of household appliances create both an advantage and a disadvantage for the producer firms. The standards adopted in different countries diverge significantly so, manufacturing companies should implement the mandatory conditions. The weakness of the technology-push argument is that it ignores prices and other changes in economic conditions that affect the profitability of innovations (Nemet, 2009).

3. Energy Efficiency Standards and Labels as a Market Transformation Strategy

Labels, standards and other market transformation activities seek to increase the production and use of more energy-efficient products (IEA, 2000:49). Well-designed and appropriate energy efficiency standards remove inefficient products from the marketplace, increasing the overall economic welfare of consumers without seriously limiting their choice of products. Energy labels improve the market operations by displaying accurate energy consumption information on products, which is useful in the purchase decision. Energy labels empower consumers to make informed choices about the products they buy and to manage their energy bills. Labels and standards are appropriate for most countries and such developments can be considered as the cornerstone of countries energy policies and programs.

Many countries have implemented either mandatory or voluntary minimum energy efficiency standards or labelling programs. The most common energy efficiency labels and standards strategy consist of mandatory minimum energy performance standards that aim to push the market for more efficient products, and energy information and endorsement labels that aim to pull the market. Minimum energy performance standards are mainly used for the products that can enter the markets, in other words these are the minimum requirements to appear in the markets. But energy labeling policies aim to influence consumers' preferences towards more energy efficient appliances. The idea for constructing such a policy is that the belief that the information presented with the labels would surpass the brand and the model of the product. This is a long term policy and for this to happen the necessary information should be obtained transparently from the producers. Once the consumers find the labels credible and explicatory about the life-cycle costs and their environmental effects then the presented information will become part of their purchasing negotiation.

Table 2 and 3 present the energy efficiency standards and labeling programs for household goods which have been adopted in selected developed and developing countries. Canada is the country with the most numerous target products with energy efficiency standards, followed by China, the US, South Korea, and Japan. Among the household goods the most commonly specified products are refrigerators, freezers, air-conditioners, lights, fluorescent lamps and ballasts. It is also crucial to note that most countries implement mandatory programs rather than voluntary ones.

Table 3 shows the energy efficiency label programs implemented in the case countries taken into account in this study. In general, there are two different types of labeling systems namely, comparative labels and endorsement labels. Within this grouping, comparative labels enable the comparison of energy efficiency among the products of same type on the market, while endorsement labels identify products that exceed a fixed energy efficiency level. Energy Star, which was developed in the USA and then adopted in EU, Canada, and Japan.

Table 2. Energy-Efficiency Standard Programs

Case Country	Standard Program Type	Products Covered
EU	Mandatory	Refrigerators, Freezers, Refrigerators, Freezers, Ballasts, Gas Boilers.
	Voluntary	11 products such as; Clothes Washers, Dishwashers, Audio Equipment, Electric Water Heaters, TVs, VCRs, DVDs, Motors.
USA	Mandatory	22 products such as; Refrigerators, Freezers, RACs, Boilers, Clothes Washers, Clothes Dryers, Ballasts, Passenger cars.
	Voluntary	Cooktops and Ranges/Ovens, Microwave Ovens.
Canada	Mandatory	35 products such as; Refrigerators, Freezers, Central ACs, RACs, Clothes Washers/Dryer, Ballasts, Boilers, Heaters, Heat Pumps, Furnaces, Computers.
China	Mandatory	26 products such as; Ballasts, Refrigerators, Freezers, Central ACs, Clothes Washers, TVs, Irons, RACs, Rice Cookers, Transformers, Passenger cars.
S. Korea	Mandatory	21 products such as; Refrigerators, Freezers, RACs, Clothes Washers, Fluorescent Lamps, Rice Cookers, Passenger cars.
Japan	Mandatory	21 products such as; Refrigerators, Freezers, RACs, Fluorescent Lights, TVs, DVD Recorders, Electric Rice Cookers, Electric Toilet Seats, Passenger cars.

Source: Hirayama et al. (2008: 111). http://www.aceee.org/files/proceedings/2008/data/papers/8_194.pdf

Table 3. Energy-Efficiency Labeling Programs

Case Country	Label Name and Type	Products Covered
EU	EU Energy Label (Mandatory & Comparative)	21 products including Boilers, Refrigerator-freezers, RACs, Clothes Dryers, Clothes Washers, Clothes Washers/Dryer, etc
	EU Eco-Label (Voluntary & Endorsement)	9 products including Clothes Washers, Computers, TVs, Dishwashers, Fluorescent Lamps, Refrigerator, etc
	EU Energy Star (Voluntary & Endorsement)	Computers, Copiers, Fax Machines, Monitors, Printers, Scanners
USA	Energy Guide (Mandatory & Comparative)	17 products including Ballasts (Electronic), Boilers, Central AC, Clothes Washers, RACs, Refrigerator-freezers, etc
	Energy Star (Voluntary & Endorsement)	47 products including Battery Chargers, Ceiling Fans, CFLs, Clothes Dryers, Computers, Laptops, MFDs, Monitors, etc
Canada	Energy Guide (Mandatory & Comparative)	15 products including Refrigerator-freezers, Clothes Washers/Dryer, Cooktops and Ranges/Ovens, RASs, etc
	Energy Star (Voluntary & Endorsement)	48 products including Battery Chargers, Ceiling Fans, CFLs, Computers, Dehumidifiers, TVs, VCRs, Monitors, etc
China	China Energy Label (Mandatory & Comparative)	Central ACs, Clothes Washers, Freezers, RACs (Window), Refrigerator, Refrigerator-freezers, Self-ballasted Fluorescent Lamps, High Pressure Sodium Lamps, Small and medium Threephase Asynchronous Motors
	Energy Conservation Certification Label (Voluntary & Endorsement)	35 products including Ballasts, Central ACs, CFLs, Clothes Washers, TVs, Fluorescent Lamps, RACs, Rice Cooker, etc
S.Korea	Energy Efficiency Label & Energy saving mark (Mandatory & Comparative)	34 products including Ballasts (Electronic/Magnetic), Boilers (Gas), CFLs, Fluorescent Lamps, Pumps, et & 17 products including TVs, VCRs, audio, DVDs, Microwave Oven, set top box, Computers, etc. (This labeling program is conducted with 1-Watt standby power program.)
	High-efficiency Equipment Label & Energy Saving Label (Voluntary & Endorsement)	34 products including Ballasts (Electronic/Magnetic), Boilers (Gas), CFLs, Fluorescent Lamps, Pumps, etc & 20 products including Battery Chargers, Bidets, Computers, Copiers, Cordless Phones, TVs, VCRs and/or DVDs, etc
Japan	Energy Saving Label & Energy Saving Label (Mandatory & Comparative)	RACs, Refrigerator-freezers, TVs & 20 products including Toilet Electric Seats, VCRs, DVDs, Rice Cooker, Microwave Ovens, Hard-disk drives, etc
	Energy Star (Voluntary)	Computers, Copiers, Fax Machines, Hard-disk drives, Monitors, MFDs, Scanners

Source: Hirayama et al., 2008: 112

Among the countries shown in Table 3, Canada is the country with the most numerous target products with energy efficiency standards. For instance, Canada implements its national comparative labelling program, EnerGuide, which has both mandatory and voluntary labeling elements. The EnerGuide label for major household appliances specify all details pertaining to the labels, including placement on products. The label applies to both domestic and imported products. Energy Star is an international standard for energy efficient consumer products originated in the US which was created in 1992. Other case countries recognize and promote the criteria and logo established under the US Energy Star scheme.

4. Legal Framework for Energy Efficiency Standards and Labels in Turkey

Turkey first adopted the European Energy Labeling Framework Directive (92/75/EEC) in 2001. After the implementation of the directive it was mandatory for manufacturers and/or sellers to provide information regarding to energy consumption of the product. The inspection of the necessary documentation is carried out by the Ministry of Science. Then energy efficiency Law No. 5627 was enacted in May 2007. The purpose of the Law is to increase energy efficiency and to diminish the burden of energy costs on the economy without causing any declines in the quality and to protect environment. In order to prepare a sound plan and strategy, an Energy Efficiency Coordination Board was established with the Law. The Board was responsible from preparing, approval and implementation of energy efficiency projects. The Ministry of Energy and Natural Resources was authorized to ensure the coordination of the enforcement, directing, monitoring through the Board. Training, consultancy and awareness raising activities are outlined under Article 6. In Article 7, subsection i) principles and procedures for the classification and minimum efficiency specification of electric motors, air conditioners, electrical home appliances and light bulbs shall be laid down in a regulation to be jointly prepared with the General Directorate and issued by the Ministry of Industry and Commerce, and those no meeting the minimum thresholds shall not be allowed to sell.

After law becomes effective, a number of directives and notifications are prepared to complement and improve the existing efficiency legislation. The directives set targets on a national level in line with the members of the EU. Relevant legal basis for energy efficiency on household appliances since 2007 is as follows:

- Preparation and Implementation of the Technical Legislation on the Product 2001 (Law No.4703)
  Energy Efficiency Law 2007 (Law No.5627)
- ***Directives***
  Increasing efficiency in energy resources and consumption 2011 (No.28097)
  Indication by labeling and standard product information of the consumption of energy and other resources by energy related products 2011 (No. 28130)
  Improving energy end-use efficiency and energy services (No. 28097)
- ***Notifications***
  Energy labeling for dishwashers 2012 (No. 28331)
  Energy labeling for washing machines (No. 28331)
  Energy labeling for household refrigerators (No. 28331)
  Energy labeling for televisions (No. 28331)
  Requirements for standby and off-mode power consumption of electrical and electronic household and office equipment (No. 28038)
  Training and certification programs on energy efficiency (No.28415)

Furthermore, Directive 2010/30/EU on the indication by labeling and standard production of the consumption of energy and other resources by energy-related products broadens the energy labeling scope. In line with this EU directive, Turkey has implemented the necessary conditions with the notification as shown above. The Turkey-EU Customs Union Agreement which was signed in 1995 was a turning point in between two parties. As a candidate country, Turkey is harmonizing its rules according to the EU directives. Implementations of the EU environmental directives are essential but besides this fact, by improving environmental conditions Turkey will benefit from environmental policies. The first Council Directive on the indication by labeling and standard product information of the consumption of energy was issued in 22 September 1992. And the purpose of the Directive 92/75/EEC was to harmonize the means of labeling so the information relating to the consumption of

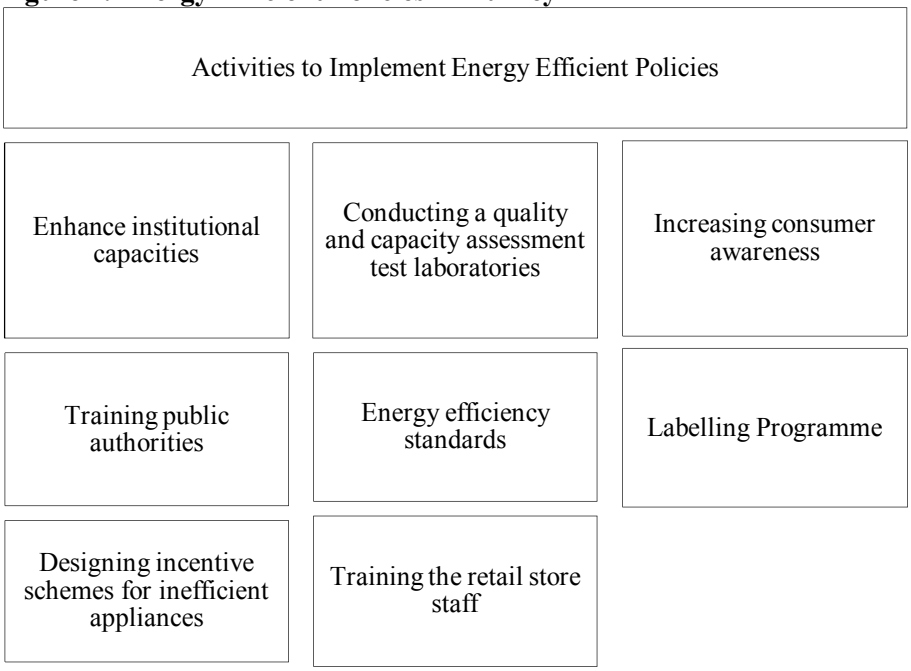
energy would be contained in the labels. This Directive was later amended in 19 May 2010 and the prior directive was extended.

Further, with Turkish Official Gazette number 28331 of June 2012, new regulations for more efficient house appliances become effective. The Law was prepared parallel to EU/1060/2010 and consists of household refrigerators, washing machines, televisions and dishwashers. The purpose of the notifications is to provide additional product information about the energy consumption of the products. The regulation places obligations both to the producers and the sellers. For example, both parties should indicate the energy efficiency class information in their advertisements about the product. Energy efficiency classes and their indexes were identified by the regulation and they are present in the appendix section of the related law.

In order to provide more competitive environment for energy efficient appliances in the markets, a project is implemented with the financial support of Global Environment Facility (GEF). The financial assistance of GEF for the project is totally 5.656.600 US$. The project began in 2010 and is expected to be completed in 2014. UNDP, Ministry of Science, Industry and Technology, Turkish White Goods Manufacturers (TURKBESD) and Arcelik A.S are the key partners of the project. As can be seen from the key partners, the project is designed multifaceted. By including TURKBESD and Arcelik as the representatives of the manufacturers, it is seen that the willingness to change the supply-side of the market with more energy efficient products is increased (GEF, 2010). The objective of the project is to reduce household electricity consumption by a) strengthening the local institutional capacity to develop, adopt and implement effective appliance energy efficiency policies; b) developing and implementing a structured compliance checking and enforcement program for appliance energy performance labels and standards; c) increasing consumer and the supply chain awareness in the Turkish market. In addition to these objectives, realizing the benefits of saving, it is expected that the public authorities will continue to implement even further measures.

Figure 2 presents the activities for implementing energy efficient policies in Turkey. As we have mentioned before market transformation policies normally depend on three pillars; Supply side, demand side and the regulatory side. On the government side, enhancing institutional capabilities is essential. Institutions need to be clear about what they want to affect and think about the side effects of their programs. In many countries an energy efficiency or organization is created to organize/regulate government policies.

Figure 2. Energy Efficient Policies in Turkey



These agencies coordinate the programs between government agencies, manufacturers and consumers. But there is not a uniform energy efficiency organization (ESMAP, 2012). Training public authorities and enhancing the capacity of national experts is important because energy efficiency

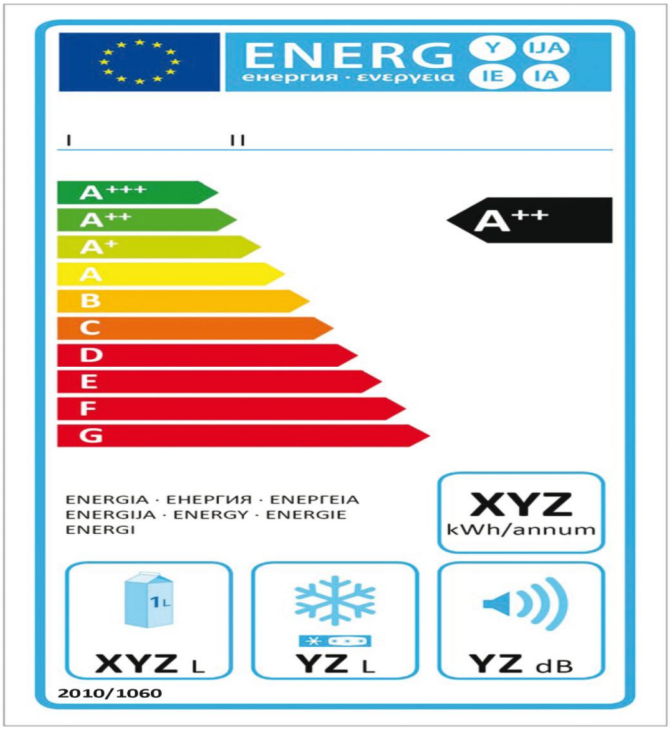
programs require participation of all market participants. Understanding why the government has participated to energy efficiency program will help experts to learn about best practices and the latest regulations on the subject. According to the IEA report (2011), between 2009 and 2010, Turkey trained and certificated 1525 energy managers. With the new trained managers the total number reached more than 4200 in mid-2011.

5. Labeling Appliances in Turkey: Current Situation and Challenges

Countries implement numerous policies to improve energy efficiency. These policies become even more important as the electricity use in households is growing rapidly despite more efficient appliances. This is mostly because of rebound effect (take-back effect) as the efficiency increases more people are willing to buy other electrical appliances and increase the electricity consumption. But still, labeling programs and efficiency standards are an effective method of transforming the market and slowing the electricity demand growth. They provide buyers' information about energy consumption of the appliances but due to lack of information labeling is a mostly overlooked factor especially in developing countries. Labeling programs introduced in developing countries generally based on the experience of developed countries. For instance; the EU label has been used as a model in Brazil, Tunisia, China and Iran, while labels introduced in Thailand and the South Korea are based on the Australian model (World Energy Council, 2008:8).

Energy labels and standards are complementary tools. Labeling acts as an incentive for manufacturers to differentiate themselves from their competitors and stimulates the introduction of new, more efficient models. Standards remove from the market the less efficient appliances (World Energy Council, 2008:8). Whereas efficiency standards shall remove the less energy efficient products from the market, energy labels shall help consumers choosing the most energy efficient products and also to provide incentives for the industry to develop and invest in these products. The EU labeling scheme which began in 1992, now covers most of the electrical appliances and are implemented in the EU member countries and Turkey. The energy label classifies energy performance of a product into ten grades in order to help consumers to understand the energy consumption level of the product. Today, a wide variety of products are labeled and there are plans to expand the labeling program with other types of products.

The accepted label is a uniform label in all EU-27 member states. Due to increased trade around the world, harmonizing products and energy efficiency policies with the trade partners will benefit to all parties. The energy efficiency labels should contain the following information:



A. The appliance's details: The name of the producer and commercial title

B. Specific information about the product model

C. Energy class: a color code associated to latter A+++ to D that gives an idea of the appliance's electrical consumption

D. Colored arrows are used to differentiate energy efficiency

E. Annual energy consumption of the appliance that is calculated yearly kWh.

F. Pictograms highlight; capacity of all storage compartments in lt.,

G. Capacity of frozen food storage in lt.,

H. Noise emissions of the product in decibels.

According to the directive, until 06/30/2014, energy efficiency class for household refrigerators will be indicated as in Table 4.

Table 4. Energy Efficiency Classification (valid until 30/6/2014)

Energy Efficiency Classification	Energy Efficiency Index
A+++ (most efficient)	EEI < 22
A++	22 ≤ EEI < 33
A+	33 ≤ EEI < 44
A	44 ≤ EEI < 55
B	55 ≤ EEI < 75
C	75 ≤ EEI < 95
D	95 ≤ EEI < 110
E	110 ≤ EEI < 125
F	125 ≤ EEI < 150
G (least efficient)	EEI ≥ 150

As the use of energy is depended on the capacity of the product indexes are more convenient in comparing different types of products. For the calculation of the Energy Efficiency Index (EEI) of a household refrigerating appliance, the Annual Energy (AE) Consumption of the household refrigerating appliance is compared to its Standard Annual Energy (SAE) Consumption. The Energy efficiency Index is calculated and rounded to the first decimal place as:

$$EEI = \frac{AE_c}{SAE_c} \times 100$$

One of the best ways to reduce the amount of money spend on electricity is to replace the inefficient product with the efficient one. According to the TEIAS statistics, the gross amount of electricity consumed in Turkey is 229 billion kWh and net consumption is 186 billion kWh in 2011. There is a big difference between the gross and the net amount of electricity consumed so there is still need for more serious precautions. Indeed, the annual amount of electricity consumed in the whole residential sector is 41 billion kWh which corresponds to 22.5% of the total electricity consumption.

Electricity consumed by refrigerators was responsible for 31.1 percent of total residential electricity consumption (Temel, 2007). In 2011 unit price of electricity was 0.216 TL, so the cost of electricity consumption of the refrigerators is as follows:

Electricity consumption: 41.4 * 31.1=12.834 billion kWh

Cost of electricity : 12.834 * 0.21=2.695 billion TL is the total amount of money spend on refrigerators.

There are 16.108.105 household electricity subscribers in Turkey. Assuming that every household has at least one refrigerator, than the electricity consumption for each refrigerator is calculated as:

Electricity consumption per refrigerator: 12.834 billion kWh / 16.108.105 = 796 kWh/year

Electricity cost per refrigerator : 796kWh/year * 0.21 TL/kWh = 167 TL/year

Every household is spending nearly 167 TL/year only for the electricity consumption for a refrigerator. Here it is assumed that the refrigerator is an average one, meaning a C class. If we replace from a C class appliance with an A++ one, then the electricity consumption will be saved by 67%. This percentage will be 54% if the appliance is A+. So we can make two calculations for two different scenarios. In the first scenario we will assume that half of the refrigerators will be replaced with an A+ class and in the second scenario they will be replaced by A++ ones.

Under the first scenario, the cost of electricity consumption of refrigerators will be lowered by 727 million TL per year and in the second scenario the saved amount will be 902 million TL per year. If we assume that a refrigerator has a life span of 16 years in Turkey, saved amounts will be up to 14.432 billion TL. In order to save this amount we believe that a recycling rebate program would be suitable for strengthening the program and to remove the inefficient products from the market. Various countries have provided different types of subsidies and incentives for energy efficient products (Kama and Kaplan, 2012). These saving estimates, if they materialize, would represent an important achievement for household goods energy efficiency programs in Turkey.

6. Conclusion

Over the last decades, many governments around the world have developed policies to improve energy efficiency. Energy efficiency policies become even more important as the electricity use in households is increasing rapidly. Energy standards and labeling programs for household appliances now operates in most developed countries and in an increasing number of developing countries. A wide variety of products are labeled, with the list varying from country to country. The most commonly labeled appliances are diverse as refrigerators, freezers, air conditioners, lighting products and washing machines.

Turkey first adopted the energy efficiency labeling scheme in 2001 in line with the EU Directives which determines energy efficiency rules for household appliances. As the second biggest producer in household appliances and manufacturers, Turkey exports energy efficient products to more developed countries with high efficiency standards. Unfortunately, in Turkey not all household manufacturers have a similar attitude in producing energy efficient appliances. Small scale manufacturers are still produce low quality appliances and export their products to developing countries. In order to overcome this issue, specific incentive programs must be designed to improve production of energy efficient appliances in small firms.

The main weakness of the standard and labeling scheme in Turkey is insufficient human and financial resources on compliance checking and enforcement program. The weaknesses on the enforcement mechanism might have negative effects on the reliability of the program. This in return endangers consumer trust. Another problem is the lack of consumer awareness, and it is an important barrier for the effective implementation of the programs. Promotions on energy efficient products should be prepared and implemented to attract consumer attention. In order to ensure the market transformation in Turkey, the sale of energy efficient appliances must be increased and thus the replacement of old and inefficient goods with the energy efficient ones must be accelerated. Lastly, the household appliance label and standards programs in different countries cover a large number of products. However, in Turkey only five products are covered within the programmes. Thus, in order to increase the effectiveness of such programmes, the number of products covered must be increased.

Market transformation for energy efficient technologies is generally a long-lasting process. The main motivation is to reduce the household electricity consumption by accelerating the market transformation for less energy consuming appliances. This process can be speed up the result of improving the energy efficiency of appliances and encourage manufacturers to invest in research and development for more energy efficient products. In this context, along with the recent GEF project, Turkey must also put into effect a recycling rebate program to remove inefficient goods from the market. These programmes, if they are well-implemented, would reduce the dependency in energy and thus would represent an important achievement for household appliances energy efficiency programs in Turkey.

References

Aebischer, B., Varone, F. (2001), “The Internet: the most important driver for the future electricity demand in households”, Proceedings ECEEE 2001 Summer Study, Ademe Editions, Paris.

Birner, S., Martinot, E. (2003), Market transformation for energy efficient products: lessons from programs in developing countries. Energy Policy, 33(14), 1765-1779.

Di Stafano, G., Gambardella, A., Verona, G. (2012), "Technology push and demand pull perspectives in innovation studies: Current findings and future research directions” Research Policy, 41, 1283-1295.

Dosi, G. (1982), Technological Paradigms and Technological Trajectories: A suggested Interpretation of the Determination and Directions of Technical Change, Research Policy, 11, 147-162.

Dosi, G. (1988), Sources, Procedures and Microeconomic Effects on Innovation, Journal of Economic Literature, 26, 1120-1171.

ESMAP (2012), Public Procurement of Energy Efficient Products: Lessons from Around the World”, Technical Report 003/12, USA.

Geller, H., Nadel, S. (1994), Market transformation strategies to promote end-use efficiency. Annual Review of Energy and the Environment, 19, 301-346.

Hirayama, S., Nakagami, H., Murakoshi, C., Nakamura, M., Mizutani, S. (2008), "International Comparison of Energy Efficiency Standard and Labels: Development Process and Implementation Phase", Energy Efficiency in Buildings; Scaling Up, ACEEE, USA. http://www.aceee.org/files/proceedings/2008/data/papers/8_194.pdf

IEA (2000), Energy Labels and Standards: Energy Efficiency Policy Profiles, France.

IEA (2010), Energy Efficiency Governance Handbook, Second Edition, France.

Kama, O., Kaplan, Z. (2012), *Turkiye'de Enerji Verimliliginin Arttirilmasina Yonelik Bir Oneri: Beyaz Esya Tesvik Uygulamalari*, Hukuk ve Iktisat Arastirmalari Dergisi, 4(1), 201-211.

Mowery, D., Rosenberg, N. (1979), The Influence of Market Demand Upon Innovation – A Critical Review of Some Recent Empirical Studies, Research Policy, 8(2), 102-153.

Nemet, G.F. (2009), Demand-pull, technology-push, and government-led incentives for non-incremental technical change, Research Policy, 38(5), 700-709.

Prahl, R., Schlegel, J. (1993), "Evaluating market transformation", in The Proceedings of the 1993 International Energy Program Evaluation Conference, Chicago, IL, National Energy Program Evaluation Conference, pp. 469-477.

Rennings, K. (2000), Redefining innovation-eco-innovation research and the contribution from ecological economics, Ecological Economics, 32, 319-332.

Suozzo, M., Nadel, S. (1996), "Learning the Lessons of Market Transformation Programs." Proceedings of the 1996 ACEEE Summer Study on Energy in Buildings, Washington DC.

Taylor M., Rubin, E., Hounshell, D . (2005), Control of SO2 emissions from power plants: A case of induced technological innovation in the US. Technological Forecasting and Social Change, 72 697-718.

United Nations (2011), Guidelines for Strengthening Energy Efficiency Planning and Management in Asia and the Pacific, Economic and Social Commission for Asia and the Pacific, UNESCAP Publications, ST/ESCAP/2598.

Wiel, S., McMahon, J. (2003), Governments should implement energy-efficiency standards and labels cautiously, Energy Policy, 31(13), 1403-1415.

World Energy Council (2008), Energy Efficiency Policies around the World: Review and Evaluation, Executive Summary, London, UK.

World Energy Council (2007), Energy and Climate Change, World Energy Council, London, UK.

UNDP-GEP (2010), Project Document PIMS 4014, Atlas Project (http://www.undp.org.tr/Gozlem3.aspx?WebSayfaNo=2229)