Republic of Korea

Case Study : Efficiency Management of Energy-Using Appliances

1. Introduction

Household appliances, office equipment, lighting appliances, heating apparatus and automobiles that we are using in our daily lives spend certain amounts of energy. However, products differ in their energy consumption.

There may be many ways to raise energy efficiency nationwide, but one way is to pursue energy saving from the source by inducing manufacturers to supply more energy-efficient products.

<Energy Efficiency Program>

Energy Efficiency Standards & Labeling Program	Certification of High efficiency Energy-using Appliances Program	e-Standby Program
- Implemented since August 1992 - Promote energy efficiency	- Implemented since December 1996 - Promote high efficiency equipment	- Implemented since January 1999

improvement and minimum efficiency applied - Energy efficiency grade label used - 17 items including refrigerators - Mandatory labeling	and appliances - Certificate and label issued for highly efficient equipment and appliance - 33 items including ballast - Voluntary Agreement (VA)	- Save standby power - Attach Energy Saving Label - 18 items including computers and TVs - Voluntary Agreement (VA)

Currently, the Ministry of Commerce, Industry and Energy (MOCIE) and Korea Energy Management Corporation (KEMCO) are operating 3 energy efficiency programs. They are the Energy Efficiency Standards & Labeling Program, Certification of High efficiency Energy-using Appliances Program, and e-Standby Program.

< List of Energy Efficiency Program Items >

Category	Purpose	Items
Energy Efficiency Standards & Labeling Program	Increase energy efficiency, apply minimum efficiency	Refrigerators, air conditioners, washing machines, drum type washing machine, electric fans, domestic gas boilers, incandescent light bulbs, fluorescent lamps, Ballasts for Fluorescent Lamps, compact fluorescent lamps, electric water dispensers, dishwashers, kimchi refrigerators, electric rice cookers, freezers, vacuum cleaners, motor vehicles (17 items)
Certification of high	Supply high-	High efficiency induction motors, 26 ? 32W fluorescent

efficiency energy-using appliance s program	efficiency equipment and appliances	lamps, ballast for 26？ 32W fluorescent lamps, compact fluorescent lamps, reflectors for fluorescent lamps, sensor lighting equipment, heat recovery ventilator, airtight window frames, gas boilers for industrial buildings, domestic gas boilers, high-efficiency pumps, centrifugal water chillers, uninterruptible power supply system, vending machines, transformers, T-5 fluorescent lamps, electronic ballasts for metal halide lamps, electronic ballasts for sodium lamps, high efficiency inverter, LED traffic lights, single-phase induction motor, ballast for 16mm fluorescent lamps, metal halide lamps, reflectors for HID lamps, oil-burning boilers, etc (33 items)
e-standby program (Energy Saving Label)	Reducing standby power	Computers, monitors, printers, facsimiles, photocopiers, scanners, multifunction devices, TVs VCRs, audios, DVD players, microwave ovens, mobile phone battery chargers, set-top boxes, DC power supply, cordless and fixed-line telephones, etc (18 items)

Improve energy efficiency and apply minimum efficiency standards

17 items including refrigerators, air conditioners, and motor vehicles

Mandatory

Energy Efficiency Standards & Labeling Program

High-efficiency equipment and appliance labeling

Supply highly efficient devices

Efficiency Management Systems to Expand Supply of Energy-efficiency Equipment and Appliances	Certification of High efficiency Energy-using Appliances Program	33 items including induction motors, boilers, pumps, lighting equipment, etc VA High-efficiency equipment and appliance labeling and certification	 
	e-Standby Program (Energy Saving Label)	Standby power cut 18 items including computers, printers, photocopiers, TVs, VCRs VA - Recognizes self-testing by manufacturers Energy Saving Label	

A. Energy Efficiency Standards & Labeling Program

The Energy Efficiency Labeling program is a mandatory system for all manufacturers and importers that involves indicating the energy efficiency grade from the 1st to 5th grade on products that consume much energy and has high market penetration according to the products' energy efficiency and energy consumption. Generally speaking, the 1st grade products can save up to 30% to 40% of energy than the fifth grade products. The Energy Efficiency Labeling Program and minimum efficiency standards are applied on household appliances, lighting equipment and motor vehicles.

B. Certification of High Efficiency Energy-using Appliances Program

The High Efficiency Energy-using Appliances Program is an efficiency guarantee system for products above certain standards, paving the way to increase the supply of high efficiency energy equipment. For the certified products, the High Efficiency Equipment Label is attached and Certification issued for High Efficiency Energy Equipment. Specifically, the system is applied to items such as induction motors, boilers and lighting appliances, etc.

C. e-Standby Program

The e-Standby Program has the purpose of facilitating the supply of energy-saving products that decrease electric consumption while in standby, based on voluntary participation by manufacturers. An Energy-Saving Label is attached to products that meet energy-saving standards suggested by the Korean government. The Program is focused on electronic appliances including those for office/household use.

2. Energy Efficiency Standards & Labeling Program

A. Implementation of Energy Efficiency Labeling Program

Before the current Energy Efficiency & Standards Labeling Program was implemented, energy efficiency was “marked” rather than “graded”. The energy efficiency of energy-using appliances was made public to consumers to elicit the purchase of energy-saving products. In line with that, the energy efficiency system had been in place since the 1st Oil Shock to facilitate the development of energy-saving products by manufacturers.

In particular it became mandatory to display heat efficiency when approving heat-using equipment such as boilers in compliance with a law on managing heat that was legislated in 1974. With the legislation of the Rational Energy Utilization Act in December 1979, displaying energy efficiency in advertisements as well as on the product itself was required. Moreover, products subject to energy efficiency labeling continued to be expanded, leading to 16 heat-using items such as boilers, oil heaters and gas cookers being subject to the stipulations.

Electric appliances such as electric heaters were required to mark the energy efficiency figure on the surfaces and got approval under 1974 Electric Appliances

Safety Control Act. The items subject to them were about 210 products such as electric heaters, televisions and air conditioners.

From January 1981, the above law required 5 items including refrigerators to have their monthly energy consumption measured by an approved testing institute and marked them on the products. From January 1985, monthly energy consumption was required to be displayed even in product advertisements, thereby allowing consumers to select energy-saving products.

With the above Energy Efficiency Labeling Program implementation, competition among manufacturers resulted in the active development and spread of superior energy-saving appliances and consumers were encouraged to choose the energy-saving products, which led to firm establishment of the program in Korea.

However, consumers lacked detailed knowledge of energy efficiency and had to take trouble to research on energy efficiency figures by themselves when choosing the product, thus it was not widely recognized among consumers.

To solve this issue fundamentally, a new Energy Efficiency Labeling Program was implemented. Under the new program, a certain standard was set for each product and a corresponding grade was issued according to its energy efficiency or energy consumption.

B. Energy Efficiency Grade Labeling Program

The Energy Efficiency Grade Labeling Program involves an energy efficiency grade labeling from Grade 1 (high efficiency) to Grade 5 (low efficiency) on products according to the energy efficiency of a product, thereby enabling the consumer to easily select energy-saving appliances. Introduced on December 14, 1991 following the revision of the Rational Energy Utilization Act, it was implemented full-scale from September 1, 1992 through revision of relevant regulations.

The revised "Rational Energy Utilization Act" required the setting of energy efficiency standards and grade labeling for energy-using equipment that consume considerable amount of energy and are widely used in the market. Items such as refrigerators, air conditioners, passenger cars, lighting equipment and other products were designated as subject appliances.

An efficiency grade was applied and issued to refrigerators and passenger cars from September 1, 1992. Items subject to the program were expanded to include incandescent light bulbs and fluorescent lamps from October 1, 1992. As of May 2005, 17 items including motor vehicles are included.

Under the early scheme of program, a manufacturer had to take a efficiency test of its product by a government-approved testing institutes and submitted the test report to KEMCO and then KEMCO reviewed it and issued the grade. From June 1, 1993 the scheme was changed to a simpler one in which the manufacturers submit the test report to KEMCO just for reference and attach the label on their products themselves.

KEMCO implements follow-up measures such as annual product/factory/store inspections to check if the performance of each product matches the reported grade and if the manufacturer keeps labeling requirements to protect the consumer.

The current labeling program is obligating manufacturers or importers to attach labels on their products before they are shipped from the warehouse or cleared customs after taking the efficiency test by authorized institutes such as Korean Agency for Technology and Standards and Korea Testing Laboratory.

Since its first implementation for refrigerators and lighting equipment in 1992, the subject item was expanded to: air conditioners in 1993; ballasts for fluorescent lamps in 1994; compact fluorescent lamps, linear 32W, circular 32W, 40W fluorescent lamps, ballasts for linear 32W, circular 40W fluorescent lamps in 1999; domestic gas boilers in 2000; dishwashers and electric water dispensers in 2002; electric rice cookers, compact fluorescent lamps, kimchi refrigerators in 2004. The subject items will be expanded continuously in the future.

Also, to expand the items and enhance the effectiveness of the program, the efficiency improvement trends of subject items were analyzed and efficiency/grading standards were adjusted in 1995. The revised Rational Energy Utilization Act in 1997 required the products failed to meet minimum efficiency standards or maximum energy use to improve their efficiency or energy use within 6 months. For products that failed to improve without a reasonable cause, their production or sale was prohibited. If the ban was violated, the product was subject to a fine of up to 20 million Korean Won.

< Status of Efficiency Grade Labeling >

(As of December 31, 2002)

Category	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Refrigerators	846	269	164	43	73	1,395
	(60.6%)	(19.3%)	(11.8%)	(3.1%)	(5.2%)	(100%)
Air Conditioners	1,110	463	120	30	8	1,731
	(64.1%)	(26.7%)	(6.9%)	(1.7%)	(0.5%)	(100%)
Washing Machines	320	6	2	1	1	330
	(97.0%)	(1.8%)	(0.6%)	(0.3%)	(0.3%)	(100%)
Incandescent Light Bulbs	2	54	109	24	-	189
	(1.1%)	(28.6%)	(57.7%)	(12.7%)		(100%)
Fluorescent Lamps	43	90	81	64	67	345
	(12.5%)	(26.1%)	(23.5%)	(18.6%)	(19.4%)	(100%)
Ballasts for Fluorescent Lamps	1	533	239	212	182	1,167
	(0.1%)	(45.7%)	(20.5%)	(18.2%)	(15.6%)	(100%)
Compact Fluorescent Lamps	291	302	38	14	7	652
	(44.6%)	(46.3%)	(5.8%)	(2.1%)	(1.1%)	(100%)
Domestic Gas Boilers	1,296	3	1	-	-	1,300
	(99.7%)	(0.2%)	(0.1%)			(100%)

Dishwashers	160 (93.6%)	10 (5.8%)	1 (0.6%)	-	-	171 (100%)
Electric Water Dispensers	40 (30.3%)	46 (34.8%)	44 (33.3%)	2 (1.5%)	-	132 (100%)
Total	4,109	1,776	799	390	338	7,412
Ratio (%)	55.4	24.0	10.8	5.3	4.6	100

C. Energy Efficiency Standards Program

Based on MOCIE Notification 1993-13(Regulation on setting energy efficiency standards and labeling energy efficiency grade), minimum and target efficiency standards were assigned for appliances such as refrigerators and air conditioners to be met within a certain period of time. It was implemented with the Efficiency Grade Labeling Program but currently was integrated into the MOCIE Notification "Regulation on the operation of equipment and appliances "