MEPS EXPERIENCE IN KOREA

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ENERGY REVIEW IN KOREA

With the rapid economic growth propelled by heavy and chemical industries, Korea's energy consumption has increased sharply since the mid-1970s. The total primary energy consumption, which stood at 43.9 million TOE in 1980, increased nearly four-fold to 181.2 million TOE in 1999, to rank Korea as the tenth largest energy-consuming country in the world. Per capita energy consumption also increased rapidly from 1.15 TOE in 1980 to 3.89 TOE in 1999. Poor in indigenous energy resources, Korea has to rely almost entirely on imports to meet its energy needs. In 1999, the dependency rate on imported energy, including nuclear energy, was 97.2%, and its cost amounted to US$ 22.8 billion, which was 19% of the nation's total inbound shipments. The high rate of increase in energy demand is expected to persist in the future, because further economic growth is expected despite nationwide efforts driven by the government to encourage energy conservation and higher energy efficiency.

Table 1. Major energy statistics

	1994	1995	1996	1997	1998	1999
GDP growth(%)	8.3	8.9	6.8	5.0	-5.8	10.7
Primary energy consumption growth(%)	8.2	9.6	9.8	9.3	-8.1	9.3
Energy / GDP elasticity	0.99	1.08	1.45	1.86	1.39	0.87
Overseas Dependency(%)	96.4	96.8	97.3	97.6	97.1	97.2

For the first time to introduce energy efficiency program in Korea, we analyzed various data collection. In order to obtain the data about energy consumption of main home appliance products, demand of electrical power for residential house was investigated from 1961 to 1990. Since the rural electrification was carried out successfully and the electricity is growing with the increase of income by the economic development, the demand of the electricity in the residence was increased from 162 GWh in 1961 to 17,735 GWh in 1990, growth of 109.5 times. This means that the average growth per a year is 17.6%. The demand of the electricity shown in Table 2 is a summary of the lasting changes in each of the end-use sectors.

Therefore, the ratio of electricity in the residential sector was a steady increase from 13.6% to 18.8% of total consumption in that year. Domestic refrigerators and freezers account for about 17% of residential electricity use, or about 3.7% of total electricity use. The lighting consumes about 24% of residential use. Other data are shown in Table 3. As the possession of refrigerator in each household is already saturated, the increasing trend is more moderately compared to the past years. But the trend toward buying the bigger size is appeared when the old refrigerator was replaced with the new one. According to the production data, in the early of 1980s, the top production size rate was the 180-220 liters and changed 220-280 liters in the late 1980s, and 300-500 liters in 1990, 1991.

Table 2. Electricity demand by sector (unit: %)

Sector	1961	1966	1971	1976	1981	1986	1990
Residential	13.6	10.4	10.9	12.2	16.8	18.3	18.8

Commercial	30.4	25.7	21.6	15.3	14.7	16.3	18.4
Industrial	56.9	63.9	67.5	72.5	68.5	65.4	62.8

Table 3. Composition ratio of electrical use for each appliance (1990)

Description	Composition ratio (%)
Lighting	23.8
Refrigerator	17.1
Cooking	16.2
TV	10.9
Heating	8.9
Cooling	2.4
Others	20.7

Table 4. The percentage of households with such appliances (unit: %)

Year	Refrigerator	Air-conditioner	TV	VTR	Clothes washer	Microwave oven
1981	43	1	15	0.6	15.2	-
1982	54	1	37	1.3	17.1	-
1983	68	3	49	2.9	21	1
1984	71	2	58	60.	27	3
1985	87	2	69	8.4	39	4
1986	92	3	89	11.6	41	5
1987	95	4	87	15.0	47	8
1988	98	8	99	21.0	52	9
1989	103	9	104	33.4	65	15
1990	106	8	125	43.3	73	21
1991	110	9	127	51.6	86	32

* Note: Total No. of households in 1991, Korea : 11,500,000

The percentage of domestic households with such appliances is shown in Table 4. It can be seen that major appliances except air conditioner are already saturated. While air conditioners are spread up to about 95% in U.S. and about 80% in Japan, the Table shows only 10% in domestic. Hence, the number of air conditioners is rapidly increased. In the United States, the refrigerators and freezers alone require 20% of peak load electricity generation in 1990. Particularly, in Korea, a surplus of electric power in summer was abruptly drop down from 51.5% in 1987 to 5.4% in 1991. In 1992, it is getting worse, 2.5%. Unless the policy of energy savings is put in force immediately, the limited supply of electric power will be possible. Therefore, the government, under the Rational Energy Utilization Act, issued the regulation energy efficiency for the main energy consuming products, such as air conditioners, refrigerators, lighting equipment, and automobiles in September 1, 1992.

ENERGY EFFICIENCY STANDARDS & LABELING PROGRAM (EESLP) IN KOREA

A BRIEF HISTORY OF EESLP IN KOREA

The energy labeling program for major appliances in Korea was first introduced in 1981. This program was only voluntary. In the middle of 1980s, Korea has experienced rapid economic growth for

the last couple of decades, which has resulted in a tremendous increase in energy demand. In particular, the electricity consumption has increased in the recent years with the wide spread of home appliances, which endangers the stable power supply especially in the summer season. As Korea is endowed with very few energy resources, it relies on almost all energies needed from abroad. In an effort to solve these problems, the Korean government has put foremost energy policy priority on energy efficiency improvement and conservation, because it offers a win-win strategy that provides environmental benefits, including reducing greenhouse gas emissions, while reducing energy import dependence, as well as reducing direct energy costs.

In 1991, Korea Institute of Energy Research (KIER), a non-profit scientific research institute supported by the government, formulated the labeling rule for the Korean Ministry of Commerce, Industry and Energy (MOCIE) based on a statistical analysis and engineering analysis of efficiency data provided by manufacturers. Finally, based on the Rational Energy Utilization Act, commonly known as the Energy Conservation Law (ECL) in 1992 MOCIE mandated "*Regulation on Energy Efficiency Standards Setting and Rating Labeling*" mandatory for particular types of selected consumer products. In the beginning, 6 items, refrigerators/refrigerator-freezers, room air conditioners, incandescent lamps, T10 fluorescent lamps, ballasts, passengers cars were included for this program, and step by step more items were added to this program. At present, the products include as follows;

- Refrigerators and refrigerator-freezers,
- Room air-conditioners,
- Clothes washers
- Incandescent lamps,
- fluorescent lamps(T10 and T8 types),
- Ballast for T8 and T10 fluorescent lamps,
- Self-ballasted CFLs(screw base compact fluorescent lamps), and
- Passenger cars.

The followings are considered to be added in the future; electric water heater (not fixed), gas boiler (2001. 7), dishwasher (2002), ballasts for HID lamp (2002), etc. The labeling program establishes an efficiency level table comprised of 5 levels of efficiency and a rating formula for each particular model (or type) of products. Labels are to be affixed on all products with a numerical designation that represents the level of energy efficiency. The labels also provide with an information on energy consumption. The efficiency is determined in accordance with test procedures under proper section of the Korean Industrial Standard (KS). The program also requires that the information energy consumption be displayed on any technical material associated with the sale of the products. KIER's roles are;

At present, in collaboration with MOCIE,

- to formulate energy efficiency standards and labeling rules of new appliances,
- to revise the energy efficiency standards and labeling rules of consumer products every 3 years,
- to test energy efficiency performance for appliances and lighting equipment and passenger cars,
- to perform engineering analysis that establishes the technical feasibility to improve energy efficiency, and
- to perform economic and environmental effects analysis.

INTRODUCTION

The EESLP consists of the energy efficiency grade indication, the minimum energy performance (or efficiency) standard (MEPS) and the target energy performance (or efficiency) standard (TEPS), etc. The purpose of EESLP is to save energy by enabling the consumers to identify the energy saving products easily through indicating the energy efficiency grade from the 1st to 5th grade. Generally speaking, the 1st grade products can save up to 30% to 40% of energy than the fifth grade products. The purpose of MEPS is to prohibit the low efficiency products from spreading and promote the manufacturers'technical development by setting up and controlling the minimum required efficiency

standard. The not-improved products can be expelled. The TEPS aims to reduce the current energy consumption by each product by 10~30 per cent, within a designated length of time.

SUBJECT PRODUCTS

1. Subject products

The following 8 items are the EESLP subject products. The EESLP is applied not only domestic goods but also imported goods.

Classification	Scope	Effective date / update
Refrigerators / Refrigerator-Freezers	- rated power consumption is less than 500W - internal cubic volume is less than 1000 liter	Sep. 1, 1992[1] / Jan. 1, 1996[3] / Jan. 1, 2001[6]
Air conditioners	- the cooling capacity is less than 17.5kW	Jan. 1, 1993[1] / Jan. 1, 1996[3] / Jan. 1, 2001[6]
Clothes washers	- top loading, automatic household clothes washers with a wash capacity is less than 15kg	Jan. 1, 2001[6]
Incandescent lamps	- lamp wattage 30W, 60W, 100W	Oct. 1, 1992[1] / Jan. 1, 1996[3]
Fluorescent lamps	- straight tube : T10(20W, 40W), T8(32W) - circle tube : T10(32W, 40W)	Oct. 1, 1992[1] / Jan. 1, 1996[3] / July 1, 1999[5]
Ballasts for fluorescent lams	- ballasts(magnetic & electronic) for fluorescent lamps	July 1, 1994[2] / July 1, 1999[5]
CFLs with ballast(screw base)	- rated frequency is 60Hz, and rated input voltage is less than 300V	July 1, 1999[5]
Passenger cars	- fueled with gasoline, LPG, light oil	Sep. 1, 1992[1] / Jan. 1, 1997[4]

[1] Aug. 21, 1992 MOCIE Announcement No.1992- 71 Enacted
[2] Jan. 1, 1994 MOCIE Announcement No.1993-130 Revised
[3] Dec. 29, 1995 MOCIE Announcement No.1995-125 Revised
[4] Oct. 7, 1996 MOCIE Announcement No.1996-384 Revised
[5] Mar. 8, 1999 MOCIE Announcement No.1999- 24 Revised
[6] Sep. 23, 2000 MOCIE Announcement No.2000-101 Revised (current)

2. Energy efficiency standards and grade levels are established by the following indices.

Refrigerators/refrigerator-freezers: kWh/month
Air conditioners: COP = cooling capacity(W)/cooling input power(W)
Clothes washers: Wh/kg/1cycle
Incandescent lamps: lm/W
Fluorescent lamps: lm/W
Ballasts: BEF = Commercial ballast efficacy with reference ramp(1m/W)/reference ballast efficacy with reference lamp (1m/W)
CFLs with ballast: lm/W
Passenger cars: km/*l*

ENERGY EFFICIENCY STANDARDS AND ENERGY EFFICIENCY RATING STANDARDS

TEPS is imposed on all eight items while MEPS on seven appliances except passenger cars. MEPS is to prevent the proliferation of inefficient models while TESP is to promote the development and circulation of more energy-efficient technologies. MOCIE sets the standards that manufacturers should achieve within a given period. Though MOCIE Announcements mentioned earlier, it announces the achievement periods, standards, ways of efficiency measurements, and so on, in consideration of

technological advancements and other socio-economic environment. KIER mainly involves standards setting, in consultation with MOCIE, KEMCO (Korea Energy Management Corp.) and the manufacturers and importers concerned, KEMCO is responsible for the implementation and monitoring of the standards, The compliance test is carried out by the government-designated test laboratories.

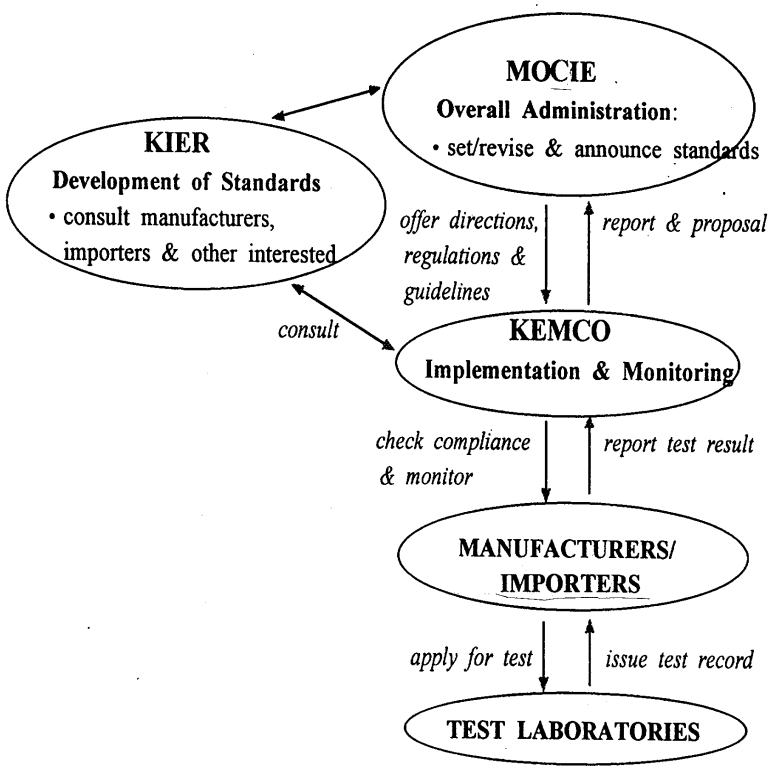

Figure 1. Implementation Process of TEPS and MEPS Setting in Korea.

The TEPS aims to reduce the current energy consumption by each covered product by 10~30 per cent. Under the current "*Regulations on Energy Efficiency Standards Setting and Rating Labeling*" issued on September 23, 2000, the TEPS and MEPS are set as seen in following Tables.

1. Refrigerators and refrigerator-freezers

(a) Energy efficiency standards

Product type	MEPS[a](kWh/month)	TEPS[b](kWh/month)
Refrigerators	P 0.067AV + 30.15	P 0.037AV + 16.75
Refrigerator-freezers AV < 500 liter	P 0.045AV + 53.01	P 0.025AV + 29.45
Refrigerator-freezers AV 500 liter	P 0.078AV + 29.14	P 0.043AV + 16.19

[a] As of Jan. 1, 2001 [b] By the end of 2002

* Note: 1. AV(Adjusted Volume, liter) = Refrigerator volume + K x Freezer volume
2. Adjustment factor K = 1.78 for Refrigerator-freezers
3. Formula for adjustment factor (K) = (T1-T3)/(T1-T2)
where,
T1 : Ambient temperature in testing (30)

T2 : Average indoor temperature of the fresh compartment (3)
T3 : Average indoor temperature of the freezing compartment (-18)

(b) Energy **e**fficiency rating criteria, R is

R = Energy consumption of commercial refrigerator-freezer (kWh/month) / TEPS (kWh/month)

(c) Energy efficiency rating standards

R	Grade
R 1.00	1
1.00 < R 1.20	2
1.20 < R 1.40	3
1.40 < R 1.60	4
1.60 < R 1.80	5

(d) Test methods of energy consumption, complying with KS C 9305

2. Air conditioners

(a) Energy efficiency standards

Type		MEPS[a] (COP)	TEPS[b] (COP)
Wall mounted type(Unitary)		2.37	3.05
Split type	Cooling capacity < 4kW	2.86	3.54
	4kW Cooling capacity < 10kW	2.46	3.14
	10kW Cooling capacity < 17.5kW	2.25	2.93

[a] As of Jan. 1, 2001 [b] By the end of 2002

(b) Energy efficiency rating criteria, COP

(c) Energy efficiency rating standards

i) Wall mounted type

COP	Grade
3.05 < COP	1
2.88 < COP 3.05	2
2.71 < COP 2.88	3
2.54 < COP 2.71	4
2.37 < COP 2.54	5

ii) Split type (Cooling capacity < 4kW)

COP	Grade
3.54 < COP	1
3.37 < COP 3.54	2
3.20 < COP 3.37	3
3.03 < COP 3.20	4
2.86 < COP 3.03	5

iii) Split type (4kW Cooling capacity 10kW)

COP	Grade
3.14 < COP	1

2.97 < COP	3.14	2
2.80 < COP	2.97	3
2.63 < COP	2.80	4
2.46 < COP	2.63	5

iv) Split type (10kW Cooling capacity 17.5kW)

COP		Grade
2.93 < COP		1
2.76 < COP	2.93	2
2.59 < COP	2.76	3
2.42 < COP	2.59	4
2.25 < COP	2.42	5

(d) Test methods of COP, complying with KS C 9306 and KS B 6369

3. Incandescent lamps

(a) Energy efficiency standards

Type	Lamp wattage (W)	MEPS[a](lm/W)	TEPS[b](lm/W)
110V	30	10.0	12.8
	60	13.0	15.0
	100	14.2	16.5
220V	30	8.0	10.0
	60	10.8	13.0
	100	12.5	14.6

[a] As of Jan. 1, 1997 [b] By the end of 1998

(b) Energy efficiency rating criteria, R is

R = TEPS (1m/W) / energy efficiency (1m/W) of commercial lamp

(c) Energy efficiency rating standards

R		Grade
R	1.00	1
1.00 < R	1.10	2
1.10 < R	1.20	3
1.20 < R	1.30	4
1.30 < R	1.40	5

(d) Test methods of energy efficiency, complying with KS C 7501

4. Fluorescent lamps

(a) Energy efficiency standards

Type	Lamp wattage (W)	MEPS[a](1m/W)	TEPS[b](1m/W)
Straight tube	20	55.0	76.0
	32	73.0	95.0
	40	66.0	98.0

Circle tube	32 40	52.8 58.0	68.0 76.0

[a] As of Jan. 1, 2000 [b]By of June 30, 2002

(b) Energy efficiency rating criteria, R is

R = TEPS (1m/W) / Energy efficiency (1m/W) of commercial lamp

(c) Energy efficiency rating standards

i) Straight tube 20W

R	Grade
R 1.00	1
1.00 < R 1.10	2
1.10 < R 1.20	3
1.20 < R 1.25	4
1.25 < R 1.38	5

ii) Straight tube 40W

R	Grade
R 1.00	1
1.00 < R 1.03	2
1.03 < R 1.15	3
1.15 < R 1.27	4
1.27 < R 1.48	5

iii) Straight tube 32W and circle tube type

R	Grade
R 1.00	1
1.00 < R 1.10	2
1.10 < R 1.20	3
1.20 < R 1.25	4
1.25 < R 1.30	5

(d) Test methods of energy efficiency, complying with KS C 7601-1995

5. Ballasts for fluorescent lamps

(a) Energy efficiency standards

Application for operation of	Input voltage	MEPS[a]	TEPS[b]
Straight tube 20W lamp	220	0.83	1.15
40W lamp		0.97	1.20
32W lamp		0.97	1.180
Circle tube 32W lamp		0.97	1.18
40W lamp		0.97	1.180

[a] As of Jan. 1, 2000 [b] By of June 30, 2002

(b) Energy efficiency rating criteria, R is

R = Commercial ballast efficacy with reference ramp (1m/W) / Reference ballast efficacy with reference lamp (1m/W)

(c) Energy efficiency rating standards

i) Ballast for straight tube 20W

R	Grade
1.15 R	1
1.06 R < 1.15	2
0.97 R < 1.06	3
0.92 R < 0.97	4
0.83 R < 0.92	5

ii) Ballast for straight tube 40W

R	Grade
1.18 R	1
1.09 R < 1.18	2
1.05 R < 1.09	3
1.01 R < 1.05	4
0.97 R < 1.01	5

iii) Ballasts for Straight tube 32W and circle tube type lamp

R	Grade
1.18 R	1
1.09 R < 1.18	2
1.05 R < 1.09	3
1.01 R < 1.05	4
0.97 R < 1.01	5

(d) Test methods of energy efficiency, complying with KS C 8102 (Magnetic ballasts for fluorescent lamps) and KS C 8100(electronic ballasts for fluorescent lamps)

6. Compact fluorescent lamps with ballast

(a) Energy efficiency standards

Nominal lamp wattage	MEPS[a](1m/W)	TEPS[b](1m/W)
> 10	42.0	48.3
10 - 15	48.0	55.2
< 15	58.0	66.7

[a] As of Jan. 1, 2000 [b] By of June 30, 2002

(b) Energy efficiency rating criteria, R is

R = TEPS (1m/W) / Energy efficiency [1m/W] of commercial lamp

(c) Energy efficiency rating standards

R	Grade

R	Grade
R 1.00	1
1.00 < R 1.06	2
1.06 < R 1.09	3
1.09 < R 1.12	4
1.12 < R 1.15	5

(d) Test methods of energy efficiency, complying with KS C 7621

7. Clothes washers

(a) Energy efficiency standards

Product type	MEPS[a](Wh/kg/1cycle)	TEPS[b](Wh/kg/1cycle)
Top loading / Automatic	36.0	16.0

[a] As of Jan. 1, 2001 [b] By the end of 2002

(b) Energy efficiency rating criteria, R is

R = TEPS (Wh/kg/1cycle) / Energy efficiency(Wh/kg/1cycle) of commercial clothes washer

(c) Energy efficiency rating standards

R	Grade
R 16.0	1
16.0 < R 20.0	2
20.0 < R 25.0	3
25.0 < R 30.0	4
30.0 < R 36.0	5

(d) Test methods of energy efficiency, complying with KS C 9608

MEPS IN KOREA

In 1992 MOCIE was authorized to set MEPS levels on the basis of analyses carried out by agencies such as KIER and through a statistical analysis and engineering analysis of efficiency data provided by manufacturers. The MEPS subject products are seven of the foregoing products, such as refrigerators/refrigerator-freezers, air conditioners, clothes washers, incandescent lamps, fluorescent lamps, screw base CFLs, ballasts for fluorescent lamp except the passenger cars. The aim of the MEPS is to eliminate the most inefficient models from the market while the targets are to encourage manufacturers to continually increase the efficiency of products. If the products are unimproved, at once, the system prohibits the producers and salesmen from circulating them. Generally a new three-year process for EESLP to further products was adopted. The process will be:

1st Year Announcement MEPS of new product, and energy ratings come into effect
2nd Year MEPS come into effect
3rd Year TEPS come into effect

The MEPS is usually based on the lowest value of the 5th grade. Offenders of this law will be subject to the fine of below twenty millions won levied by the MOCIE.

THE RELEVANT ARTICLES ABOUT THE MEPS FROM THE RATIONAL ENERGY UTILIZATION ACT

The Rational Energy Utilization Act, Article 18 Clause 2
Article 18(Post management of the equipment & supplies, subject to the efficiency management) When equipment & supplies, subject to the efficiency management are under the standard of the minimum consumption efficiency or excess the standard of the maximum amount used as regulation of Article 17, Clause 1, Number 2, the Minister of Industry and Energy can prohibit the manufacturers, importers or salesmen from producing and/or selling them to consumers.

The Rational Energy Utilization Act, Article 95- Clause 2
Article 95 Penalty (Post management of the equipment & supplies, subject to the efficiency management) Offenders of this law, prohibiting the production or sale of the products, are subject to the fine of up to twenty millions won.

ENERGY EFFICIENCY RATING LABEL

Figure 2. Example of a refrigerator energy efficiency rating label.

The purpose of Energy efficiency rating label is to save energy by enabling the consumers to identify the energy saving products easily through indicating the energy efficiency grade from the 1st to 5th grade. Energy efficiency rating label consists of 1st ~ 5th grade, and the closest product to the 1st grade product is the best energy-saving product. The 1st grade product saves the energy more 30~40% than the 5th one.

Energy efficiency rating labeling is made mandatory in Korea by government legislation and regulations that give force to the relevant Korean standards and outline the requirements for energy labels for appliances. An example of a refrigerator energy efficiency rating label is shown in Fig. 2. The label is designed to stand out well from a yellow background, with black, white and red components. The two key items of information are the energy consumption (expressed as kWh/month) and the energy efficiency rating (expressed as grade 1). The energy consumption is an estimate of the monthly energy consumption of the appliance, based on the tested energy consumption together with information about the typical use of the appliance in the home. The energy efficiency rating gives a quick comparative assessment of the model's energy efficiency.

Table 5. Key information on the energy rating label

Products	Information on the label
Refrigerators Refrigerator-freezers	model name, volume, energy consumption in kWh/month, grade
Air conditioners	model name, cooling capacity in kW, kWh/month, grade
Incandescent lamps	model name, lamp wattage in W, lm/W, grade
Fluorescent lamps	model name, lamp wattage in W, lm/W, grade
Ballasts	model name, nominal lamp wattage in W, BEF, grade
Screw base CFLs	model name, lamp wattage in W, lm/W, grade
Clothes washers	model name, Wh/kg/cycle, energy consumption in Wh, grade

The grade label is attached to the front or side face to be identified by the consumers easily in case of refrigerators and air-conditioners, and is indicated on the each package of the products and whole package in case of lighting appliances. Energy efficiency rating is divided from 1st to 5th grade and the closest product to the 1st grade is the best energy-saving product.

IMPACT OF EESLP

The EESLP has very high visibility and recognition. Recognition of the label among randomly surveyed adults is consistently over 85% throughout Korea. Awareness among appliance sellers is even higher.: in 1994 nearly 96% of recent and intending appliance purchasers said they were aware of the energy efficiency rating label, and 72% said they used the information on it to compare appliances prior to purchase. The result of survey gave energy efficiency equal importance with other key appliance characteristics such as size, brand and price.

Table 6. Composition ratio of each appliance (unit: %)

		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Refrigerator-freezers	1993	9.6	50.8	28.1	4.8	6.5
	2000	67.6	23.2	9.2	-	-
Air conditioners	1993	66.7	25.7	3.8	2.8	1.0
	2000	75.7	21.4	2.9	-	-
Incandescent lamps	1993	2.9	26.1	53.6	14.5	2.9
	2000	0.6	29.0	59.3	11.1	-
Fluorescent lamps	1993	8.3	43.3	36.7	8.3	3.4
	2000	10.8	23.3	23.6	20.9	21.3

Ballasts	1994	-	21.7	26.4	9.7	42.2
	2000	-	39.1	21.4	22.1	17.4

Since the EESLP was introduced in 1992, it has been observed that the market share of higher efficiency appliances has increased significantly. As shown in Table 6, the ratio of the high-efficient models, equivalent grade 1 or 2, has steadily increased from 55.4% in the end of 1993 to 66% in the end of 2000, in spite of the reinforced and higher level energy efficiency standards and energy efficiency rating standards. Table 7 presents projections of total energy consumption of subject products of energy efficiency rating label, such as refrigerator-freezers, air conditioners, clothes washers, incandescent lamps, fluorescent lamps, screw base CFLs, ballasts for fluorescent lamp except the passenger car. Large energy savings and economic savings are projected for subject products of energy efficiency rating label. The projected reductions in energy consumption are associated with reductions in air pollutants and the electricity generating station.

Table 7. Energy savings effect of EESLP

	2000		2002		2006	
	Savings (10^3 TOE)	Savings (billion won)	Savings (10^3 TOE)	Savings (billion won)	Savings (10^3 TOE)	Savings (billion won)
Subject products of EESLP	2,000	2,700	2,250	3,036	2,730	3,900

Table 8. Improvement of energy efficiency (1992. 9 ~ 2000. present)

	Units	1992. 9[1]	1993	1996	2000
Refrigerator-freezers	kWh/m/liter[2]	0.113	0.103 (↑ 9.7%)	0.092 (↑ 22.8%)	0.065 (↑ 73.8%)
Air conditioners	kWh/kW	2.4	2.9 (↑ 20.8)	3.1 (↑29.2)	3.7 (↑54.2)
Incandescent lamps	Lm/W	10.0	10.6 (↑6%)	10.8 (↑8%)	11.0 (↑10%)
Fluorescent lamps	Lm/W	65.0	75.0 (↑15.4%)	81.0 (↑24.6%)	90.0 (↑38.5%)

* Note: Average values of major manufacturers' products

[1] At the time of introduction of EESLP

[2] kWh/month/liter.

CONCLUSION

Korea's first energy efficiency standards and rating labels, set in 1992, led to significant in the efficiencies of the four appliances covered, refrigerators, air conditioners, lighting equipment and passenger cars. In 1999 MOCIE added screw base CFLs, clothes washers, household gas boilers(from July 1, 2001) drives to the list of regulated appliances, as well as strengthening the standards for refrigerators, air conditioners, lighting equipment and passenger cars.

Korea's energy efficiency standards apply to the shipment-weighted average efficiency of each manufacturer, in contrast to the MEPS prevalent in some countries. The current standards call for efficiency improvements that can be attained with existing technology, or with only technological innovation, at little or no incremental cost. Makers that cannot improve their products sufficiently will have to withdraw the most inefficient products from market(and may have to withdraw completely). Furthermore, it is expected that setting the new standards will be a major incentive for the engineers who

work on energy-efficient development, ushering in an era of renewed competition based on product energy efficiencies. Moreover, the current round of standards is not final goals, but intermediate targets. We hope that the future establishment of even higher energy efficiency targets, such as Japan's top-runner program, will lead to the development of even more efficient appliances. Further developments related to appliance energy efficiency standards continue. An appliance EESLP system is being studied, extension subject products (such as vending machines, T5 lamps and associated ballasts, dishwashers, gas water heaters, etc.) is underway, and a shift in testing protocols from KS to ISO is underway for electric appliances. More efforts will be made to promote research on appliance energy efficiency and to build up their facilities, test methods, and the like. In addition we are very considering to make MEPS level highly, but not to make the grading in the future.

As a whole, the EESLP in Korea is found to be operating successfully without major negative impacts. Appliance energy efficiency is now a key program area for government, serving greenhouse gas reduction, economic efficiency and resource conservation policies. Government, the appliance industry and consumer groups are now all playing key roles in promoting greater appliance energy efficiency in Korea. Once initial difficulties were overcome, the high degree of co-operation and consultation between all parties has resulted in the rapid and harmonious development of the program.

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