B. ENERGY

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Ministry of Commerce, Industry and Energy

Energy

Decision Making

The Ministry of Commerce, Industry & Energy (MOCIE) manages the Special Account for Energy and takes responsibility for planning and guiding all energy-related activities. In addition, MOCIE plays an important role in sponsoring energy corporations and research institutes such as Korea Electric Power Corporation (KEPCO), Korea Gas Corporations (KOGAS), Korea Institute of Energy Research (KIER) and Korea Energy Economics Institute (KEEI). According to the Rational Energy Utilization Act, MOCIE formulates the National Energy Basic Plan every 5 years and takes full responsibility for implementing that plan.

In addition, the Task Force on Energy Pricing teamed up with the Ministry of Commerce, Industry & Energy, Ministry of Construction & Transportation, the Ministry of Environment, the Ministry of Finance & Economy etc. is working on energy price reform to reduce growing energy consumption in industrial and transportation sectors.

The Ministry of Construction & Transportation works on improving urban transportation systems and thus reducing air pollutant emissions by enhancing access to public transportation system in partnership with local governments.

Legislation, Regulation, and Policy Instruments

In 1979, the government promulgated the Rational Energy Utilization Act to implement comprehensive and aggressive policies on energy efficiency and conservation. In 1997, this act was revised to incorporate a Pre-notification System of Energy Prices, which was designed to make Consumers more responsive to energy policies.

Regulations, incentives, subsidies directed at consumers: The government has played a central role in the price setting process. For regulation purposes, the government imposed customs tariffs, VAT, special excise tax, traffic tax etc. to reduce energy consumption including oil, LNG and coal, and increase revenues. A progressive tariff is being imposed to reduce electricity consumption in households. The government has implemented demand side management programs such as load management, time-of-use rate system, discount system for voluntary curtailment, and rebate for efficient lighting systems. To reduce energy consumption in the transportation sector, the government imposes progressive car tax to reduce the demand for motor vehicles and control the demand for large sedans.

Regulation, incentive, subsidies directed at industries: The government bans the production and sale of appliances and equipment, which do not meet the Minimum Efficiency Performance Standards. The government provides 10% tax credit for investment in energy-efficient facilities as well as facilities using renewable energy. In addition, 2.75%(floating rate) low-interest loans are offered for energy service companies (ESCOs) and investment in energy-efficient facilities as well as facilities using renewable energy.

The government established the 10-year National Plan for energy Technology Development (1997-2006), which incorporates plans for: renewable energy, clean energy, and energy efficient technologies. the main goals of the plan are to meet 3% of total energy supply with renewable energy by 2006, to reduce 10% of final energy consumption by 2006; to advance clean energy technologies, especially to reduce SOx, NOx, dust and CO2.

Development of energy policy options: The Korea Energy Economics Insititue (KEEI), supported by the Korean government, is the nation's principal energy policy research organization. It provides a broad range of research works on energy policy options to the government, industry and non-profit organizations faced with energy challenges.

Programs and Projects

Direct and government-funded subsidies are widely used to defray the higher, up-front capital costs of renewable technologies. For example, the Local Energy Program is greatly contributing to the installation of facilities using renewable energy. Under this program, the central government (MOCIE) provides local governments with subsidies to effectively implement the installation of facilities using renewable energy such as photovoltaics, wind power etc. This program consists of 2 sub-programs: the Infrastructure Build-up Program such as the establishment of local energy planning, feasibility study on the renewable energy with great potential in the local area, and public awareness enhancement of energy efficiency, fully supported with 100% of project costs; and the Pilot Project to invest in the energy efficient facilities or the utilization of the renewable energy with great potential in the local area, provided with 80% of capital costs.

Expansion of Combined Heat & Power: It is a program to provide mass energy consumers with heat and electricity through cogeneration including municipal waste incineration and industrial waste heat. There are two major areas; District Heating & Cooling and Industrial Complex Combined Heat & Power(CHP). For the promotion of the program, the government enacted the 'Comprehensive Energy Supply Act' in 1991,

and has been providing suppliers and consumers with tax incentives, environmental regulation relaxation and long-term low interest loan of US$1million since 1983. Until 2004, District Heating has provided to 1,322,000 households in 21 districts, covering 10.6% of total households.

Financial Support to promote Energy Service Company (ESCO): the Energy Service Company invests in energy utilizing facility with guarantee of performance and later collects the invested capital and profit from the saved energy cost. As of 2005, 169 companies are registered as ESCO. The government will support ESCO with US$123 million of long-term low-interest rate loan in 2005 and has triggered market development by pilot projects and procurements in the public sector.

Green Energy Family Movement: To enhance public awareness about benefits from energy-efficient equipment and facilities, GEF initiated Green Lighting, Green Motor and Green Energy Design Program.

Energy Auditing: Energy Auditing, provided by MOCIE, is an information transfer program to assist energy consumers in understanding and employing technologies and practices to use energy more efficiently. Depending on the perfo rmance, financial supports are provided, if necessary.

Energy Efficiency Standards & Labeling Program: Started in 1992 for market development and public awareness of energy-efficient products, the objective of the program is to encourage manufactures to produce more energy-efficient products by offering incentives so that end-users can have more options to purchase energy-efficient products.

Voluntary Agreement (VA): An agreement between energy-intensive company and the government. A company sets a goal for GHG reduction and concrete action plan, and the government supports the company with various measures. Until 2004, total 1,024 work sites have participated in this program.

R&D and Dissemination of GHG Reduction Technology: MOCIE is supporting research, development and dissemination of energy-efficient technologies, renewable energy technologies and clean energy technologies. A total of 33 energy efficiency technology development programs, including those related to industrial boilers, furnaces, and motors, are under way, and renewable energy development programs including photovolaics, biomass and wind power are under way.

Community-driven Energy Projects: Series of projects are developed to support local government in implementing measures to rationalize energy use. MOCIE provides energy technology information and supports energy conservation projects of the local governments through KEMCO (Korea Energy Management Corporation).

Energy Saving in the Public Sector: The government initiated the Energy Saving Performance Contracting Program to help the public buildings sector reduce energy consumption. In addition, the government made it a priority for the central government agencies and local administrations to use energy-efficient equipment and appliances such as high efficient motors and fluorescent lamps. The government continues to

monitor the effects of such energy-saving activities and provide related information through workshops and other public campaigns.

Status

The share of firewoods and other renewable energy, which had accounted for nearly 20% of the Republic of Korea's total energy consumption in the early 1970s, has been reduced to less than 2% in 2004. Since it was introduced in the mid-1980s, LNG grows to cover 12.9% of total primary energy consumption in 2004. The Republic of Korea launched a nuclear energy program in the late 1970s and currently supplies 14.8% of primary energy in 2004 through nuclear power generation. In 2004, the Republic of Korea paid US$ 49.6billion for its energy import, which was equivalent to 22.1% of its total import. In 2004, according to IEA, the Republic of Korea has been ranked as the 10th largest energy consumer in the world as well as the 7th largest oil consumer.

Primary Energy Consumption

(unit: 1 million toe)

	Coal	Petro - leum	LNG	Hydro	Nuclear	Firewood & other	Total
1996	32.2	99.9	12.2	1.3	18.5	1.2	165.2
1997	34.8	109.1	14.8	1.4	19.3	1.3	180.6
1998	36.0	90.6	13.8	1.5	22.4	1.5	165.9
1999	38.2	97.3	16.8	1.5	25.8	1.8	181.4
2000	42.9	100.3	18.9	1.4	27.2	2.1	192.9
2001	45.7	100.4	20.8	1.0	28.0	2.5	198.4
2002	49.1	102.4	23.1	1.3	29.8	2.9	208.6
2003	51.1	102.4	24.2	1.7	32.4	3.2	215.1
2004	53.1	100.9	28.5	1.5	32.8	4.3	221.1

Renewable energy accounted for 2.1% (4,436,000 TOE) of total primary energy supply in 2003. Municipal and industrial waste represents 68.5% of total renewable energy. Although solar thermal water heating units have successfully been commercialized and deployed, they are still less competitive in the energy market and thus account for only 0.7%. Also, photovoltaic system technologies have completed basic research phase and entered the utilization phase, expanding use of photovoltaic power system in isolated small islands. But only 0.1% of the total renewable energy comes from photovoltaic system due to a variety of market barriers.

Use of Renewable Energy: 2003

(unit: 1000 toe, %)

	Waste	Biomass	Solar Thermal	Small Hydro Power	Photovoltaic Power System	Wind Power	Total
Amount	3039.3	131.1	32.9	1,225.6	1.9	5.2	4436.0
Share	68.5	3.0	0.7	27.6	0.1	0.1	100

Capacity-Building, Education, Training and Awareness-Raising

The Green Energy Family (GEF) Movement, which started in 1995, is a nationwide voluntary partnership movement among citizens, hundreds of companies, NGOs and the press to enhance energy efficiency and reduce social costs. Through this movement, companies can reduce energy costs, while energy providers can lessen the burden of expanding energy supply capacity. This public movement initiated Green Lighting, Green Motor and Green Energy Design Program.

MOCIE has produced and distributed VTR cassettes, movies and various PR materials. The government also organizes exhibitions and divers cultural events on a regional basis to publicize successful cases of energy conservation. November is designated as the "Energy Conservation Month and the first Friday of every month is designated as the "Energy Conservation Day." Energy Conservation Exhibition named ENCONEX has been annually organized since 1975 to propagate updated energy conservation technologies and equipment at home and abroad, and to provide information on specified technologies for interested companies in the industry, buildings and transportation sectors. Energy Conservation Convention has been also biennially held to arouse the energy conservation spirit among people and to award those who made considerable contributions to the cause.

Training Courses are fostered to operate energy equipment subject to certification inspection, operators of gas boilers and certified energy managers. As authorized by the law, KEMCO is in charge of training programs for the energy managers and operators of energy equipment and facilities to upgrade their skills as well as enhance their safety control proficiency.

The Ministry of Education & Human Resources designated 16 elementary and 16 middle schools as "Demonstration Energy Conservation Schools" in 2002. In addition to financial assistance of about US$5,385 for each school, the government supports educational aids such as books, videotapes and diskettes for the designated schools. There are other training and educational courses for the staffs of cooperative organizations in the field of energy conservation, the staff responsible for PR and education in energy-related organizations, managers of energy appliances manufacturing companies and managers of outstanding companies in energy conservation.

Information

The MOCIE supports energy conservation business through collecting, analyzing, processing and disseminating energy information. Analyzed and processed information and data are also available for end-users such as universities, industries, research institutes and the general public. Processed statistical data and information are published and circulated in the form of printouts and books so that end-users may have access to the basic data for their energy conservation business. Through PC

communication network and internet Web site (www.mocie.go.kr), MOCIE offers the latest energy information. KEMCO publishes and distributes periodicals on useful and diverse new energy conservation technologies and systems, successful cases energy conservation in some companies, outstanding and effective energy conservation policy programs in some governments etc., with a view to linking information exchange among organizations concerned. "Energy Management," a monthly staple magazine of KEMCO, has a circulation of some 7,000 a month. About 7,000 copies of "Energy Conservation Handbook" containing energy information such as energy policies and the present energy situation at home and abroad are biennially published. It also publishes some other books including "Energy Products Directory," "Statue Book of the Rational Energy Utilization," "Energy Consumption Statistics," and "Technical Information Pamphlet."

Research and Technologies

MOCIE supports R&D and dissemination of energy-efficient technologies, renewable energy technologies and clean technologies.

Photovoltaics: In 1980s, photovoltaic systems for telecommunication, navigation lights and measurement equipment, have been installed for demonstration. The demonstration of monocrystalline silicon photovoltaic module was achieved through R&D program. In addition, operation and maintenance technology development has facilitated photovoltaic system development. Photovoltaic systems have proven to be the most appropriate power systems for small islands with less than 50 households. Rural electrification by photovoltaic systems was initiated to provide remote areas with electricity in remote islands in 1990s. Total installed capacity of photovoltaic systems amounted to 5.9MW by 2003. But more R&D investments will be needed to make photovoltaic systems competitive.

Solar Thermal: the government is making efforts to spread residential use of solar water heating systems in rural areas and small- and mid-sized cities. Currently, low-temperature solar thermal system is commercially available and medium-high solar collector systems are under development. Totally, 190,523 units of solar water heating system have been installed in residential sector as of 2003. There is a large market potential in the areas such as fish farming, swimming pool, process heat and so on.

Wind Power: Wind energy resources are available along coasts, on high mountains and in small islands. By the end of 2003, 47 wind power generation plants have been installed with a total capacity of 18.7MW. A wind power project in Jeju Island is a benchmark for renewable energy deployment in Korea. And now, a feasibility study was conducted for the power plant using both photovoltaic and wind power in small islands which do not have access to the national electricity power grid system. Meanwhile, the private sector is involved in development of blade and induction generator technology.

Renewable Energy and Biomass: The government continues to disseminate municipal solid waste incinerators linked with district heating and industrial waste incinerators. In 1993, the Waste Management Law was revised to encourage industrial complexes to use waste as a feedstock for waste heat production. New industrial complexes with areas of greater than 500,000M2 are required to install collective industrial incinerators. However, installation of incinerator has brought about complaints for air pollution from local community, requiring significant prevention measures and local promotional campaign. In the future, the government will promote industrial incinerators to solve waste disposal problem as well as to make most of the heat energy generated from waste incineration. Landfill gas recovery has a significant potential but is still relatively at

a primitive state of development. Totally 106,020TOE of Biomass energy was used in 2003. Korean government established goals for high-tech development using renewable energy, considering technological level, available funds and market potential.

In addition, the government selected 21 high-priority programs to promote early commercialization and deployment and make R&D program more effective, taking into consideration: first, high energy saving potential; second, environmental friendliness; and last, high initial capital cost which increases private investment risks. The high priority programs for the government selected on the criteria of having a large potential for energy conservation, energy security, and environmental protection, and with the technology which the private sector finds it difficult to develop due to the lack of economic feasibility, are solar thermal energy, photovoltaic power system, fuel cell, and IGCC.

	High-Priority Program	General Program

Energy Efficient Technology	Industry	Chemical Separation Tech Dryer Energy Conversion & Storage HVAC Industrial Energy	Combustion Dying Machinery Paper Machinery Process Control and Automation Chemical Reaction Process Heat Exchange Structural Materials Functional Materials
	Buildings	Energy Efficient Building Technology	Building Energy Management Building Auto System Building Insulation
	Transportation		Fuel-Efficient Vehicles

	Electricity	Lighting System Induction Motor Small-Scale Cogeneration	Refrigeration Customer Electricity Management Electric Exchange Energy Storage Electric Heat Superconductivity Power Equipment DSM
Renewable Energy		Solar Thermal Photovoltaics Fuel Cell IGCC	Biomass Wind Power Coal Utilization Tech
Clean Energy		Fluidized Bed Combustion Coal Ash Utilization Tech Combustion Treatment Tech New Catalyst for Oil Refining CO2 Separation and Recovery	Coal Preparation Puluverized Coal Combustion Regeneration and Treatment of Used Catalyst Biocatalytic Desulfurization and

		Process Development for Oil Refining Fixation and Utilization CO2

Financing

Korea's environment-based energy taxation system was revised at the beginning of July 2000 to encourage the conservation of energy consumption and promote protection of the environment. The essence of the revision was the tax levy on heavy oil which has been exempted from taxation. This system aims to further improve the competitiveness of natural gas in the fuel market for industry or power generation. The tax rate on light oil and kerosene will continue to be raised until, by 2006, it will attain a level that is 1.5 or 2 times that of 2001. Gasoline, which was subject to a higher tax rate, will see no change for the same period.

The government has provided long-term and low-interest loans from the Fund for the Rational Use of Energy along with tax incentives, for energy efficiency and conservation investments. KEMCO funded by the MOCIE is in charge of its management and

monitoring. The Fund supports installation of energy conservation facilities which include cogeneration facilities for industry and large building, production of high-efficient products, non-electric cooling systems, regional energy development projects and energy service companies. The types of requests eligible for loan include: the purchase of the proper facilities and their incidental facilities and equipment; installation and retrofit works; design and superintendence; and test run of the facilities, expenses for the purchase of land and expenses for erecting buildings which do not contain constructions indispensable for the installation of the facilities. The expenses for the purchase of the building site for installing facilities are funded for mass energy supply projects and the expenses for feasibility study are funded for regional energy development projects by local governments. Operation costs are confined to the expenses needed for the operation of one-rotation (3 months) of the facilities on the basis of the annual or estimated sales for the products produced by the facilities.

The loans for installing energy-saving facilities or equipment in most cases have 3- to 5-year grace periods and 5-year repayment periods with interest rates of 2.75% (floating rate), which are about half of the market or prime rates. Up to 90-100% of investment money can be provided to the applicants. The maximum amount eligible for industrial energy-saving facilities and VA is 3 billon won per project; 5 billon won per project for ESCOs and regional energy development; 1 billon won for energy-saving facilities in

building and transportation; 10 million won per house for home insulation retrofit for housing. Funds are available to both the public and the private sector companies.

The government provides tax incentives for energy efficiency investments with 10% tax credit from 2005

Cooperation

To address energy and environmental challenges, the Republic of Korea is strengthening cooperation with international agencies. Through this activity, the Republic of Korea maintains various channels with foreign countries to exchange technical and policy information and development of joint programs, and disseminates the information to the interested parties at home and abroad.

Bilateral Cooperation: KEMCO keeps close relationships with other relevant organizations abroad to exchange energy information and staff, and to develop

collaborative programs such training, joint seminars or joint research. Its main partners are ECCJ, NEDO, DOE, and ADEME.

Multilateral Cooperation: The Republic of Korea has actively participated in 11 programs established by IEA and energy cooperation in APEC.

The government has played a leading role in dealing with climate change. In order to formulate and implement measures to deal with the Framework Convention on Climate Change (FCCC), an inter-ministerial committee on the FCCC, comprised of related government agencies, research institutions and private companies, was established in April 1998 with the Prime Minister as the head of the committee. In December 1998, comprehensive measures to cope with FCCC were formulated, and have since been promoted.

Poor in endowment of energy resources, the Republic of Korea has been aware of the importance of the rational utilization of energy and promoting systematically designed programs for energy conservation. After the Rio Conference, energy-saving efforts of the government have been further strengthened. The government amended the Rational Energy Utilization Act, in December 2003, in order to mitigate CO2 emissions

by coordinating the domestic energy conservation efforts with the global environmental issue.