Republic of Korea

(Updated 2012)

1. GENERAL INFORMATION

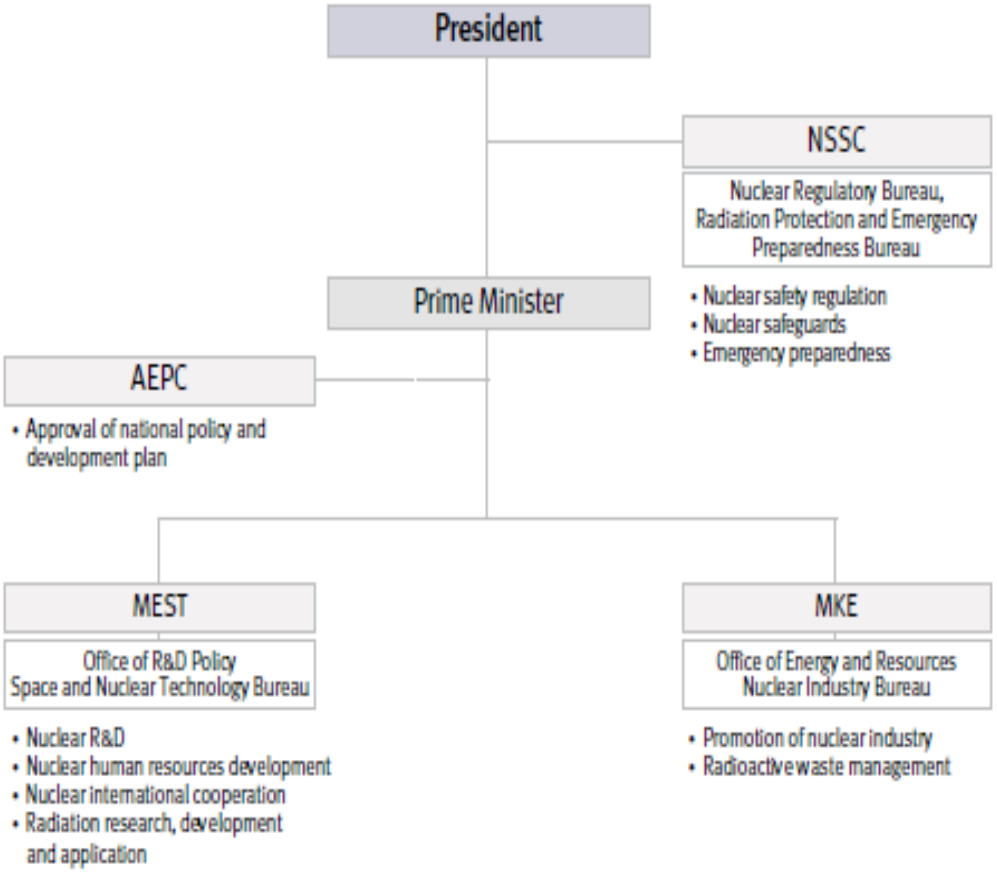
1.1. Country overview

1.1.1. Governmental System

Korea has nurtured professional competence in technology, manpower, and operational and manufacturing capability through its nuclear development program.

- For the peaceful use of nuclear energy, Korea encourages partnership between research institutes, academia and industry.
- The Ministry of Education, Science and Technology (MEST) takes responsibility for nuclear policy, R&D, radiation utilization promotion, human resource development and international cooperation, and the Ministry of Knowledge Economy (MKE) for nuclear industry and radioactive waste management. Korea established the Nuclear Safety and Security Commission (NSSC) under the Office of the President in October 2011, after the Fukushima accident, to strengthen administration of nuclear safety regulation.
- The Atomic Energy Promotion Committee (AEPC), chaired by the Prime Minister along with other concerned Ministers and dignitaries from various sectors, reviews and approves national policy, development plans and other important matters relating to the use of nuclear energy.

FIGURE 1. GOVERNMENTAL SYSTEM



Source : Ministry of Education, Science and Technology

1.1.2. Geography and Climate

South Korea faces Japan across the East Sea and China across the Yellow Sea. To the north, across the DMZ, is North Korea.

The Taebaek Range, referred to as the backbone of the Korean Peninsula, stretches along the east coast and slopes steeply into the East Sea. Along the western and southern coasts, the mountains descend gradually to the coastal plains, and large rivers wind through the area. The relatively wide plains stretch far from the mid-and downstream sections of the rivers.

Many of Korea's highest mountains are part of the Taebaek Range. The most famous and picturesque of these is Mt. Seoraksan. The Taebaek Range has a branch trending southwest and culminating at the Mt. Jirisan massif. This is the Sobaek Range. The highest mountain in the Republic of Korea is Mt. Hallasan, a dormant volcano at the center of Jejudo Island.

The largest rivers in South Korea are the Hangang River, Geumgang River, Yeongsangang River, Seomjingang River, and Nakdonggang River. The annual precipitation of Korea is 1,245mm, which is 1.4 times the global average, but the per capita precipitation is only one-eighth of the world average. Water management in Korea is difficult, especially because more than 60% of annual precipitation is lost as

runoff during floods and torrential rains, while rivers dry up in the dry season. Exacerbating matters, water consumption has been increasing sharply due to population growth, economic development, and changes in lifestyle.

Korea is a peninsula. The Yellow Sea is to the west, the East Sea to the east and the South Sea to the south. To the south of Korea's largest island is the East China Sea. The west and south coasts have heavily indented ria coastlines where the tidal range is enormous, and the relative flatness of land means that the tideland is very wide. Dotted with so many islands, it is called Dadohae, meaning 'sea of many islands.' The east coast, in contrast, is very straight, with the water deep and the tidal range narrow. Along the coast are sand dunes and lagoons, and the volcanic islands of Ulleungdo and Dokdo are far to the east in the East Sea.

The Republic of Korea lies between 38ºN and 33ºN latitude and 126ºE to 132ºE longitude. The country has a continental climate of very cold, dry winters and very hot, humid summers. Winters are influenced by westerly winds from Siberia and the Mongolian plateau, while summers are generally characterized by an oceanic climate, due to moist, warm winds from the Pacific Ocean. Korea has four distinct seasons, though spring and autumn tend to be short. Spring comes in early April and lasts throughout May. The hot and humid summer begins in June and lasts about four months. The summer rainy season lasts from the end of June to mid-July. Summer ends in late September, giving way to crisp, clear autumn days that last until the end of October. It becomes colder in November, and a very cold, bleak winter sets in during December and lasts until the end of February.

1.1.3. Population

The population in Korea as of the end of 2010, estimated in November 2006, was nearly 49 million people (Table 1). Population density was nearly 490 persons per square kilometre, with 82.1% living in urban areas.

TABLE 1. POPULATION INFORMATION

							Average annual growth rate (%)*
Year	1970	1980	1990	2000	2005	2010	2000 to 2010
Population (millions)	32.2	38.1	42.9	47.0	48.1	48.9	0.40
Population density (inhabitants/km²)	328	385	432	473	483	490	0.35
Urban Population as % of total	41.2	57.3	74.4	79.7	81.5	82.1	0.30
Area (1000 km²)	99.720						

* $[(Yn/Yo)^{\wedge (1/n)}-1] * 100$

Source: Korean Statistical Information Service (http://kosis.kr/eng)

1.1.4. Economic Data

Economic statistics for Korea are regularly published by the Bank of Korea. Table 2 shows the historical Gross Domestic Product (GPD) statistics.

TABLE 2. GROSS DOMESTIC PRODUCT (GDP)

	Average annual growth rate (%)

	1970	1980	1990	2000	2005	2009	2000 to 2009
GDP (millions of current US$)	8,100	64,300	270,300	533,500	844,700	832,900	5.1
GDP (millions of constant 2005 US$)	180,532	239,879	521,138	614,327	844,700	768,147	2.5
GDP per capita (PPP* US$/capita)	822	2,746	8,535	17,219	22,783	27,658**	6.1
GDP per capita (current US$/capita)	255	1,688	6,306	11,350	17,548	17,085	4.6

* PPP: Purchasing Power Parity

** 2008 data

Source: The Bank of Korea Economic Statistics System (http://ecos.bok.or.kr/EIndex_en.jsp)
and OECD (http://www.oecd.org/)

1.2. Energy Information

1.2.1. Estimated available energy

Table 3 shows the energy reserves of Korea as of the end of 2011.

TABLE 3. ESTIMATED AVAILABLE ENERGY SOURCES

	Estimated available energy sources					
	Fossil Fuels			Nuclear	Renewables	
	Solid	Liquid	Gas	Uranium	Hydro	Other Renewables
Total amount in specific units*	1,352	-	50	-	0.00157	0.00192
Total amount in Exajoule (EJ)	28.42	-	16.92	-	0.01	0.02

* Solid, Liquid: Million tons; Gas: Billion m3; Uranium: Metric tons;
Hydro(supply capacity), Renewables(generating capacity): TW

Source: Korea Resources Corporation(http://www.kores.or.kr/),
Korea National Oil Corporation (http://www.knoc.co.kr/ENG),
Korea Electric Power Corporation (http://www.kepco.co.kr/eng)

1.2.2. Energy Statistics

TABLE 4. ENERGY STATISTICS

								Average annual growth rate (%)
	1970	1980	1990	2000	2005	2009	2011	2000 to 2011
Energy consumption* (EJ)								
- Total	0.82	1.84	3.90	8.08	9.57	10.19	11.36	3.15
- Solids***	0.24	0.55	1.02	1.80	2.29	2.87	3.14	5.19
- Liquids	0.39	1.12	2.10	4.20	4.25	4.28	4.5	0.63
- Gases	-	-	0.13	0.79	1.27	1.42	1.91	8.36
- Nuclear	-	0.04	0.55	1.14	1.54	1.33	1.36	1.62
- Hydro	0.01	0.02	0.07	0.06	0.05	0.05	0.07	1.41
- Other	0.18	0.11	0.03	0.09	0.17	0.23	0.27	10.5

Renewables								
Energy production(EJ)								
- Total	0.43	0.52	0.98	1.37	1.83	1.68	1.75	2.25
- Solids**	0.22	0.36	0.32	0.08	0.05	0.05	0.04	-6.11
- Liquids	-	-	-	-	-	-	-	-
- Gases	-	-	-	-	0.02	0.02	0.02	-
- Nuclear	-	0.04	0.55	1.14	1.54	1.33	1.36	1.62
- Hydro	0.01	0.02	0.07	0.06	0.05	0.05	0.07	1.41
- Other Renewables	0.20	0.10	0.03	0.09	0.17	0.23	0.27	10.5
Net import(Import - Export) (EJ)								
- Total	0.39	1.32	3.02	7.13	7.97	8.81	10.21	3.32

* Energy consumption = Primary energy consumption + Net import (Import - Export) of secondary energy.
** Solid fuels include coal, lignite, etc.
Source: Korea Energy Statistics Information System (http://www.kesis.net/)

1.2.3. Energy policy

The government has announced a long-term strategy, in August 2008, which will determine the direction of its national energy policy until 2030. The National Energy Committee mapped out the plan on the basis of the 3Es: Energy Security, Economic Efficiency and Environmental Protection. The National Energy Committee is chaired by the President and comprises senior government officials and leading members of the business community, academia and civic groups. Korea will reach its long-term energy goals by taking the following steps:

- Improving energy efficiency and reducing energy consumption. By 2030, Korea will reduce its energy intensity level to 0.185 TOE/US$1,000 from the current level of 0.341 TOE/US$1,000, a difference of 46%. It will also cut energy consumption by 42 million TOE.
- Increasing the supply of clean energy and reducing the use of fossil fuels. By 2030, fossil fuels will account for only 61% of total energy consumption, while the use of renewable energy will increase to 11%.
- Boosting the green energy industry. By 2030, Korea's green energy technologies will be comparable to the levels of most advanced countries.

Since the national energy policy is required to be reviewed and revised every 5 years, the government will establish and announce the second national energy plan to reflect changes in energy conditions in 2013.

1.3. Electricity system

1.3.1. Electricity policy and decision making process

The principle ministry responsible for the development of electricity policy in Korea is the Ministry of Knowledge Economy (MKE). MKE works in consultation and close

co-operation with the Ministry of Strategy and Finance (MOSF), six generation companies (GenCos) and the Korea Electric Power Corporation (KEPCO). With energy being regarded as a key component of Korea's rapid economic development, the government has maintained a strong presence in the sector.

MKE, either through direct or indirect government ownership of energy companies, utilities and several energy research institutes, has maintained a high degree of control in all aspects of energy policy development and implementation.

The Ministry of Education, Science and Technology (MEST) has the overall responsibility for ensuring nuclear safety through regulatory activities and related R&D. The MEST is also a policy maker for the nuclear sector.

MKE continues to establish the biannual Basic Plan of Long-term Electricity Supply and Demand (BPE for short), which provides long-term energy policy directions and information on electricity supply and demand, such as the electricity facility plan to secure stable electricity supply. Generation companies can apply for government approval of their generation business and power plant construction plans based on the BPE.

The 5th BPE was established in 2010, and covers a planning period from 2010 to 2024. The BPE was made based on the construction intentions of GenCos and the demand forecast provided by Korea Power Exchange (KPX). For establishing the plan, the government reviewed and prepared the working drafts of four subcommittees (Generating capacity expansion, Demanding forecast, Demand-side management and Transmission system expansion), and collected opinions on every aspect from various economic organizations, through a public hearing.

The main objectives of the 5th BPE are as follows:

- Gradually expanding base-load generating facilities in order to establish an economical electricity supply system
- Composing the environmentally friendly power supply with consideration of the reduction in national greenhouse gases
- Minimizing uncertainties of the supply and demand outlook

1.3.2. Structure of electric power sector

[Generation]

Six generation companies (GenCos), i.e. five thermal power GenCos and one hydro-nuclear power GenCo, generated 88.4% of electricity in Korea in June 2011. The remainder mostly came from independent generators and industry self-generators, producing for their own use and selling back to the grid.

[Transmission]

Korea's transmission grid consists of over 31,249 c-km of transmission lines, as of December 2011. KEPCO owns and operates these transmission systems. Transmission voltages in Korea are 765kV and 345kV for trunk routes, and 154kV or 66kV for local networks. The 66kV lines are being replaced, and KEPCO is now

carrying out the second stage of a 765kV power transmission project that will serve as the backbone of transmission in the 21st century. The power network of Jeju Island is connected to the mainland transmission system by submarine high-voltage direct current (HVDC) cables (231 c-km). The Supervisory Control and Data Acquisition (SCADA) system is used to remotely monitor and control substation operations. In addition to equipment and facility upgrading, more substations are being automated and built indoors to secure power supply reliability.

[Distribution]

Korea's distribution grid utilizes over 435,549 c-km of transmission lines, as of December 2011. There is only one distribution network operator in Korea, which is KEPCO. KEPCO maintains a highly credible power distribution system which ensures a stable power supply. In December 2011, the rate of power loss in transmission and distribution was 3.69%.

1.3.3. Main indicators

TABLE 5. ELECTRICITY PRODUCTION, CONSUMPTION AND CAPACITY

	1970	1980	1990	2000	2005	2009	2011	Average annual growth rate (%) 2000 to 2011
Capacity of electrical plants (GW)								
- Thermal	2.18	7.65	11.07	31.59	40.50	49.10	52.35	4.70
- Hydro	0.33	1.16	2.34	3.15	3.88	5.52	6.42	6.69
- Nuclear	-	0.59	7.62	13.72	17.72	17.72	18.72	2.87
- Wind	-	-	-	-	0.09	0.35	0.41	-
- Geothermal	-	-	-	-	-	-	-	-
- other renewable	-	-	-	-	0.07	0.78	1.45	-
- Total	2.51	9.39	21.02	48.45	62.26	73.47	79.34	4.59
Electricity production (TW.h)								
- Thermal	7.95	31.7	48.42	151.83	209.51	278.40	326.75	7.22
- Hydro	1.22	1.98	6.36	5.61	5.19	5.64	7.83	3.08
- Nuclear	-	3.48	52.89	108.96	146.78	147.78	154.72	3.24
- Wind	-	-	-	-	0.13	0.69	0.86	-
- Geothermal	-	-	-	-	-	-	-	-
- other renewable	-	-	-	-	3.87	1.09	6.73	-
- Total (1)	9.17	37.24	107.67	266.40	364.64	433.60	496.89	5.83
Total Electricity consumption (TW.h)	7.74	32.73	94.38	239.54	332.41	394.49	434.16	5.56

(1) Electricity transmission losses are not deducted.
Source: Korea Electric Power Corporation (http://www.kepco.co.kr/eng)

TABLE 6. ENERGY RELATED RATIOS

	1970	1980	1990	2000	2005	2009	2010
Energy consumption per capita (GJ/capita)	25.24	48.15	90.85	170.82	198.87	208.92	224.95
Electricity consumption per capita (kW.h/capita)	240	859	2,206	5,067	6,883	8,092	8,883
Electricity production/Energy production (%)	7.68	27.36	99.11	175.47	179.21	232.29	249.44
Nuclear/Total electricity (%)	0.00	9.34	49.12	40.90	40.25	34.08	31.3

Ratio of external dependency (%) (1)	47.56	73.37	87.95	97.15	96.66	96.50	96.50

(1) Net import / Total energy consumption.
Source: Energy Info. Korea 2010 by Korea Energy Economics Institute (http://www.kesis.net/)

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2. NUCLEAR POWER SITUATION

2.1. Historical development and current organizational structure

2.1.1. Overview

Nuclear activities in Korea were initiated in 1957, when Korea became a member of the IAEA. The following year, Korea passed its Atomic Energy Law. In 1959, the Office of Atomic Energy was established, in conformity with the global trend toward development of peaceful uses of atomic energy.

Korea has carried out a very ambitious nuclear power program since the 1970s, in parallel with the nation's industrialization policy. Korea has maintained a strong commitment to nuclear power development as an integral part of its national energy policy, aiming to reduce external vulnerability and insure against global fossil fuel shortages. Currently, Korea has one of the most dynamic nuclear power programs.

During the early years of nuclear power development, power plants were constructed mostly through "Turn-Key" contracts, providing little opportunity for domestic industries to participate in their construction. Since then, however, domestic participation in overall construction management, design, equipment supply and civil construction has continuously increased through the adoption of "Non Turn-Key" approaches. As part of this trend, a high degree of technological self-reliance in various fields of the nuclear industry was achieved through the construction of Yonggwang-3 & 4. At present, nuclear power plant technology and related fuel cycle technologies are maturing.

The first domestic reactors were Ulchin-3 & 4, 1,000 MW(e) PWRs, initially called the Korea Standard Nuclear Power Plant (KSNP) but now referred to as the OPR1000, which entered into commercial operation in 1998. The Ulchin-3 & 4 became the reference plant for all OPR1000 plants thereafter. Six more OPR1000 plants are being built at Ulchin, Shin-Kori and Shin-Wolsong, as shown in Table 7.

The newly advanced reactors being built at Shin Kori-3 & 4 are 1,400MW(e) PWRs, called APR1400. These third-generation reactors have been under construction since September 2007. The plants are evolutionally advanced in the fields of technology, safety and economics. Two more APR1400 plants are being built at Shin-Ulchin site as shown in Table 8.

In April 2009, the government authorised construction of Shin Ulchin 1 & 2 and contracts for major components were expected to be signed soon after. The two units will be the first to be virtually free of Westinghouse IP content, and are expected to cost US$ 4.7 billion and be completed in 2016. Site works commenced in May 2012.

A further plant at either Samcheok or Yeongdeok, 190 km east of Seoul, is envisaged, with the site to be decided at the end of 2012.

KEPCO is actively marketing OPR-1000 and APR-1400 units in Middle East and North African countries. In December 2009, the APR-1400 was selected as the basis of the United Arab Emirates' (UAE) nuclear power program, with the first four reactors to be operating by 2020 under a $20.4 billion contact, and another ten to follow. The choice was on the basis of cost and reliability of building schedule. An application for US Design Certification is likely by about 2012.

Korean government data is reported to put the overnight cost of APR-1400, at the end of 2009, as $2,300/kW, compared with $2,900/kW for EPR and $3,580/kW for the GE Hitachi ABWR. The same data puts the generation cost for Areva's APR at US$ 3.03 cents per kilowatt-hour, compared with an estimated 3.93 cents/kWh for EPR, and 6.86 cents/kWh for ABWR.

South Korea is constrained in its fuel cycle policy by the 1970s' Korea-US Atomic Energy Agreement. This constrains raw material supply and disallows uranium enrichment and the reprocessing of used fuel. Following the UAE agreement, the government has described these US constraints as "excessive", and will continue to

push for them to be eased, preferably before the Agreement is due for renewal in 2014.

2.1.2. Current organizational chart(s)

In Korea, basic energy-related activities are planned and carried out by the National Energy Committee (NEC) every five years, in accordance with the National Energy Fundamental Act. The chairman of the NEC is the President. The NEC's principle work is to establish long-term energy strategy and to determine the direction of national energy policy.

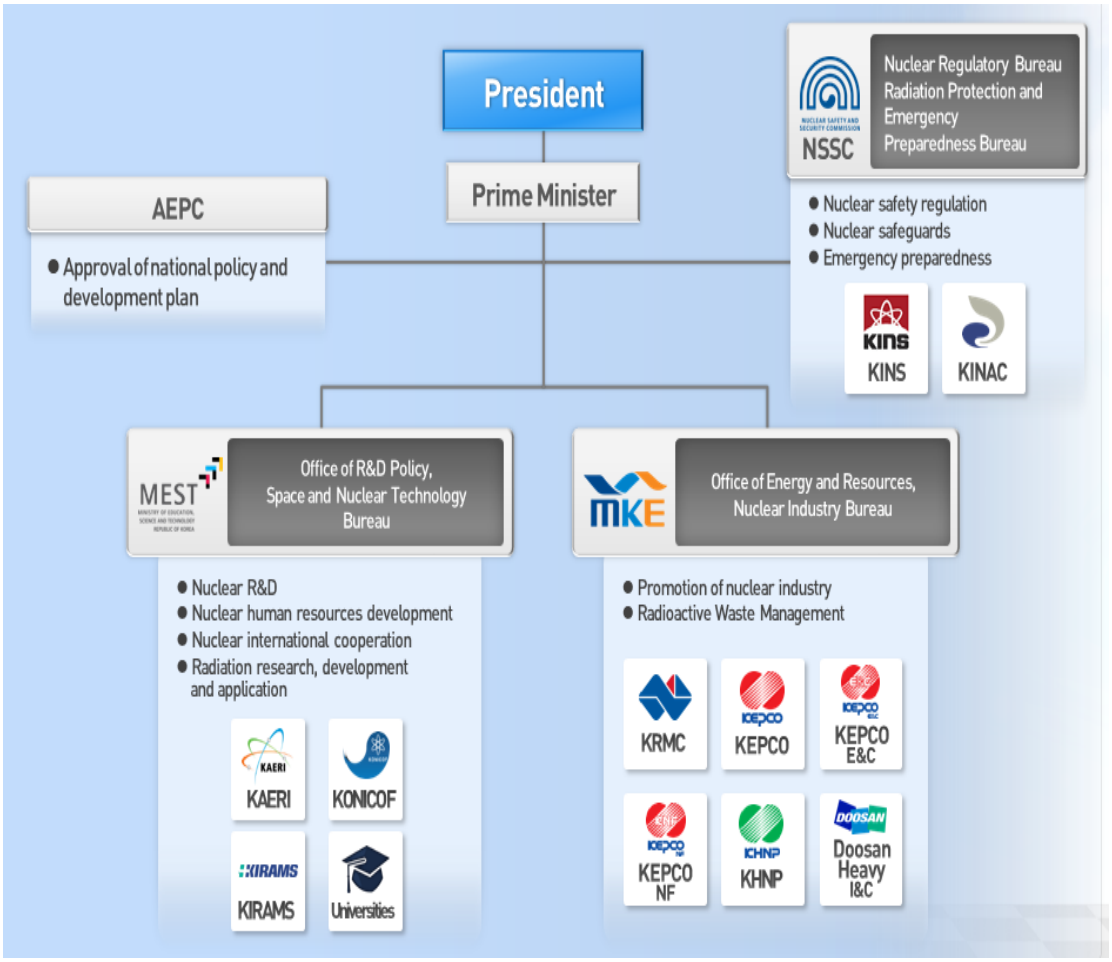
Nuclear-related activities are planned and carried out by various other organizations, such as the Atomic Energy Commission (AEC), the Nuclear Safety Commission (NSC), the Ministry of Education, Science and Technology (MEST) and the Ministry of Knowledge Economy (MKE).

Under the Atomic Energy Act, the AEC is the highest-ranking decision-making body on policy issues and utilization of nuclear energy. The AEC is composed of between nine and eleven members, representing various sectors of the government, academia and industry. The chairman of the AEC is the Prime Minister.

The MEST has overall responsibility for the nation's nuclear research and development, and for regulatory and licensing work. In order to deal with important nuclear safety issue, the NSC was established as part of the MEST in December 1996. The NSC consists of seven to nine members, including the Minister of Education, Science and Technology, who serves as chairman.

The government launched the new Nuclear Safety and Security Commission (NSSC) in October 2011. It is the new independent regulator, reporting to the president, and its chairman has ministerial rank. The Korean Institute of Nuclear Safety (KINS), formerly the expert safety regulator under MEST, became a technical support organisation under it, while MEST simply promotes nuclear power. The NSSC's scope covers licensing, inspection, enforcement, incident response and emergency response, non-proliferation and safeguards, export/import control and physical protection.The MKE is responsible for the construction and operation of nuclear power plants, the nuclear fuel supply, and the management of low- and intermediate-level radioactive waste. KEPCO, KHNP, KNFC, NETEC and heavy engineering operations come under MKE, and KEPCO seems to have a controlling role re the others. The Korea Nuclear Energy Foundation (KNEF) is a public information body also under MKE.

FIGURE 2. MAIN NUCLEAR-RELATED ORGANIZATIONS IN KOREA



2.2. Nuclear power plants: Overview

2.2.1. Status and performance of nuclear power plants

Currently, a total gross capacity of 20.7GWe is installed in the 23 operating Korean NPPs, comprising of 19 pressurized water reactors (PWRs) and 4 CANDU pressurized heavy water reactors (PHWRs). There are 4 further units under construction. Table 7 shows the status of NPPs and Figure 3 shows the geographical location.

TABLE 7. STATUS AND PERFORMANCE OF NUCLEAR POWER PLANTS

Station	Type	Net Capacity	Operator	Status	Reactor Supplier	Construc-tion Date+	Grid Date ++	Commercial Date	Shutdown Date	UCF for year **
KORI-1	PWR	576	KHNP	Operati onal	Westing-house	1971 August	1977 June	1978 April	-	95.66
KORI-2	PWR	637	KHNP	Operati onal	Westing-house	1977 December	1983 April	1983 July	-	92.19
KORI-3	PWR	1007	KHNP	Operati onal	Westing-house	1979 October	1985 January	1985 September	-	88.92
KORI-4	PWR	1007	KHNP	Operati onal	Westing-house	1980 April	1985 December	1986 April	-	88.82
SHIN KORI-1	PWR	960	KHNP	Operati onal	DHIC	2006 June	2010 August	2011 February	-	-
SHIN KORI-2	PWR	960	KHNP	under cons.	DHIC	2007 June	(2011 August)	(2011 December)	-	-

SHIN KORI-3	PWR	1340	KHNP	under cons.	DHIC	2008 October	-	(2013 September)	-	-
SHIN KORI-4	PWR	1340	KHNP	under cons.	DHIC	2009 August	-	(2014 September)		-
YONG GWANG-1	PWR	953	KHNP	Operational	Westing-house	1981 June	1986 March	1986 August	-	88.94
YONG GWANG-2	PWR	947	KHNP	Operational	Westing - house	1981 December	1986 November	1987 June	-	99.99
YONG GWANG-3	PWR	997	KHNP	Operational	KHI/ KAERI	1989 December	1994 October	1995 March	-	99.97
YONG GWANG-4	PWR	994	KHNP	Operational	KHI/ KAERI	1990 June	1995 July	1996 January	-	87.98
YONG GWANG-5	PWR	988	KHNP	Operational	DHIC	1997 June	2001 December	2002 May	-	90.59
YONG GWANG-6	PWR	996	KHNP	Operational	DHIC	1997 November	2002 September	2002 December	-	97.89
WOL SONG-1	PHWR	597	KHNP	Operational	AECL	1977 October	1982 December	1983 April	-	23.03
WOL SONG-2	PHWR	710	KHNP	Operational	AECL/ KHI	1992 September	1997 April	1997 July	-	94.21
WOL SONG-3	PHWR	707	KHNP	Operational	KHI/AECL	1994 March	1998 March	1998 July	-	94.56
WOL SONG-4	PHWR	708	KHNP	Operational	KHI/ AECL	1994 July	1999 May	1999 October	-	92.63
SHIN WOL SONG-1	PWR	960	KHNP	under cons.	DHIC	2007 November	-	(2012 March)	-	-
SHIN WOL SONG-2	PWR	960	KHNP	under cons.	DHIC	2008 September	-	(2013 January)	-	-
ULCHIN-1	PWR	945	KHNP	Operational	Frama-tom	1983 January	1988 April	1988 September	-	90.94
ULCHIN-2	PWR	942	KHNP	Operational	Frama-tom	1983 July	1989 April	1989 September	-	100.00
ULCHIN-3	PWR	994	KHNP	Operational	KHI/ KAERI	1993 July	1998 January	1998 August	-	92.96
ULCHIN-4	PWR	998	KHNP	Operational	KHI/ KAERI	1993 November	1998 December	1999 December	-	90.56
ULCHIN-5	PWR	1001	KHNP	Operational	DHIC	1999 October	2003 December	2004 July	-	90.69
ULCHIN-6	PWR	1001	KHNP	Operational	DHIC	2000 September	2005 January	2005 April	-	99.47
SHIN ULCHIN-1	PWR	1340	KHNP	under cons.	DHIC	(2011 November)	-	2016 June	-	-
SHIN ULCHIN-2	PWR	1340	KHNP	under cons.	DHIC	(2012 November)	-	2017 June	-	-

* UCF (Unit Capability Factor) for the latest available year (only applicable to reactors in operation).

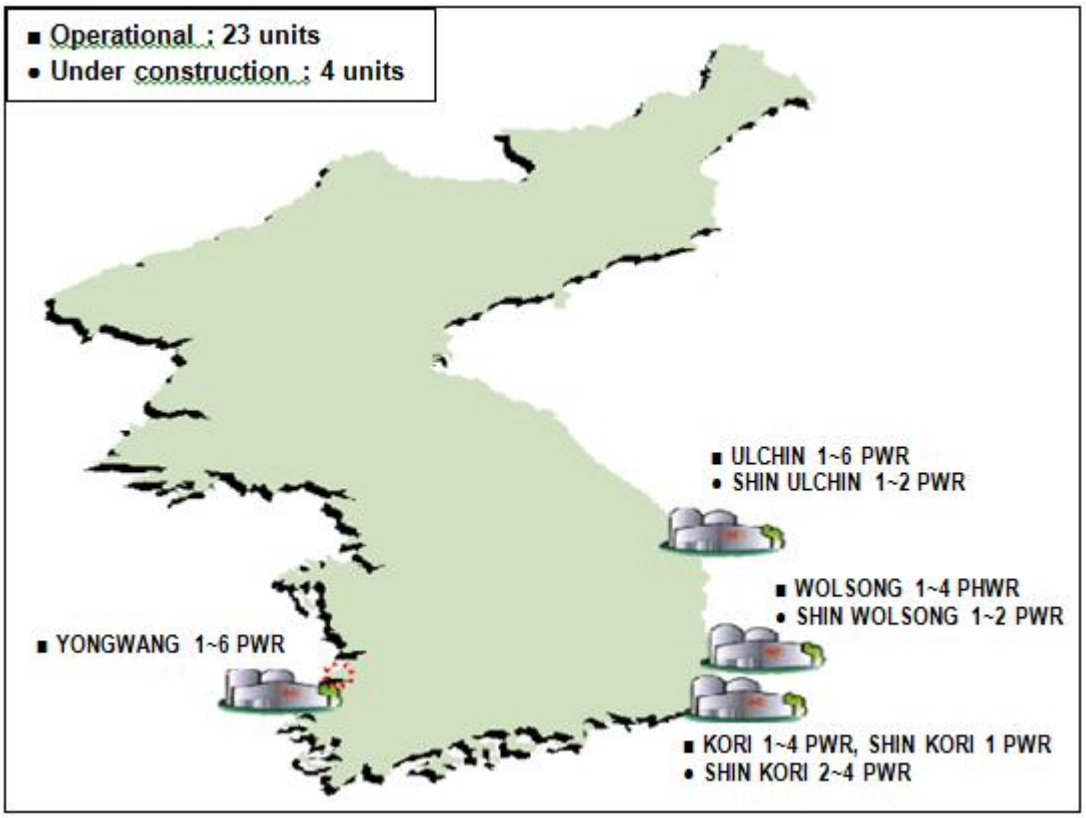
** Latest available data

+ Date, when first major placing of concrete, usually for the base mat of the reactor building completion.

++ Date of first connection to the grid

Source: PRIS database (www.iaea.org/pris).

FIGURE 3. GEOGRAPHICAL LOCATION OF NPPs IN THE REPUBLIC OF KOREA



2.2.2. Plant upgrading, plant life management and license renewals

[Plant upgrading and plant life management]

Beginning in September 2002, KHNP conducted Power Uprating Projects for Kori-3 & 4 to uprate their reactor thermal power and to eventually increase their electrical output. Kori-3 & 4 reached their new-rated thermal power(2,900MWth, 4.5% uprating) on December 2009 and February 2009, respectively, and increased their electrical output by 34.1MWe, from 999MWe (original output) to 1,033.1MWe (uprated output).

In addition, KHNP is conducting further Power Uprating Projects for Kori-3 & 4 and Ulchin-1 & 2, to uprate their reactor thermal power and eventually to increase their electrical output. Kori-3 & 4 will reach their new rated thermal power (2,944MWth, 1.5% MUR uprating) in February 2014 and February 2013 respectively, and their electrical output will be increased by 10MWe from 1,033.1MWe (original output) to 1,043.1MWe (uprated output). Ulchin-1 & 2 will reach their new-rated thermal power (2,900MWth, 4.5% SPU uprating) in September and March 2013, respectively, and their electrical output will be increased by 54MWe from 1,003MWe (original output) to 1,057MWe (uprated output).
To effectively manage major Systems, Structures and Components (SSCs) and to reduce the maintenance cost of the operating nuclear power plants, Long Term Asset Management (LTAM) strategies, based on equipment reliability processes (INPO AP-913), were developed in KHNP as a part of plant-life management. The LTAM

project for operating plants (20 units) has been ongoing since March 2010, and will conclude in August 2012.

[License renewals (Continued operation)]

The license renewal period of nuclear power plants (NPPs) is ten years, according to the current legal framework of the Republic of Korea. It is mandatory for the utility to conduct a Periodic Safety Review (PSR) for its operating NPPs every ten years, and to submit PSR reports for regulatory review and approval. The definition of Continued Operation (CO) is stated in the nuclear law enforcement ordinance and, under this legal statement, it is possible to extend a plant's operation beyond its design lifetime. A enhanced PSR report, including a Lifetime Evaluation Report(LER) and Radiological Environment Report(RER), should be submitted by the utility to the Ministry of Education, Science and Technology(MEST) in the CO application, two to five years before the end of the original license period. The LER of the CO includes identification of the Systems, Structures, and Components (SSCs) within the scope of the CO, Aging Management Programs (AMPs) and Time Limited Aging Analyses (TLAAs).

In June 2006, KHNP submitted the safety evaluation report for continued operation of Kori-1 to the NSSC, and continued operation was officially permitted on December 11, 2006. The safety evaluation report for Wolsong-1 was submitted in December 2009, and is currently under review by the regulatory body.

2.3. Future development of Nuclear Power

2.3.1. Nuclear power development strategy

According to the 5th Basic Plan of Long-term Electricity Supply and Demand, which was finalized by MKE in December 2010, 13 new nuclear power units will be constructed by 2024. The share of nuclear power capacity and nuclear power generation will increase from 31.4% in 2010, to 48.5% by 2024.

TABLE 8. PLANNED NUCLEAR POWER PLANTS

Station/Project Name	Type	Capacity	Expected Construction Start Year	Expected Commercial Year
SHIN KORI-5	PWR	1400	2014	2018
SHIN KORI-6	PWR	1400	2015	2019
SHIN ULCHIN-3	PWR	1400	2016	2020
SHIN ULCHIN-4	PWR	1400	2017	2021
SHIN KORI-7	PWR	1500	-	2022
SHIN KORI-8	PWR	1500	-	2023

To enhance the safety and economics of nuclear power plants, KHNP has been developing an advanced power reactor with a capacity of 1,400MWe, called the APR1400. This has been under development since 1995, constructed on the basis of the technological self-reliance of the OPR1000.

The APR1400 is a third-generation light water reactor. It is expected to be ten times safer than the OPR1000. In terms of economic benefits, it will be more competitive

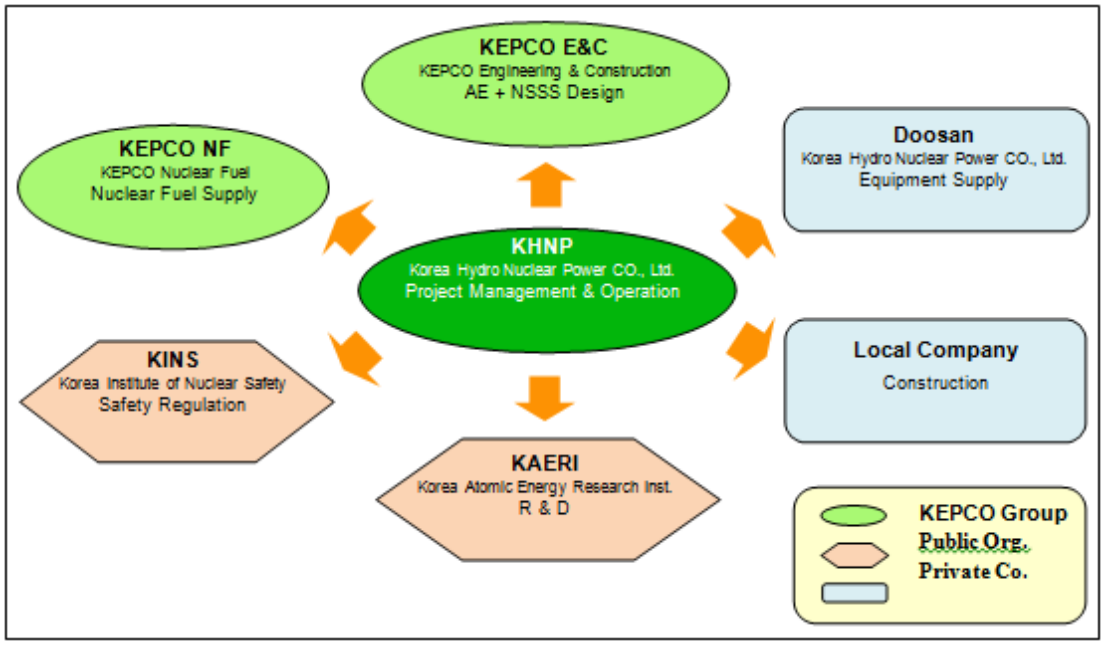
than any existing nuclear power units or thermal plants. The standard design of the APR1400 was certified through a stringent safety review by the Korean regulatory agency, in May 2002, and announced as the new design concept with enhanced safety and economic competitiveness. Shin Kori-3 & 4 will be the first APR1400 plants and are now under construction at the site, adjacent to the present Kori nuclear power station. They are scheduled to start commercial operation in September 2013 and 2014, respectively.

2.3.2. Project management

In 1985, the Korean government made the landmark decision to implement a national self-reliance policy, and allocated the roles and duties among the domestic nuclear organizations in order to streamline the nuclear power industry.

- Total Project Management	KHNP
- Architectural Engineering and NSSS Design	KEPCO E&C (formerly KOPEC)
- Nuclear Fuel Design and Fabrication	KEPCO NF (formerly KNF)
- Research & Development	KAERI
- NSSS, Turbine and Generator Manufacturing	Doosan (formerly Hanjung)
- Safety Regulation	KINS

FIGURE 4. STRUCTURE OF NUCLEAR POWER INDUSTRY



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Doosan has taken part in plant manufacturing by virtue of its capability to supply heavy industrial construction equipment and machinery. KEPCO E&C was established in 1975, to foster the nation's self-reliance in power technologies, particularly in nuclear power engineering for pressurized water reactors. KEPCO E&C has taken on the primary architect engineer's responsibility. KEPCO NF was established in November 1982, by joint investment of KEPCO and KAERI, to localize nuclear fuel fabrication for pressurized water reactors and CANDU reactors. KINS conducts safety reviews and inspections of nuclear facilities or radiation facilities.

The technological self-reliance strategy has been applied since construction of Yonggwang-3&4. Domestic nuclear industries became the projects' prime contractors on the condition of technology support, guidance and then transfer from foreign subcontractors.

2.3.3. Project funding

KHNP works to secure the reasonable sales price of electricity and reduce the cost of production in order to maximize retained earnings which can then be used for future capital expenditure. To acquire additional funding in the short-term, KHNP is issuing corporate bonds with diversified maturities in order to attract national and international investors.

In the long term, KHNP is considering diversifying its financing options to mitigate negative impact on financial status, thus strengthening funding capability. KHNP is introducing project finance to finance renewable power projects, and planning to expand project financing into utilizing future projects' own cash flow for financing.

2.3.4. Electric grid development

According to the 5th Basic Plan of Long-term Electricity Supply and Demand, which was finalized by the MKE in December 2010, 182-c-km-long transmission lines for Shin Kori-1&2 and 520-c-km-long transmission lines for Shin Kori-3&4 will be added to the current grid.

2.3.5. Site Selection

TABLE 9. LIST OF SELECTED NPPs SITES AND CHARACTERISTICS

Station	Source of Cooling Water	Operation Status	Transportation Infrastructure	Approval Status
KORI-1	Sea Water	Operational	Wharf Main Access Road	Operating License
KORI-2	Sea Water	Operational	Wharf Main Access Road	Operating License
KORI-3	Sea Water	Operational	Wharf Main Access Road	Operating License

KORI-4	Sea Water	Operational	Wharf Main Access Road	Operating License
SHIN KORI-1	Sea Water	Operational	Wharf Main Access Road	Operating License
SHIN KORI-2	Sea Water	Under Construction	Wharf Main Access Road	Construction Permit
SHIN KORI-3	Sea Water	Under Construction	Main Access Road	Construction Permit
SHIN KORI-4	Sea Water	Under Construction	Main Access Road	Construction Permit
YONGGWANG-1	Sea Water	Operational	Wharf Main Access Road	Operating License
YONGGWANG-2	Sea Water	Operational	Wharf Main Access Road	Operating License
YONGGWANG-3	Sea Water	Operational	Wharf Main Access Road	Operating License
YONGGWANG-4	Sea Water	Operational	Wharf Main Access Road	Operating License
YONGGWANG-5	Sea Water	Operational	Wharf Main Access Road	Operating License
YONGGWANG-6	Sea Water	Operational	Wharf Main Access Road	Operating License
WOLSONG-1	Sea Water	Operational	Wharf Main Access Road	Operating License
WOLSONG-2	Sea Water	Operational	Wharf Main Access Road	Operating License
WOLSONG-3	Sea Water	Operational	Wharf Main Access Road	Operating License
WOLSONG-4	Sea Water	Operational	Wharf Main Access Road	Operating License
SHIN WOLSONG-1	Sea Water	Under Construction	Main Access Road	Construction Permit
SHIN WOLSONG-2	Sea Water	Under Construction	Main Access Road	Construction Permit
ULCHIN-1	Sea Water	Operational	Wharf Main Access Road	Operating License
ULCHIN-2	Sea Water	Operational	Wharf Main Access Road	Operating License
ULCHIN-3	Sea Water	Operational	Wharf Main Access Road	Operating License
ULCHIN-4	Sea Water	Operational	Wharf Main Access Road	Operating License
ULCHIN-5	Sea Water	Operational	Wharf Main Access Road	Operating License
ULCHIN-6	Sea Water	Operational	Wharf Main Access Road	Operating Permits
SHIN ULCHIN-1	Sea Water	Under Construction	Main Access Road	Execution Plan Approval
SHIN ULCHIN-2	Sea Water	Under Construction	Main Access Road	Execution Plan Approval

2.4. Organizations involved in construction of NPPs

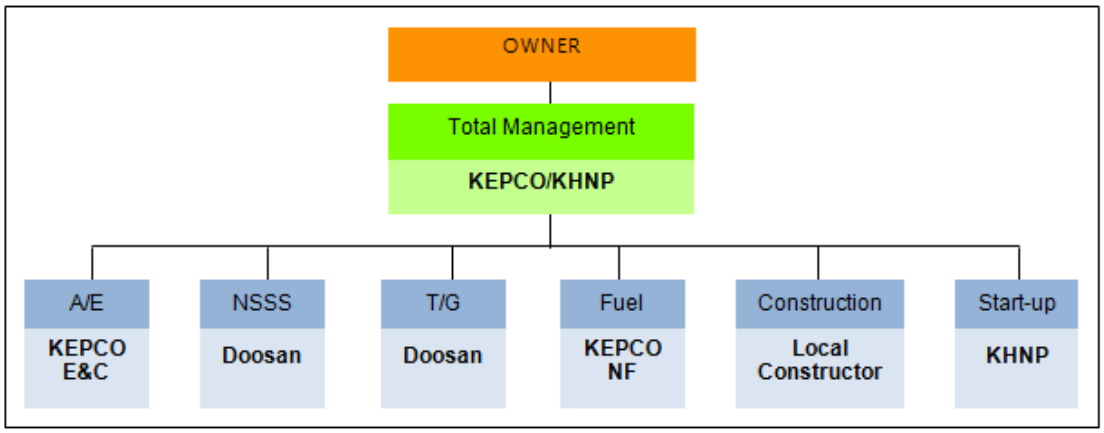
Since the Korean government decided to pursue technological self-reliance in 1985, the structure of domestic projects in Korea has been similar to that shown in Figure 5.

KHNP is in charge of total project management from construction to start-up, as an owner. KHNP designated KEPCO E&C for architect/engineering of plants and NSSS design, DOOSAN for the supply of the NSSS and the turbine/generator, and KEPCO NF for nuclear fuel. KAERI contributes to nuclear technology research and

development. Construction is performed by several domestic companies, such as HYUNDAI, DAEWOO and SAMSUNG.

Since 2009, KEPCO has determined that KEPCO will lead overseas nuclear projects, while KEPCO and KHNP will jointly participate in project management as an EPC contractor, as shown in Figure 5.

FIGURE 5. STRUCTURE OF OVERSEA'S NUCLEAR PROJECTS



2.5. Organizations involved in operation of NPPs

Figure 5 shows the main organizations involved in nuclear power plant operation. Additionally, KEPCO KPS provides maintenance services for all the operating nuclear power plants, while 5 individual companies, including Doosan, provide maintenance services for the start-up of Ulchin-5, 6.

2.6. Organizations involved in decommissioning of NPPs

According to Atomic Energy Act, KHNP, the sole NPP operator in the Republic of Korea, is responsibility for the decommissioning of NPPs. In order to do this, KHNP makes yearly deposits toward the cost of plant decommissioning, and has accumulated these funds as an in-house liability since 1983.

2.7. Fuel cycle including waste management

The Republic of Korea's demand for nuclear fuel has continuously increased with the expansion of its nuclear power capacity. KHNP, the sole consumer of nuclear fuel in the Republic of Korea, has guidelines in place for a procurement strategy which ensures the stable supply of nuclear fuel and economic efficiency. KHNP has maintained an optimal supply and demand plan through long-term contracts, spot-market purchases and adoption of the international open-bid process.

In accordance with the guidelines, in 2010, KHNP imported uranium concentrates from Australia, Canada, France, Germany, Kazakhstan, Russia and the U.S. and imported conversion & enrichment services from Canada, France, Germany, Russia, the U.K. and the U.S.

Fuel fabrication services are fully localized by the KEPCO Nuclear Fuel (KEPCO NF). Spent fuel is stored in the spent fuel storage facilities of the respective nuclear power plants. The national policy for spent fuel management, including construction of a centralized spent-fuel interim-storage facility, will be determined at a later date.

2.8. Research and development

2.8.1. R&D organizations

The Atomic Energy Act stipulates that the Ministry of Education, Science and Technology (MEST) shall formulate the National Nuclear R&D Program according to a sector-by-sector implementation plan.

The Nuclear R&D Program, otherwise called the "National Medium-and-Long-term Nuclear R&D Program," is mainly implemented by the Korea Atomic Energy Research Institute (KAERI), Korea Institute of Radiological & Medical Sciences (KIRMS) and Korea Institute of Nuclear Safety (KINS). Additional industry-led R&D programs are implemented by Korea Hydro & Nuclear Power Co., Ltd. (KHNP), KEPCO Engineering & Construction Company, Inc. (KEPCO E&C), KEPCO Plant Service and Engineering CO., Ltd (KEPCO KPS) and KEPCO Nuclear Fuel (KNF), among other companies.

2.8.2. Development of advanced nuclear technologies

The "National Medium-and-Long-term Nuclear R&D Program" was launched in June 1992, as a 10 year program (1992-2001). However, it was modified into a new R&D program, for the 1997-2006 and 2007-2011 terms, to take into account major changes in technological development situations. The program is funded by both the government and the nuclear industry.

The national R&D Program is focused on five research fields including: 1) advanced reactor & fuel, 2) nuclear safety, 3) radioactive waste management, 4) application of radiation and radioisotopes and 5) fundamental technologies.

Projects for further development of advanced reactors and fuel cycle technology are in progress under the mid- and long-term nuclear R&D program. As a near term reactor option, the Korea Next Generation Reactor, which is called Advanced Power Reactor 1400, has been developed and is under construction. Building on the APR1400, the Advanced Power Reactor Plus is in development. For the mid- and long-term reactor options, the Korea Advanced Liquid Metal Reactor (KALIMER) and other advanced reactors, as members of Gen IV programs, are also under development.

Even though the Republic of Korea has applied a "wait and see policy" for spent fuel management, several alternative studies on spent fuel management have been carried out. R&D activities on the disposal and treatment of radioactive wastes as well as the decontamination and decommissioning of nuclear facilities are in progress.

Several research projects concerning radiation and radioisotopes, including the production of radioisotopes, have been or are being conducted for applications in various areas such as medicine, agriculture, food and industry.

2.8.3. International co-operation and initiatives

The international nuclear society recognizes the expanded role of nuclear energy systems to cope with increasing energy demand and to deal with climate change. International co-operative programs have been initiated for the development of new nuclear energy systems with significant improvements in safety, economics, resource reutilization, environmental friendliness, and proliferation resistance.

Korea has been actively participating in these programs. They include the Generation IV International Forum (GIF), the International Project on Innovative Nuclear Reactors and Fuel Cycle (INPRO) and the International Framework for Nuclear Energy Cooperation (IFNEC).

The Generation-IV (Gen-IV) nuclear energy systems will provide significantly higher improvements in sustainability, safety, economics, and nuclear non-proliferation, when compared with existing nuclear systems. The resulting improved nuclear energy systems are projected to be commercialized after 2030. Advanced countries in nuclear energy, such as the United States, France, Japan, and Korea, have organized the Generation IV International Forum (GIF) and carried out joint research for future nuclear energy systems.

Korea has been a chartered member of GIF since 2000, and has played a significant role in the development of Gen-IV nuclear energy systems. Since 2006, Korea has participated in the co-development of the Sodium-Cooled Fast Reactor (SFR) and Very High Temperature Reactor (VHTR). The SFR is a next-generation nuclear reactor which initiates nuclear fission using high-speed neutrons of a high-energy level. By using high-speed neutrons, spent nuclear fuel can be reused as new fuel. This will achieve not only the most effective use of uranium, but also reduce the toxicity of spent fuel by transforming its longer half-life and highly toxic radioactive elements into a shorter half-life and less toxic elements. The VHTR, operating at 950^{o}C, can be used for the production of large amounts of hydrogen in a safe, clean and economical manner through direct separation of water, using its high temperature level. As of March 2012, Korea has signed on to six collaborative projects: Safety & Operation (SO), Advanced Fuels (AF), Component Design & Balance of Plant (CDBOP) in SFR, Fuel & Fuel Cycle (FFC), Materials (MAT) and Hydrogen Production (HP) in VHTR.

INPRO was initiated in 2000, for the purpose of jointly considering the international actions required to achieve the desired innovations in nuclear reactors and fuel cycles. Currently, thirty-one countries are members of INPRO, and Korea has been a member since 2001. INPRO has investigated the role of nuclear energy in the 21st century for

sustainable development, and determined the requirements and criteria for innovative technologies for nuclear fuel cycles and nuclear power. Korea coordinated activities for developing the criteria for proliferation resistance of nuclear reactors and fuel systems, and participated in case studies for the examination of innovative nuclear energy technologies against the criteria and requirements. Korea has also participated in INPRO Collaborative Projects (CPs), which have started to address technical issues. Korea is leading the project on Proliferation Resistance: Acquisition/Diversion Analysis (PRADA), for attaining the security of future nuclear energy systems, and is participating in other CPs, including the European Union's CP on thorium fuel cycle and Russia and India's CP on fast reactors. Korea has participated in the INPRO Dialogue Forum on Nuclear Energy Innovations, which is organized to discuss strategies for collaboration towards ensuring and facilitating the integration of nuclear technologies in states without the capacity to do so alone, while also participating in INPRO/GIF Interface Meetings to discuss recent developments and the relationship between INPRO and GIF.

GNEP was organized internationally in 2007, to focus on the worldwide expansion of nuclear energy for peaceful purposes in a safe and secure manner that supports clean development, while reducing the risk of nuclear proliferation. Korea joined GNEP in 2008. The twenty-five member countries divide the work into two expert-based Working Groups: Reliable Nuclear Fuel Services and Nuclear Infrastructure Development. GNEP makes collaborative efforts for a stable nuclear fuel market and for infrastructure support for member countries that intend to introduce nuclear power. GNEP changed its name to the International Framework for Nuclear Energy Cooperation (IFNEC) in June 2010, to provide a broader scope with wider international participation in order to more effectively explore the most important issues underlying the use and expansion of nuclear energy worldwide. Korea is sharing its experience in infrastructure development, including institutions, organizations and human resources, and technological self-reliance of nuclear power plants, to assist member countries in their planned introduction of nuclear power. The 8th IFNEC Steering Committee was held in Korea in May 2011.

2.9. Human resources development

Korea is a striking example in the development of nuclear power. At the beginning stage, when nuclear power was first introduced into Korea, the country was one of the beneficiaries of overseas technological support in nuclear power. However, the country succeeds nowadays in localizing most nuclear power technologies, including design, manufacturing, construction, operation & maintenance, fuel fabrication, and the building up of safety regulatory infrastructure in a relatively short period. While 21 nuclear plants are in operation for domestic need, Korea proves its nuclear capability through two overseas contracts, namely the UAE nuclear power plant and Jordan's nuclear research reactor.

It is noteworthy that the 'Koreanization' process of nuclear power technology has derived from constant efforts to develop human resources. The first step towards nuclear self-reliance was to initiate education and training. In 1958, the first nuclear education program was initiated by the department of nuclear engineering of Seoul National University. Subsequently, the Korea Atomic Energy Research Institute

(KAERI), established in 1959, enlarged its role in education and training through establishing the Nuclear Training Institute in 1960. At present, more than twenty actors in industry and at university level participate in the production of a well-educated and highly-trained workforce, for the competent, safe and successful application of nuclear power.
The structure of human resource development consists of three dimensions – industry, universities, and public institutes. At the industry level, this involves nuclear-specialized companies such as the KHNP (Korea Hydro & Nuclear Power), KEPCO (Korea Electronic Power Co.), and KOPEC E&C (KEPCO Engineering & Construction). Universities who contribute to the establishing of nuclear education courses include the Seoul National University Hanyang University, Kyunghee University, Jeju National University, Chosun University, Dongguk University and Handong University. Public institutes involved include KAERI, KINS (the Korea Institute of Nuclear Safety), and KINAC (the Korea Institute of Nuclear Nonproliferation and Control). The KRA (Korea Radioisotype Association) and the KAIF (Korea Atomic Industrial Forum) also participate in developing nuclear human resource through education and training.

The Korean government has recognized that the development of human resources is prerequisite, to underpin not only sustainable peaceful use of nuclear power, but also nuclear safety. The Ministry of Education, Science and Technology (MEST) has formulated a *Comprehensive Nuclear Energy Promotion Plan* (CNEPP) every five year, under the legal basis of the Korean Atomic Energy Act. In 2012, the CNEPP emphasizes the necessity of a HRD network at domestic level that allows diverse HRD needs to be dealt with appropriately, and of establishing a master plan for a national development plan for nuclear human resource through close cooperation among industry and university. Accordingly, the Nuclear Education Cooperation Center (NECC), a subsidiary of the Korea Nuclear International Cooperation Foundation (KONICOF), was launched in early 2012, and takes a significant role in coordinating any cooperation among domestic and overseas counterparts in the field of nuclear HRD.

As an emerging donor country, Korea has a strong will to expand education and training opportunities for the vision of ‘Atom for Peace’. Many institutes have established special courses and programs for emerging nuclear countries. Two leading research institutes, KAERI and KINS, are both opening graduate courses within relevant research fields. KAERI offers graduate courses majoring in such areas as nuclear engineering and radioactive isotypes application, in collaboration with the University of Science and Technology. KINS conducts an international certification course in nuclear safety and regulations, along with the Korea Advanced Institute of Science and Technology (KAIST). In industry level, KEPCO established the KEPCO International Nuclear Graduate School (KINGS) in 2012, which offers graduate courses specializing in the knowledge and skills necessary for nuclear power. For diverse overseas needs, the NECC of the KONICOF is a representative communications channel for arranging international education cooperation between overseas’ needs and domestic supply.

2.10. Stakeholder Communication

A new stakeholder communication strategy, called the 'Connective Interchange', was established in Korea following the Fukushima accident in Japan. The 'eco-friendliness' of nuclear energy has been emphasized in relation to climate change, while statistics and data were utilized, as part of promotional strategies, when comparing against other energy sources. Following the Fukushima accident, the focus was placed on 'Storytelling', with efforts being placed on an interactive two-way communication approach for the necessities of nuclear energy.

2.10.1. Overview of Stakeholder Communication Strategy

Stakeholder groups need to be separated through detailed classification in order to effectively accelerate the promotion of nuclear power plants, because understandings and forms of nuclear power vary in different people. Based on knowledge levels and involvement with NPPs, and with consideration of geographical proximity of the facility sites, ideological spectrum and political tendency, group-based members of our society can show different attitudes and patterns of behavior.

Stakeholder Group Classification		**Involvement**	
		High	**Low**
Knowledge	**High**	Group 2(Civic-Social group)	Group 1(Opinion leaders)
	Low	Group 3(Local government/residents)	Group 4(General public)

The targeted members can be divided into four large groups, according to respective knowledge levels of nuclear power and involvement with NPPs. Group 1, referred to as Opinion leaders, possesses high-level knowledge of nuclear power, but has a low level of direct involvement. Group 2 possesses both high-level knowledge and involvement with nuclear power. It includes civic-social groups, including environmental activists. Group 3 possesses low-level knowledge, but has high involvement through close geographical conditions with nuclear power facilities. Local governments and local residents are in this category. Group 4 possesses both low-level knowledge and involvement. This group includes the general public, next-generation students and teachers. As shown by such group classifications, each group should be approached with an appropriate, devised stakeholder communication strategy.

2.10.2. Main Programmes for Each Stakeholder Group

[General Public]

Nuclear energy institutes, including KHNP (Korea Hydro & Nuclear Power) and KONEPA (Korea Nuclear Energy Promotion Agency), are pushing ahead with public education on nuclear energy. Their goal is to eliminate the negative perception of nuclear energy held by many members of the public and to build a social consensus on its use. To achieve this, the public is being provided with information on nuclear power plant operation and on the current state of radioactive waste through websites

and through newsletters sent out to website members. In addition, booklets are being published on the operation of nuclear power plants (NPPs) and on the safety and necessity of nuclear energy, with each booklet targeting different readers with different content.

Visitors are provided with opportunities to learn about the current state of NPPs, and may tour facilities through the information & exhibition centers that are installed in NPPs. The public is also informed about the safety, economic feasibility and eco-friendliness of nuclear energy through booths at various exhibitions.

The nuclear industry in Korea strives to provide the public with objective and scientific knowledge on nuclear energy through mass media such as TV and newspapers. This may take various forms, such as advertisements, informational features, publicity campaigns and articles. Efforts are also being made to promote a positive awareness of nuclear energy by organizing or supporting seminars, workshops and academic presentations.

[Local Residents]

Public relations activities targeting local residents who, as direct stakeholders, are very interested in the nuclear energy business, are focused on narrowing the gap and strengthening the bond between these stakeholders and the industry through direct contact, to reassure them of the safety of nuclear energy. The nuclear industry in Korea recognizes that the degree of acceptance of nuclear energy varies depending on local and international situations and factors, and therefore establishes and executes separate strategies accordingly, to best fit the needs of these stakeholders. Nuclear power plant workers are also active in conducting person-to-person public relations activities with local residents.

KHNP provides the public with information on the operation of NPPs, the operating principles of NPPs, and the current radioactive waste situation through its website and through information & exhibition centers. In addition, KHNP conducts joint environmental inspections around NPPs with local representatives and local universities, and provides available information to local residents to monitor the operation of NPPs in non-governmental environmental watchdog groups.

[Next Generation]

As young people do not yet have a firmly-established point of view of nuclear energy, it is very important to help them develop positive perceptions with regards to it. KHNP and KONEPA work to educate young people on the advantages and necessity of nuclear energy in the following ways.

KHNP holds regular Nuclear Contests, such as a drawing contest, a writing contest and a science camp during summer vacation. It also opens its information and exhibition centers and offers plant tours for students in the neighboring areas. KONEPA presents a Nuclear Musical Festival, for the next generations to enjoy and learn about nuclear energy with their families. Science teachers across the nation are provided with nuclear energy training and distributed promotional magazines. Nuclear energy experts are also available to visit schools and teach students for one day. Moreover, KHNP provides nuclear power plant tours and lectures to special-purpose high-school students, such as science high-school students, in order to help encourage

excellent students to build a career in the nuclear power industry. KHNP also attempts to help young people gain an understanding of nuclear energy through such diverse approaches as national open recruitment of university students to act as public relations representatives, and preferential hiring of winners of the national academic-paper contests for university students.

Since schools have substantial influence on students, KONEPA is going to some lengths to analyze textbooks used in elementary, middle, and high schools and amend any additions or corrections to the textbooks so that nuclear energy education is systematically provided. Additionally, KONEPA has developed and distributed educational materials – books, presentations, pictures – for teachers who want to teach nuclear energy-related subjects. KONEPA also provides nuclear power plant tours for textbook editors, to increase their understanding of nuclear power.

[Media]

Mass media, such as television, newspapers and Internet, provide information to the public and shape public opinion. It is therefore helpful to the nuclear energy industry to offer objective material and scientific information on nuclear energy through reliable mass media channels.
KHNP and KONEPA offer objective material and scientific information on nuclear energy through reliable mass media channels, while also providing special reports on nuclear energy in joint campaigns with newspapers or through columns written by nuclear energy specialists.

The news media require facts in order to provide accurate reports on nuclear power programs. Background information provided to them includes photographs, films, videotapes, fact sheets, copies of technical reports, government laws or policy statements, and information booklets or pamphlets. Moreover, KHNP and KONEPA try to broadcast important ceremonies, including ground-breaking events, reactor installation and plant construction completion, to increase media awareness.

KHNP and KONEPA use advertising to inform people in a user-friendly manner of the fact that nuclear energy is an essential part of our everyday lives. These advertisements convey their messages not only through mass media such as radio, television, newspapers and magazines, but also through full-color electric signboards and outdoor billboards at crowded airports, bus terminals, and railway and subway stations.

KHNP and KONEPA work to continuously stage campaigns to promote nuclear energy, the environment, and energy security through joint efforts with the media. These attempts have made great contributions to public awareness of nuclear energy issues.

[Cyber-Promotion]

KHNP is increasing public confidence regarding the operation of NPPs by providing the public with real-time information on the state of operation, maintenance, and stoppage of all NPPs within the Republic of Korea through the company's website. This site also provides a ring tone and dial tone service for employees' mobile phones, and enables anyone to download ring tones for free.

KONEPA's cyber work includes collecting netizens' (network citizens) opinions through cyber discussion rooms and bulletin boards, and providing prompt answers to netizens' questions regarding nuclear energy through a 'question and answer', blog, 'Energy Planet'. KONEPA tries to raise participation of netizens and website visitors, inducing their interest by holding events such as UCC, nuclear energy quizzes and flash contests.

The company also provides promotional videos on its website, so that the public can easily gain an understanding of nuclear energy. Through these videos, the company promotes the safety, economic feasibility and eco-friendliness of nuclear energy, and seeks to build a social consensus that nuclear energy is key for green growth.

Finally, KHNP sends its nuclear power newsletter to approximately 147,000 people, twice per month, in the form of a webzine that includes domestic and overseas nuclear energy trends, KHNP news, and management agendas.

[Information & Exhibition Center]

A nuclear power plant tour is the best way to promote the safe, clean and reliable energy NPPs provide to the public. Each nuclear power plant in the Republic of Korea has an information & exhibition center, and these are visited by a combined total of more than 450,000 people each year. Visitors listen to explanations of nuclear power generation and watch a video on the current state of NPPs, after which they are able to tour the nuclear power plant facilities.

The Main Control Room and radioactive waste disposal and storage facilities are visited during the tour, and the NPPs under construction are being built for easy tour access through the use of see-through corridors.

KONEPA also holds exhibitions at nuclear-related facilities. Major exhibition facilities include the Nuclear Center at the National Seoul Science Museum, the Electric Energy Pavilion of the Expo Science Park in Daejeon and Energy Experiencing 'Happy i' Center in the head office. Each is comprised of nuclear energy-related models, experimental devices, graphic panels, an information search section and other exhibits for hands-on experiences, offering a good learning experience not only to students, but to adults as well.

3. NATIONAL LAWS AND REGULATIONS

3.1. Regulatory framework

3.1.1. Regulatory authorities

The governmental organizations concerned with nuclear activities, as shown in Figure 1, are mainly formed by administrative authorities: MKE (The Ministry of Knowledge Economy), which supervises the nuclear power program, and MEST (the Ministry of Education, Science and Technology), which is responsible for the nuclear R&D program.

Since the MEST was established, in 1967, the Ministry has performed nuclear regulatory tasks as well as having responsibility for the nuclear R&D program. This multiple responsibility caused some concern with regard to regulatory independence. For the purpose of further enhancement of regulatory independence, the legislators introduced three bills in 2009, namely i) Act on Establishment and Operation of Nuclear Safety and Security Commission, ii) Nuclear Safety Act, and iii) Nuclear Promotion Act (the latter two bills divided the then-current Atomic Energy Act into two new acts).

The accident at Fukushima in Japan, in March 2011, has raised public concerns on enhancement of nuclear safety, and expedited the passage of the bills through parliament. The Nuclear Safety and Security Commission (NSSC) was established under the President on October 26, 2011, in accordance with the new Act on Establishment and Operation of Nuclear Safety and Security Commission. The NSSC is an independent and standalone government agency, and it has the ministerial level position in the Cabinet. It does not belong to any Ministry in the Cabinet and reports only to the President, and to the National Assembly if requested. NSSC is responsible for nuclear safety, security, and safeguards for nuclear facilities and activities. The role of the MEST is thereby restricted to nuclear R&D, and its regulatory functions transferred to the NSSC.

The NSSC consists of 9 commissioners: a chairman and a vice chairman are executive members, and the 7 other commissioners are non-executive members, as shown in Figure 2. The NSSC has an advisory committee. All of the 15 advisory committee members are senior experts representing various technical areas, and each member can organize an ad-hoc subcommittee if needed. The secretariat office has around 90 staff in 2 bureaus and 8 divisions, and the commission has 5 onsite resident offices and 5 offsite emergency management centres.

Two expert organizations, KINS (the Korea Institute of Nuclear Safety) and KINAC (the Korea Institute of Nuclear Non-proliferation and Control), support the NSSC, as technical support organizations.

The KINS was established in December 1981, and initially operated under the name of "Nuclear Safety Center" as an internal organization of KAERI (the Korea Atomic Energy Research Institute). It started functioning as an independent expert organization in February 1990, and conducts matters on nuclear safety regulation, as entrusted by the MEST in accordance with the Atomic Energy Act. The KINAC was established in June 2006 and commissioned by the MEST, to perform the tasks of safeguards, control of export and import of nuclear materials, physical protection, and research and development concerning nuclear facilities and nuclear materials.

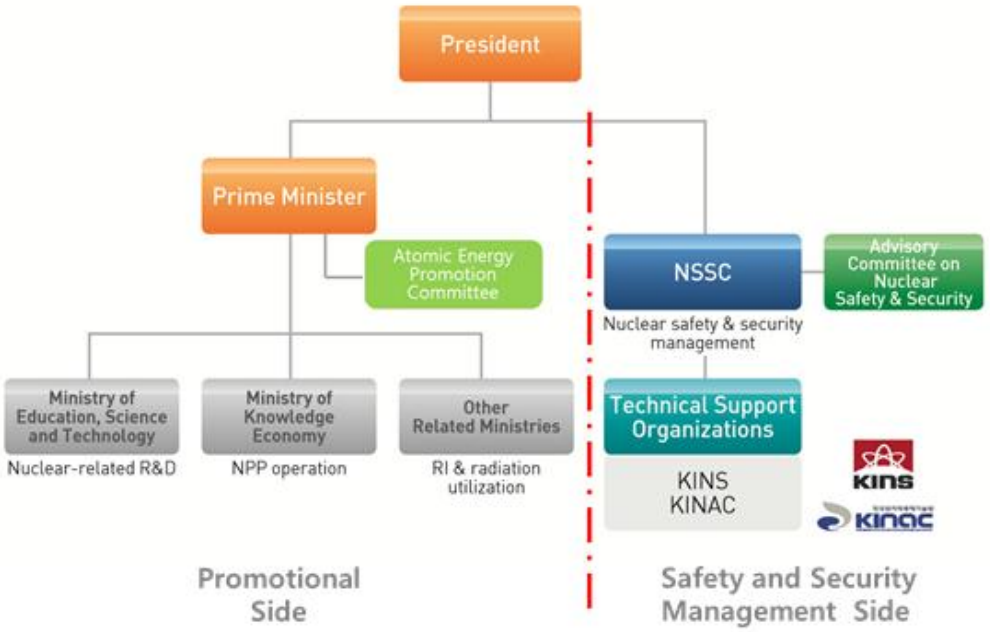


FIGURE6. **STRUCTURE OF NUCLEAR SAFETY REGULATORY ORGANIZATIONS**

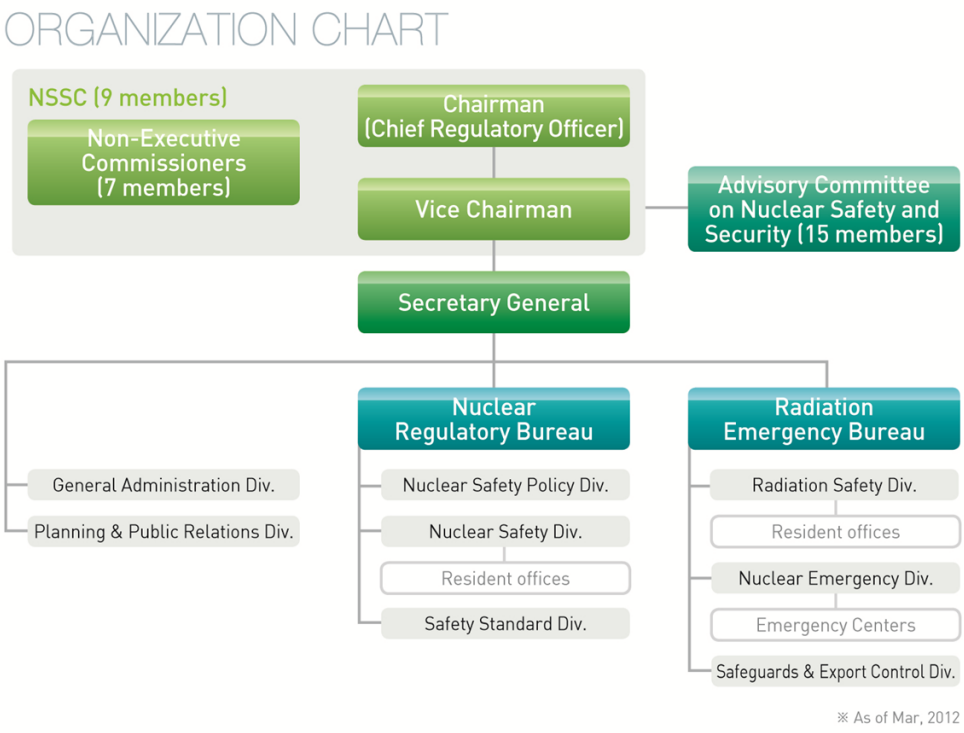


FIGURE 6. **Organization Chart of NSSC**

3.1.2. Licensing Process

Regulation and licensing processes for nuclear power plants in Korea are divided into three stages:

- In the site selection stage, the conceptual design is examined to determine the appropriateness of the proposed site. The safety requirements of the site are reviewed from the standpoints of the design, the construction, and the operation of the plant
- For the construction permit, the utility submits a Preliminary Safety Analysis Report (PSAR) and an overall quality assurance program for the project, along with the reference design of the plant. Additionally, the utility is required to prepare an environmental impact statement
- When the utility requests an operating license, the MEST must confirm that the as-built plant conforms to the submitted design. In this stage, operational technical specifications, and emergency plans and procedures against radiation hazards are submitted

Regulatory inspections of NPPs under construction or in operation are executed in steps according to established procedures, including pre-operational inspections of the nuclear installation, periodic inspections of the operating nuclear installations, quality assurance audits, daily inspections by resident inspectors, and special inspections.

In compliance with the Article of the Convention on Nuclear Safety, use of the Periodic Safety Review (PSR) was adopted, in 1999, by the Ministry of Education, Science and Technology (MEST) through technical review by the Nuclear Safety Commission, as a safety evaluation process during the lifetime of operating nuclear power plants to maintain the safety levels in line with current safety standards and practices in 1999. The Atomic Energy Act (AEA) was amended to establish the definite provisions for PSR implementation in 2001.

Kori-1 was designated as the first plant to apply a PSR in Korea, and HNP conducted the PSR for Kori-1 from May 2000 to October 2002. The result was submitted to the MEST in November 2002, for intensive review.

Subsequently, PSRs for other plants which have been operating for more than 10 years, such as Kori-2, 3, 4, Wolsong-2, 3, 4, Yonggwang-1, 2, 3, 4 and Ulchin-1, 2, 3, 4, were implemented by November 2010. The PSRs for the remaining plants, which are Yonggwang-5, 6 and Ulchin-5, 6, will be implemented in 2011 and 2013, respectively. The 2nd PSRs will begin in 2013 for Kori-2.

The Korean government is continually improving its nuclear control system, as the amount of domestic nuclear material increases with the growth of the nuclear industry. The government established a State System for the Accounting and Control of nuclear materials (SSAC) within the MEST. In order to develop nuclear control technology and to technically assist the government, the Technology Centre for Nuclear Control (TCNC) at KAERI was established in 1994. The Korean government launched the National Nuclear Management and Control Agency (NNCA), an independent watchdog, in October 2004. NNCA was expanded into the Korea Institute of Non-proliferation and Control (KINAC) in June 2006, in order to enhance the country's nuclear transparency.

3.1.3 Nuclear Safety Management System

NSSC has established the safety management system for nuclear power plants through all stages in Figure 7: design, site approval, construction, operation, maintenance and decommissioning. The national policies and strategies to ensure the safe use of nuclear energy are prescribed in the Nuclear Safety Act, based on which NSSC responsibility covers: nuclear reactors, fuel cycle facilities, uses of nuclear materials, and transport, storage, radioactive source and disposal of radioactive materials and wastes. For safety management of nuclear power plants, NSSC conducts site approval, issuance of construction permit, pre-operational inspection, issuance of operation license, QA inspections, and periodic safety reviews.

FIGURE 7. **Safety Management System for NPPs**

3.2. Main national laws and regulations in nuclear power

[Legislative framework of nuclear regulation]

The main national laws related to the safety of nuclear activities are the Nuclear Safety Act (NSA), the Electricity Business Act (EBA), the Environmental Impact Assessment Act and others, as shown in Table 1. All provisions concerning nuclear safety regulation and radiation protection are included in the NSA.

TABLE 10. LAWS CONCERNING NUCLEAR REGULATION

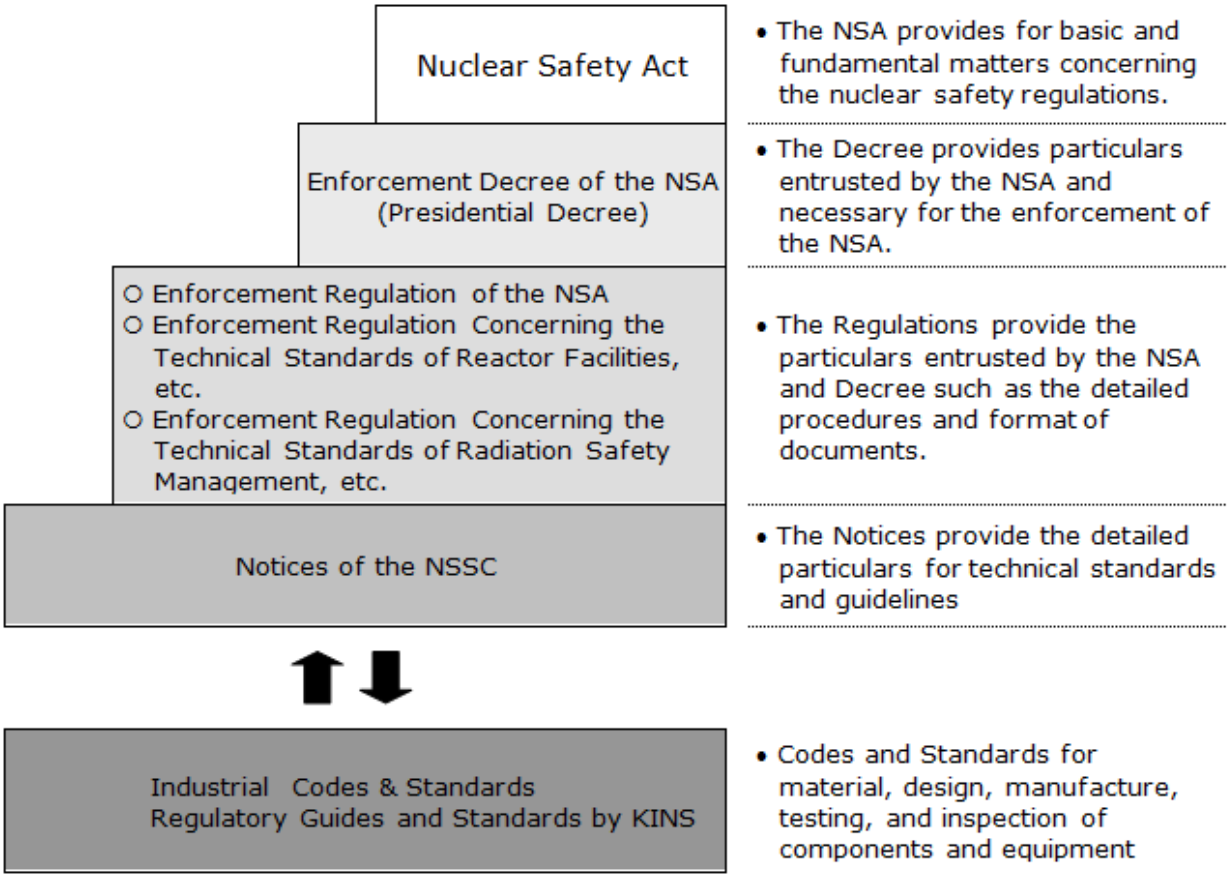
Title	Major Contents	Competent Authorities	Remarks
Nuclear Safety Act	Prescribes safety management requirements for construction and operation of nuclear facilities; production, sales, and use of nuclear materials, radio isotopes, radiation generating devices	NSSC	-
Act on the Establishment and Operation of the Nuclear Safety and Security	Prescribes organization, roles, and principles of NSSC	NSSC	

Commission			
Korea Institute of Nuclear Safety Act	Provides the establishment and operation of the Korea Institute of Nuclear Safety	NSSC	-
Act on Physical Protection and Radiological Emergency	Establishes more effective systems for physical protection of nuclear material and nuclear facilities, and provides legal and institutional basis for preventing a radiological disaster and preparing countermeasures against a radiological emergency	NSSC	-
Act on Protective Action Guidelines Against Radiation in the Natural Environment	Prescribes safety rules for managing radiation in residential areas to protect people against undue exposure to radiation from household items, construction materials, or recycled scam metal	NSSC	To be effective on 26th July, 2012
Nuclear Liability Act	Prescribes compensation rules for nuclear damages	NSSC	
Act on Indemnity Agreement for Liability	Prescribes rules of indemnity agreement for nuclear liability	NSSC	
Electricity Business Act	Provides the basic system of electricity business	MKE	-
Electric Source Development Promotion Act	Provides special cases relevant to the development of electric sources	MKE	Prior designation notice of nuclear site
Radioactive Waste Control Act	Provides for matters necessary for the safe and efficient control and management of radioactive waste	MKE	-
Basic Law of Environmental Policy	Funding law of environmental preservation policy	MOE	The NSA is entrusted with the particulars on measures to prevent radiological contamination
Act on Assessment of Impacts of Works on Environment.	Provides the extent and procedures to assess environmental impact according to the Basic Law of Environmental Policy	MOE	Assessment of environmental impacts excluding radiological impacts
Framework Act on Fire Services	Provides for general matters on the prevention, precautions and the extinguishing of fires	MOPAS	Requirements for safety management of inflammables
Basic Act on Civil Defence	Provides for general matters on the civil defence system	MOPAS	Preparedness against disasters due to nuclear accidents is included in the basic civil defence plan
Framework Act on Management of Disasters and Safety	Provides for general matters on the control of man-made disasters	MOPAS	Prescribes corrective or complementary measures for violations in the implementation of the basic civil defence plan
Industrial Accident Compensation Insurance Act	Provides insurance to compensate workers in case of an industrial disaster	MOEL	Nuclear workers are to be compensated in accordance with the compensation standards in the NSA
Industrial Safety and Health Act	Provides for the preservation and enhancement of workers' health and safety	MOEL	The AEA includes the particulars on radiological safety
Building Act	Provides for general matters on construction	MLTM	When the sites of disposal facilities have obtained prior approval, they are to be seen as having obtained construction permission in accordance with the Building Act

[Nuclear Safety Act - NSA]

The laws concerning nuclear regulation, as shown in Figure 8, consist of 4 levels: the NSA, the Enforcement Decree of the NSA, the Enforcement Regulations of the NSA (including regulations concerning technical standards of nuclear facilities etc., and regulations concerning technical standards of radiation safety management), and the Notices of the NSSC.

FIGURE 8. LEGAL HIERARCHY OF THE NUCLER SAFETY ACT



The NSA provides for basic and fundamental matters concerning the safety regulations. The NSA includes provisions for NSSC, permits for construction, and operation of radioactive waste disposal facilities, among others. The Enforcement Decree of the NSA (Presidential Decree) provides the particulars entrusted in the NSA and administrative particulars, including the detailed procedures and methods necessary for enforcement of the NSA.

The Enforcement Regulation of the NSA (NSSC Ordinances) provides the particulars, including detailed procedures, format of documents and technical standards, as entrusted by the same Act and the same Decree. The Notices of the NSSC prescribe the regulatory requirements, technical standards and guidelines, as entrusted by the same Act, Decree and Regulation.

The NSA prescribes basic matters on waste safety to be applied to radioactive waste management facilities. These are as follows:

- provisions for construction/operation permits of nuclear facilities
- provisions for step-by-step safety inspections related to installation and operation of nuclear facilities
- provisions for the safe transport and packaging of radioactive waste
- provisions for the establishment and implementation of basic policy

References

[1] Cheong Wa Dae; Office of the President of Korea (http://english.president.go.kr)

[2] Korean Statistical Information Service (http://kosis.kr/eng)

[3] The Bank of Korea Economic Statistics System (http://ecos.bok.or.kr)

[4] Korea Energy Statistics Information System (http://www.kesis.net)

[5] The 5th Basic Plan of Long-Term Electricity Supply, Ministry of Knowledge Economy

[6] Energy Info. Korea 2010, Korea Energy Economics Institute

[7] Yearbook of Energy Statistics, Korea Energy Economics Institute

[8] Yearbook of Electricity Statistics, KEPCO

[9] Yearbook of New & Renewable Energy Statistics 2010, Korea Energy Management Corporation

Appendix 1: International, Multilateral and Bilateral Agreements

INTERNATIONAL TREATIES, CONVENTIONS AND AGREEMENT

- Statute of the International Atomic Energy Agency (IAEA), in effect since August 1957.
- Agreement on the Privileges and Immunities of the International Atomic Energy Agency, in effect since January 1962.
- Amendment of Article VI. A.3 of the Statute of the International Atomic Energy Agency, in effect since January 1963.
- Amendment of Article VI of the Statute of the International Atomic Energy Agency, in effect since June 1973.
- Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA), in effect since October 1974.
- Agreement to Extend the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (1972), in effect since July 1978.
- Second Agreement to Extend the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (1972), in effect since December 1982.

- Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA, 1987), in effect since December 1987.

- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, in effect since July 1990.

- Convention on Early Notification of a Nuclear Accident, in effect since July 1990.

- Agreement to Extend the Regional Cooperative Agreement for Research Development and Training Related to Nuclear Science and Technology (1987), in effect since December 1992.

- Agreement on the Establishment of the Korean Peninsula Energy Development Organization (KEDO), in effect since March 1995.

- Convention on Nuclear Safety, in effect since October 1996.

- Second Agreement to Extend the 1987 Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology, in effect since June 1997.

- Agreement on Cooperation Among the Original Members of Korean Peninsula Energy Development Organization, in effect since September 1997.

- Protocol Amending the Agreement on the Establishment of the Korean Peninsula Energy Development Organization, in effect since September 1997.

- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, in effect since December 2002.

- Framework Agreement for International Collaboration on Research and Development of Generation IV Nuclear Energy Systems, in effect since November 2005.

- Fourth Agreement to Extend the 1987 Regional Cooperative Agreement for Research, Development, and Training Related to Nuclear Science and Technology, in effect since July 2007.

- Agreement on the Privileges and Immunities of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project, in effect since October 2007.

- Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project, in effect since October 2007.

COOPERATION AGREEMENTS WITH IAEA

- Exchange of Notes between the Government of the Republic of Korea and the International Atomic Energy Agency concerning Technical Assistance, in effect since May 1961.

- Exchange of Notes for the Services (Application of Radioisotope in Agriculture) of Technical Assistance Experts between the Republic of Korea and the International Atomic Energy Agency, in effect since October 1962.

- Exchange of Notes for the Services (Experimental Nuclear Physics) of Technical Assistance Experts between the Republic of Korea and the International Atomic Energy Agency, in effect since December 1962.

- Exchange of Notes for the Services (Radio-Chemistry) of Technical Assistance Experts between the Government of the Republic of Korea and the International Atomic Energy Agency, in effect since April 1963.

- Supplementary Agreement on Provision of Technical Assistance by the International Atomic Energy Agency to the Government of the Republic of Korea, in effect since April 1967.

- Agreement between the Government of the Republic of Korea and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons, in effect since November 1975.

- Revised Supplementary Agreement concerning the Provision of Technical Assistance by the International Atomic Energy Agency to the Government of the Republic of Korea, in effect since January 1980.

- Protocol Additional to the Agreement between the Government of the Republic of Korea and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons, in effect since February 2004.

BILATERAL AGREEMENTS

- Agreement for Cooperation between the Government of the Republic of Korea and the Government of the United States of America concerning Civil Uses of Atomic Energy, in effect since February 1956.

- Amendment to Agreement for Cooperation between the Government of the Republic of Korea and the Government of the United States of America concerning Civil Uses of Atomic Energy, in effect since May 1958.

- Lease Agreement for the Special Nuclear Material between the United States Atomic Energy Commission acting for and on behalf of the Government of the United States of America and the Government of the Republic of Korea, in effect since June 1960.

- Exchange of Notes concerning a Grant by the Government of the United States of America in the Acquisition of Certain Nuclear Research and Training Equipment and Materials between the Government of the Republic of Korea and the Government of the United States of America, in effect since November 1960.

- Lease Agreement for the Special Nuclear Material between the United States Atomic Energy Commission acting for and on behalf of the Government of the United States of America and the Government of the Republic of Korea, in effect since September 1961.

- Lease Agreement for the Special Nuclear Material between the Government of the Republic of Korea and the United States Atomic Energy Commission acting for and on behalf of the Government of the United States of America, in effect since June 1963.

- Amendment to Agreement for Cooperation between the Government of the Republic of Korea and the Government of the United States of America concerning Civil Uses of Atomic Energy, in effect since January 1966.

- Agreement between the International Atomic Energy Agency, the Government of the Republic of Korea and the Government of the United States of America for the Application of Safeguards, in effect since January 1968.

- Agreement to Amend the Agreement between the International Atomic Energy Agency, the Government of the Republic of Korea and the Government of the United States of America for the Application of Safeguards, in effect since March 1973.

- Agreement for Cooperation between the Government of the Republic of Korea and the Government of the United States of America concerning Civil Uses of Atomic Energy, in effect since March 1973.

- Amendment to Agreement for Cooperation between the Government of the Republic of Korea and the Government of the United States of America concerning Civil Uses of Atomic Energy, in effect since June 1974.

- Exchange of Notes between the Government of the Republic of Korea and the Government of the French Republic concerning Reciprocal Cooperation for the Peaceful Utilization of Atomic Energy, in effect since October 1974.

- Agreement between the International Atomic Energy Agency, the Government of the Republic of Korea and the Government of the French Republic for the Application of Safeguards, in effect since September 1975.

- Agreement between the Government of the Republic of Korea and the Government of Canada for Cooperation in the Development and Application of Atomic Energy for Peaceful Purposes, in effect since January 1976.

- Basic Agreement on Scientific and Technical Cooperation between the Government of the Republic of Korea and the Government of Spain, in effect since March 1976.

- Agreement between the Government of the Republic of Korea and the Government of Australia concerning Cooperation in Peaceful Uses of Nuclear Energy and the Transfer of Nuclear Material, in effect since May 1979.

- Exchange of Notes between the Government of the Republic of Korea and the Government of the Federal Republic of Germany for the Supply of the Radionuclide Batteries to the Republic of Korea, in effect since October 1979.

- Agreement between the Government of the Republic of Korea and the Government of the French Republic relating to Peaceful Utilization of Atomic Energy, in effect since April 1981.

- Agreement between the Government of the Republic of Korea and the Government of Belgium concerning the Collaboration in the field of the Pacific Utilization of Nuclear Energy, in effect since March 1981.

- Memorandum of Understanding between the Government of the Republic of Korea and the Government of Canada on the Establishment and Operation of the Korea-Canada Joint Coordinating Committee on Nuclear Energy, in effect since April 1983.

- Agreement between the Government of the Republic of Korea and the Government of the Federal Republic of Germany for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since April 1986.

- Exchange of Notes between the Government of the Republic of Korea and the Government of Canada on Retransfer of Nuclear Material, in effect since June 1989.

- Exchange of Notes between the Government of the Republic of Korea and the Government of Japan concerning Cooperation in Nuclear Energy, in effect since May 1990.

- Agreement between the Government of the Republic of Korea and the Government of the United Kingdom of Great Britain and Northern Ireland for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since November 1991.

- Exchange of Notes on the Republic of Korea's joining the OECD Nuclear Energy Agency between the Government of the Republic of Korea and the Organization for Economic Cooperation and Development, in effect since May 1993.

- Arrangement between the Korean Ministry of Science and Technology and the United States Department of Energy concerning Research And Development in Nuclear Material Control, Accountancy, Verification, Physical Protection, and Advanced Containment and Surveillance Technologies for International Safeguards Applications, in effect since September 1994.

- Arrangement between the Ministry of Science and Technology (M.O.S.T.), the Republic of Korea, and the Nuclear Regulatory Commission (U.S.N.R.C.), United States of America, for the Exchange of Technical Information and Cooperation in Regulatory and Safety Research Matters, in effect since June 1995.

- Agreement between the Government of the Republic of Korea and the Government of the People's Republic of China for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since February 1995.

- Agreement between the Government of the Republic of Korea and the Government of the Socialist Republic of Vietnam for Cooperation in Research into the Peaceful Uses of Nuclear Energy, in effect since January 1997.

- Agreement between the Government of the Republic of Korea and the Government of the Argentine Republic for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since September 1997.

- Exchange of Notes concerning on Agreement between the Government of the Republic of Korea and the Government of Australia concerning Cooperation in

Peaceful Uses of Nuclear Energy and Transfer of Nuclear Material Signed at Canberra on 2 May 1979, in effect since November 1997.

- Agreement between the Government of the Republic of Korea and the Government of the Russian Federation on the Peaceful Uses of Nuclear Energy, in effect since October 1999.

- Agreement between the Government of the Republic of Korea and the Government of the Republic of Turkey for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since June 1999.

- Agreement between the Government of the Republic of Korea and the Government of the Czech Republic for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since June 2001.

- Exchange of Notes between the Government of the Republic of Korea and the Government of Canada constituting an Agreement relating to the Transfer of Tritium Items for the Wolsong Tritium Removal Facility, in effect since January 2001.

- Exchange of Notes for the Amendment of the Agreement between the Government of the Republic of Korea and the Government of Canada for Cooperation in the Development and Application of Atomic Energy for Peaceful Purposes, in effect since July 2002.

- Agreement between the Government of the Republic of Korea and the Government of the Arab Republic of Egypt for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since June 2002.

- Agreement between the Government of the Republic of Korea and the Government of Romania for Cooperation in the Peaceful Uses of Nuclear Energy in the fields of Industry, Research and Development, in effect since September 2004.

- Agreement on Cooperation between the Government of the Republic of Korea and the Government of the Republic of Kazakhstan in the Peaceful Uses of Atomic Energy, signed in September 2004.

- Agreement between the Government of the Republic of Korea and the Government of the Federative Republic of Brazil for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since July 2005.

- Agreement for Cooperation between the Government of the Republic of Korea and the European Atomic Energy Community Represented by the Commission of the European Communities in the field of Fusion Energy Research, in effect since December 2006.

- Agreement between the Government of the Republic of Korea and the Government of the Republic of Chile for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since September 2006.

- Agreement between the Government of the Republic of Korea and the Government of the Republic of Indonesia for Cooperation in the Peaceful Uses of Atomic Energy, signed in December 2006.

- Agreement between the Government of the Republic of Korea and the Cabinet of Ministers of Ukraine for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since June 2008.

- Agreement between the Government of the Republic of Korea and the Government of the Hashemite Kingdom of Jordan for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since May 2009.

- Agreement between the Government of the Republic of Korea and the Government of the United Arab Emirates for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since January 2010.

- Agreement between the Government of the Republic of Korea and the Government of the Republic of Kazakhstan for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since August 2010.

- Agreement between the Government of the Republic of Korea and the Government of the Republic of South Africa for Cooperation in the Peaceful Uses of Nuclear Energy, in effect since February 2011.

Appendix 2: main organizations, institutions and companies involved in nuclear power related activities

National Nuclear Energy Authorities

Atomic Energy Commission (AEC)
Central Government Complex, 77-6 Sejong-No,
Jongno-gu, Seoul, 110-760, Republic of Korea
Tel: +82-2-2100-6950
Fax: +82-2-2100-6965

Ministry of Education, Science and Technology (MEST)
Central Government Complex, 77-6 Sejong-No,
Jongno-gu, Seoul, 110-760, Republic of Korea
Tel: +82-2-2100-6118
Fax: +82-2-2100-6133
http://www.mest.go.kr

Ministry of Knowledge Economy (MKE)
Government Complex, 88 Gwanmoonro,
Gwacheon-si, Gyeonggi-do 427-723
Republic of Korea
Tel: +82-2-1577-0900
Fax: +82-2-504-7634
http://www.mke.go.kr

Nuclear Industry

Korea Atomic Energy Research Institute (KAERI)
1045 Daeduk-daero (Dukjin-dong), Yusong-gu,
Daejeon, 305-353, Republic of Korea
Tel: +82-42-868-2000
Fax: +82-42-868-2196
http://www.kaeri.re.kr

Korea Institute of Nuclear Safety (KINS)
34 Gwahak-ro (Kusong-dong), Yusong-gu,
Daejeon, 305-338, Republic of Korea
Tel: +82-42-868-0000
Fax: +82-42-861-1700
http://www.kins.re.kr

Korea Cancer Centre Hospital (KCCH)
75 Nowon-gil (Gongneung-dong), Nowon-gu
Seoul, 139-706, Republic of Korea
Tel: +82-2-970-2114
Fax: +82-2-978-2005
http://www.kcch.re.kr

Korea Radioisotope Association (KRIA)
14-5, Gaepo-dong, Gangnam-gu,
Seoul, 135-988, Republic of Korea
Tel: +82-2-3490-7111
Fax: +82-2-445-1014
http://www.ri.or.kr

Korea Electric Power Corporation (KEPCO)
411 Yeongdong-daero (Samseong-dong),
Gangnam-gu, Seoul, 135-791, Republic of Korea
Tel: +82-2-3456-3114
Fax: +82-2-3456-3203
http://www.kepco.co.kr

Korea Hydro & Nuclear Power Co., LTD (KHNP)
411 Yeongdong-daero (Samseong-dong),
Gangnam-gu, Seoul, 135-791, Republic of Korea
Tel: +82-2-3456-2114
Fax: +82-2-3456-2359
http://www.khnp.co.kr

Doosan Heavy Industries and Construction Co. 555, Guygok-dong, Changwon-si, Kyungnam, 641-792, Republic of Korea	Tel: +82-55-278-6114 Fax: +82-55-264-5551 http://www.doosanheavy.com
KOPEC Engineering Construction Co., Inc. (KEPCO E&C) 2354 Yongu-daero, Giheung-gu, Yongin-si, Geonggi-do, 446-713, Republic of Korea	Tel: +82-31-289-3114 Fax: +82-31-283-6215 http://www.kepco-enc.com
KEPCO Nuclear Fuel Co., Ltd. (KEPCO NF) 1047 Daeduk-daero (Deokjin-dong), Yuseong-gu, Daejeon, 305-353, Republic of Korea	Tel: +82-42-868-1000 Fax: +82-42-868-1219 http://www.knfc.co.kr
KEPCO Plant Services and Engineering Co., Ltd. (KEPCO KPS) 1 Migum-ro, Bundang-gu, Seongnam-si, Geonggi-do, 463-726, Republic of Korea	Tel: +82-31-710-4114 Fax: +82-31-710-4115 http://www.kps.co.kr

Energy Research Institutes

Korea Basic Science Institute (KBSI)	http://www.kbsi.re.kr
Korea Institute of Energy Research (KIER)	http://www.kier.re.kr
Korea Advanced Institute of Science and Technology (KAIST)	http://www.kaist.ac.kr
Pohang University of Science and Technology	http://www.postech.ac.kr/e
Pohang Accelerator Laboratory (PAL)	http://pal.postech.ac.kr

Other Organizations

Korean Nuclear Society	http://www.nuclear.or.kr
Korea Nuclear Energy Promotion Agency (KONEPA)	http://www.konepa.or.kr
Korea Atomic Industrial Forum	http://www.kaif.or.kr

Coordinator: **Sae-rog Hyun / KHNP / 07290365@khnp.co.kr**