

Overview of
New and Renewable Energy
in Korea 2013

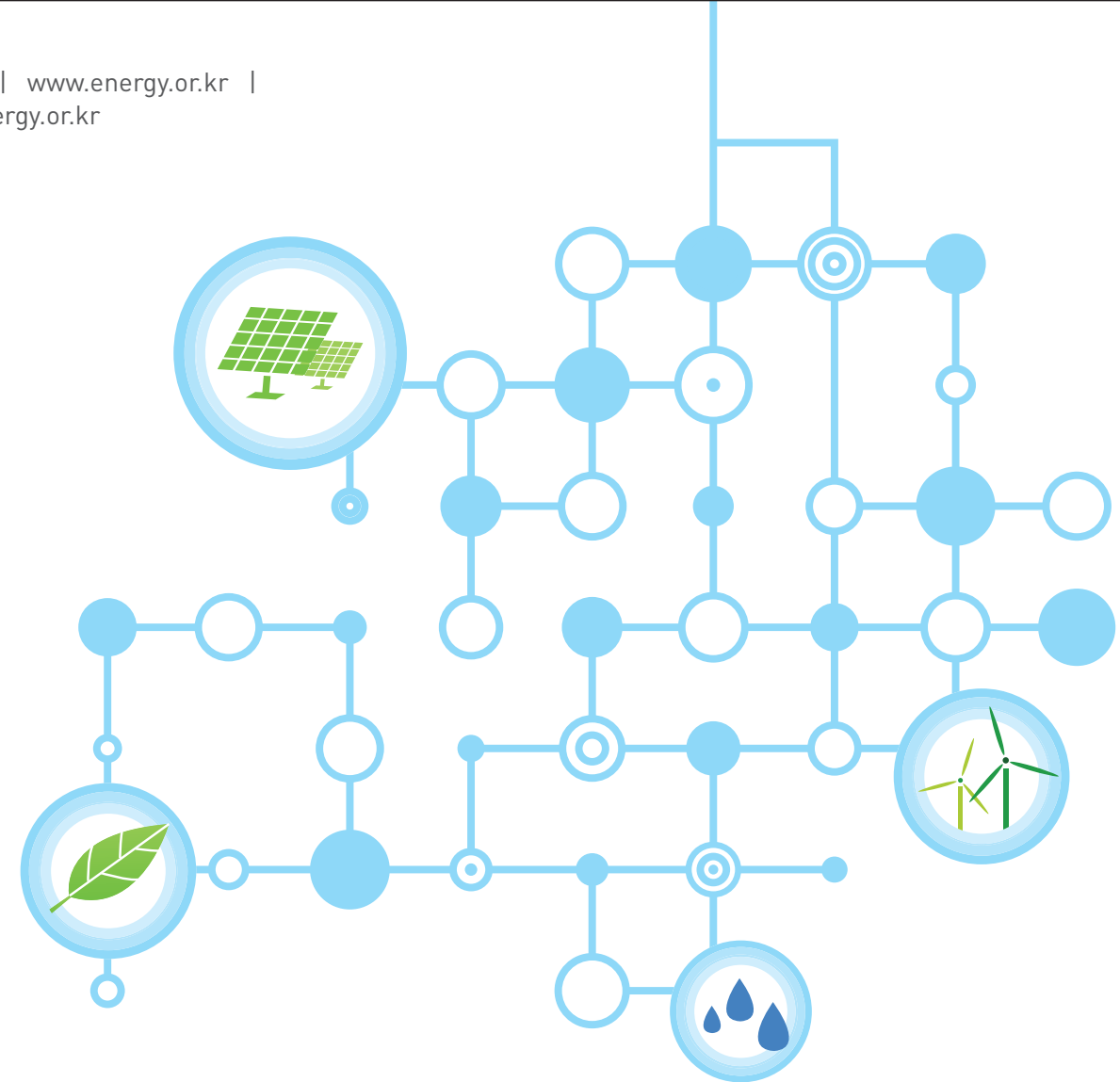


388, Poeun-Daero, Suji-Gu, Yongin-Si, Gyeonggi-Do, 448-994, Republic of Korea
Tel. +82-31-260-4816, 4818 | Fax. +82-31-260-4825 |
www.kemco.or.kr | www.energy.or.kr | www.renewableenergy.or.kr

Overview of New and Renewable Energy in Korea 2013

New & Renewable Energy Center, KEMCO

www.kemco.or.kr | www.energy.or.kr |
www.renewableenergy.or.kr



Overview of New and Renewable Energy in Korea 2013



KOREA ENERGY MANAGEMENT CORPORATION
NEW & RENEWABLE ENERGY CENTER



Korea Energy Management Corporation

Korea Energy Management Corporation(KEMCO) is a government agency responsible for the implementation of energy conservation policies and energy efficiency improvement measures as well as climate change mitigation activities.

Contents

I. OVERVIEW of KEMCO and NREC

1. KEMCO (Korea Energy Management Corporation)	04
2. NREC (New and Renewable Energy Center)	05

II. ENERGY REVIEW in KOREA

1. Energy imports & consumption	08
2. Status of NRE deployment	10
3. NRE industry analysis	12

III. PROGRAMS for NRE DEPLOYMENT

1. Infrastructure-building programs	22
1) Certificate of NRE system	22
2) COSD(Co-operating Organization for Standards Development)	24
3) New & Renewable Energy Test-bed	26
4) Overseas Business Supporting Program	27
5) International cooperation	28
6) Constructing support facilities in port for offshore wind	30

2. NRE deployment programs	31
1) Building subsidy program	31
2) Home subsidy program	32
3) Regional deployment subsidy program	33
4) Certification of Buildings Using New and Renewable Energy	34
5) Loans and tax incentive program	36
6) Feed-in-tariffs	37
7) Renewable portfolio agreement (RPA)	39
8) Renewable portfolio standard (RPS)	39
9) NRE mandatory use for public buildings	42
10) Renewable energy service companies	44
11) H-Town(Hydrogen) demonstration project	45

IV. PROSPECT for NRE in KOREA

(The 3rd basic plan for NRE technology development and deployment 2030)	48
---	----

A Message from the Director General



With rapidly changing global and domestic business environment such as the recent frequent fluctuation of petroleum prices and the costly measures for responding to UN framework convention on climate change, the importance of new and renewable energy(NRE) is becoming heightened.

New and renewable energy is not only important for tackling issues such as the exploitation of fossil and environmental deterioration, but also becoming an increasingly significant economic factor worldwide. Under such circumstances, advanced countries are making various efforts in undertaking aggressive R&D investments and deployment policies in this sector.

Despite the fact that Korea has started to focus on new and renewable energy industry later than other advanced countries, it is expected that the industry would be a national growth engine in the near future as the Korean government has made all-out efforts to support NRE technology development and deployment in order to build an industrial infrastructure.

New and Renewable Energy Center(NREC) performs various activities for its deployment such as performance evaluation & certification, Building, home, regional, deployment programs, RPS, NRE mandatory use for public buildings and test bed as well as for policy development including public relations & education and international cooperation.

As a dedicated organization for implementing the government policies, NREC is fully committed to enhance industrial competitiveness in new and renewable energy sector in the pursuit of accomplishing the national objective.

Thank you.

Director General **Ki-Woong NAM**



I. OVERVIEW of KEMCO and NREC

1. KEMCO (Korea Energy Management Corporation)
2. NREC (New and Renewable Energy Center)

I. OVERVIEW of KEMCO and NREC

1. KEMCO (Korea Energy Management Corporation)

Korea Energy Management Corporation (KEMCO) is a government agency responsible for the implementation of energy conservation policies and energy efficiency improvement measures as well as climate change mitigation activities. It was established in 1980 by the Ministry of Commerce, Industry and Energy under the “Rational Energy Utilization Act.” Its primary function is nationwide energy management by providing services that vary from technical and financial support to administrative services, thereby pursuing the ultimate goal of building an environment-friendly socio-economic structure.

Major activities of KEMCO

- Energy management in the sectors of energy-intensive industry and buildings through energy audits, inspections and follow-up measures
- Efficiency and safety management of industrial equipment, plus home and office appliances through efficiency standards setting and labeling program
- Demand-side management(DSM)
- Financial assistance toward energy conservation and efficiency improvement projects, and energy service companies (ESCOs)
- Climate change mitigation
- Public relations
- Education, training and publications
- Energy information service
- International cooperation



Organization : 4 HQs, 17 Departments, 1 Affiliated Body, 12 Regional HQs
(Staffs : 493 Persons)



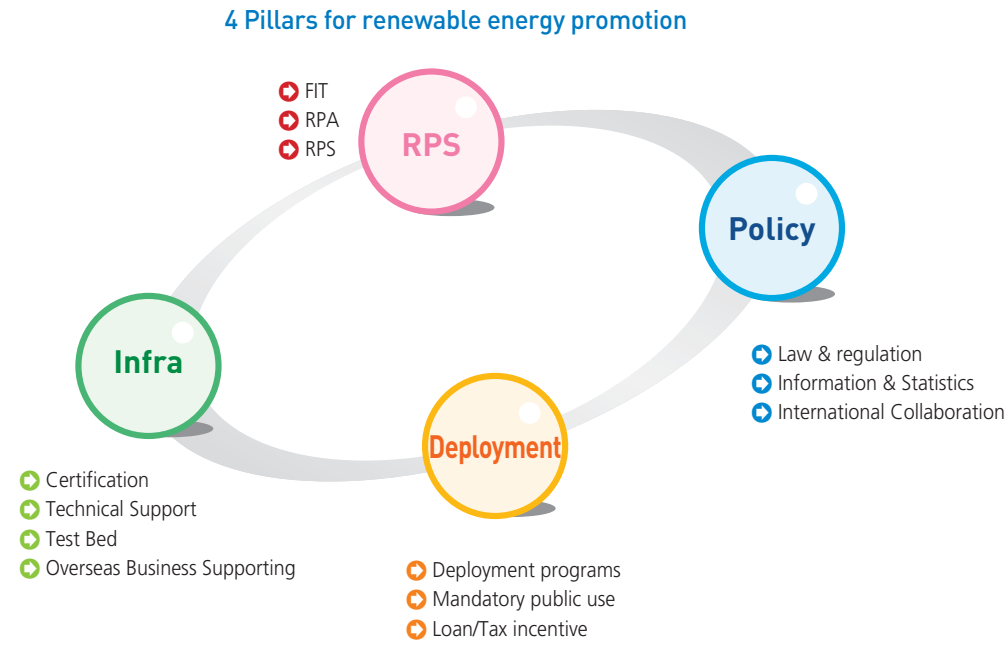
2. NREC (New and Renewable Energy Center)

New and Renewable Energy Center(NREC) was established as the affiliate of KEMCO to support and promote new and renewable energy. It has supported and has carried out government’s policies to promote NRE deployment. The 2030 target, providing 11% of NRE in our total primary energy supply(TPES), could be achieved through following activities.

Major Activities of NREC

- Technological demand survey
- Subsidy program to promote deployment
- Certification scheme for NRE systems
- Statistics
- International cooperation
- Renewable portfolio agreement(RPA)
- NRE mandatory use for public buildings

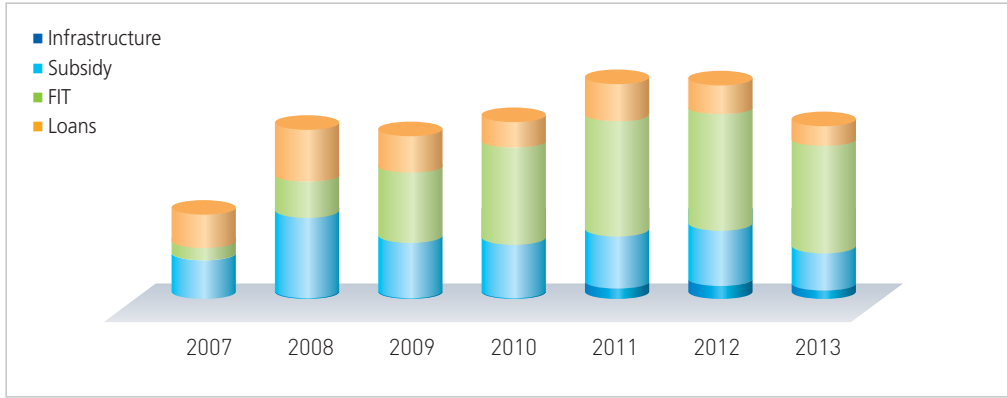
- Education, training and public relations
- Compilation, analysis, and provision of technological information
- Renewable Standard Portfolio(RPS)



Budget of NREC

(Unit : 100mil KRW)

	2007	2008	2009	2010	2011	2012	2013
Infrastructure	32	37	41	37	323	427	255
Subsidies program	1,417	2,687	1,851	1,802	1,790	1,890	1,320
FIT	270	1,267	2,392	3,318	3,950	3,950	3,460
Loans	1,213	1,803	1,303	913	1,118	893	792
Total	2,932	5,792	5,587	6,070	7,181	7,160	5,827



II. ENERGY REVIEW in KOREA

- Energy imports & consumption
- Status of NRE deployment
- NRE industry analysis

II. ENERGY REVIEW in KOREA

1. Energy imports & consumption

Because of rapid economic growth propelled by the heavy and chemical industries, Korea's energy consumption has increased sharply since the mid-1970s. Total primary energy consumption (TPES), which stood at 43.9 million tons of oil equivalent (toe) in 1980, increased more than six-fold to 275.7 million toe in 2011, ranking Korea as the 10th largest energy consuming nation in the world. Energy consumption per capita also increased rapidly from 1.1 toe in 1980 to 5.1 toe in 2011.

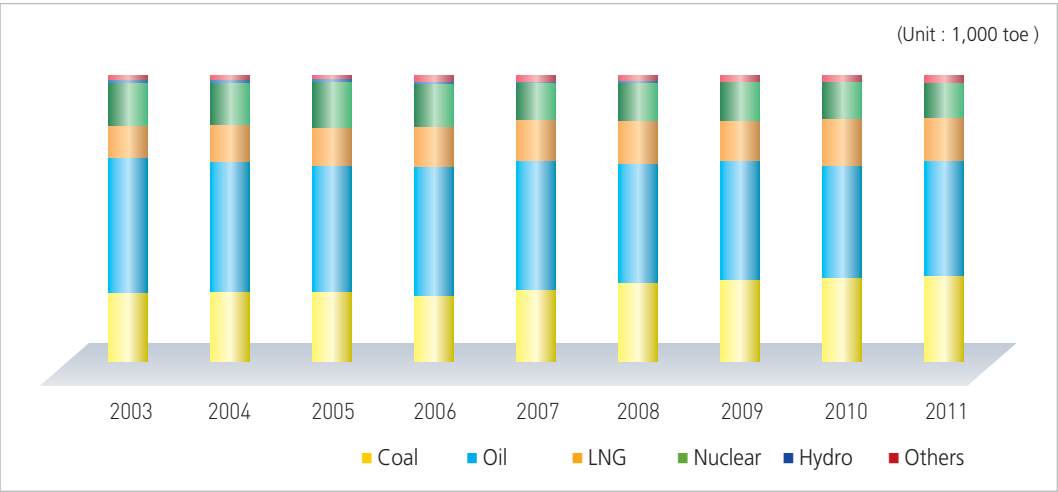
With poor indigenous energy resources, Korea has to rely almost entire energy demand on imports. In 2011, the dependency rate on imported energy, including nuclear energy, was 96.4 percent. The cost for imported energy amounted to US\$ 172.5 billion, which accounted for 32.9 percent of total inbound shipments. Korea energy resources are limited to low-quality anthracite, which accounted for less than 1 percent of total primary energy supply.

Demand for oil has been growing since 1970s, except after the two oil crises of 1973 and 1979. Coal supply has increased in an annual average rate of 5.2% for the past thirty years, but the main use of domestic anthracite has been shifted dramatically from residential sector to power generation sector. Gas was introduced in 1986 in the form of LNG imports and accounted for 17% of the primary energy consumption.



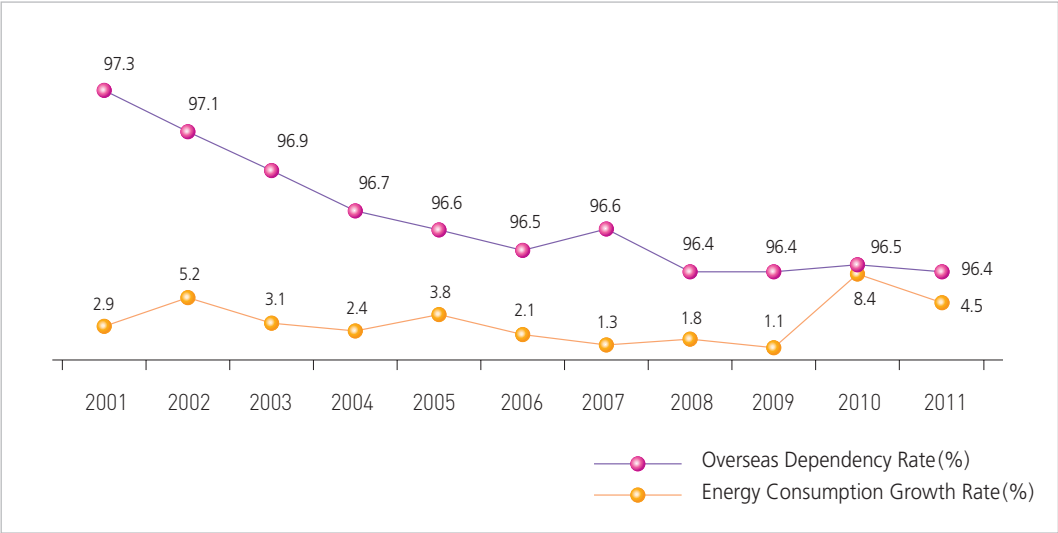
The status of energy consumption

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Portion[%] *by 2011
Coal	51,116	53,128	54,788	56,687	59,653	66,060	68,604	77,092	83,640	30.3
Oil	102,379	100,638	101,526	101,831	105,495	100,170	102,336	104,301	105,146	38.2
LNG	24,194	28,351	30,355	32,004	34,663	35,671	33,908	43,008	46,284	16.8
Nuclear	32,415	32,679	36,695	37,187	30,731	32,456	31,771	31,948	32,285	11.7
Hydro	1,722	1,465	1,297	1,305	1,084	1,196	1,213	1,392	1,715	0.6
Others	3,241	3,977	3,961	4,358	4,828	5,198	5,480	6,064	6,618	2.4
Total	215,067	220,238	228,622	233,372	236,454	240,752	243,311	263,805	275,688	100



Energy conservation and efficiency policies aim at all components ranging from primary energy production to end-use. In public procurement, the government gives preference to commodities produced using clean technology. Despite nationwide efforts by the government to encourage energy conservation and higher energy efficiency, increasing demand of energy is highly expected to persist in the future due to the rapid economic growth.

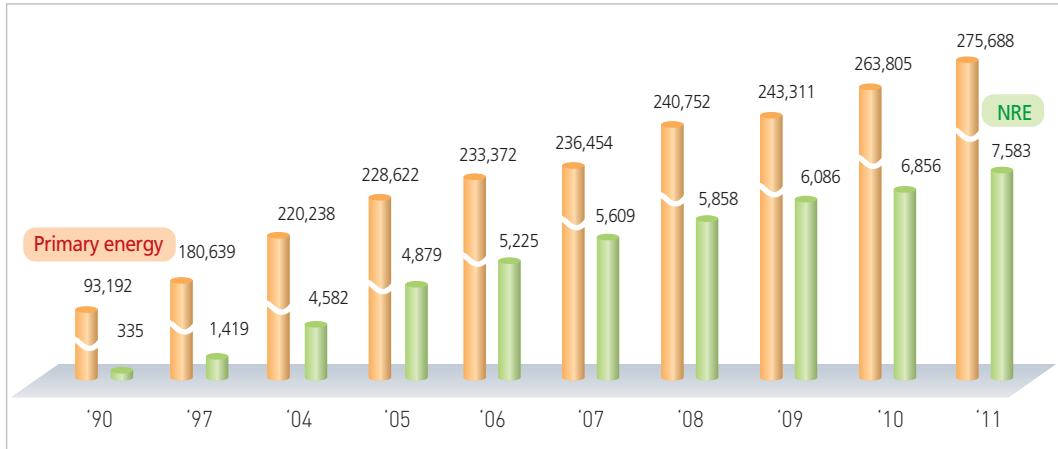
Energy consumption growth and overseas dependency rate



2. Status of NRE deployment

As of the end of 2011, NRE supply totals 7,583 thousand toe, which comprises 2.75 percent of the total primary energy consumption, 275,688 thousand toe.

NRE share in TPES

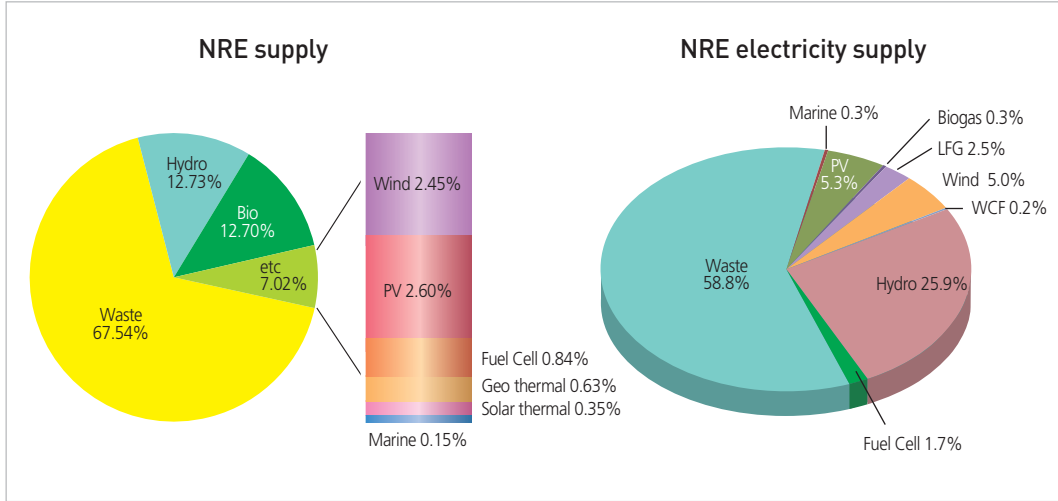


(unit ; 1,000 toe)

	'90	'97	'04	'05	'06	'07	'08	'09	'10	11
Primary energy	93,192	180,639	220,236	228,622	233,372	236,454	240,752	243,311	263,805	275,688
NRE	335.3	1,419.0	4,582.4	4,879.2	5,225	5,609	5,858	6,086	6,856	7,583
(%)	0.40	0.79	2.08	2.13	2.24	2.37	2.43	2.50	2.60	2.75

in 1,000 toe, including macro-hydro power from '03

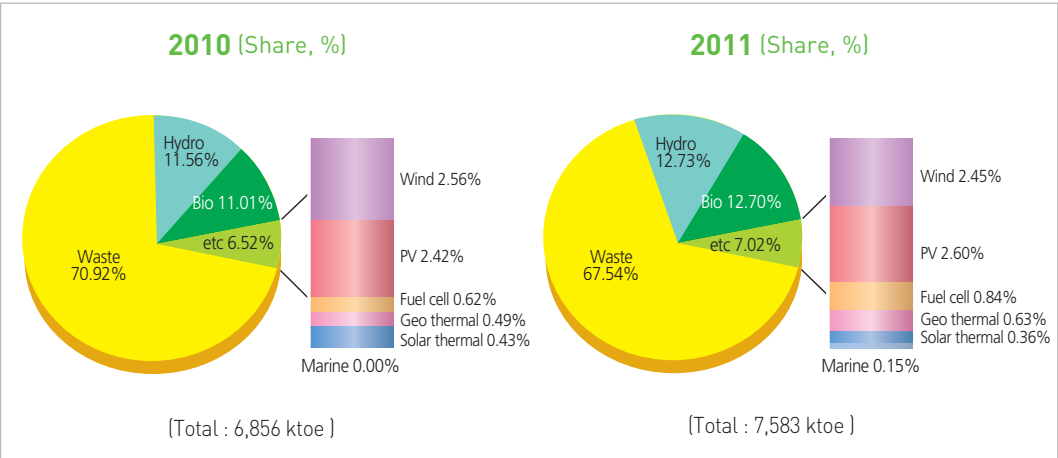
Of the total supply of NRE, waste energy contributed the largest proportion with 67.54 percent, following by hydro power with 12.73 percent, and other types of energy such as photovoltaic (PV) with 19.73 percent.



NRE power generation has increased rapidly in particular, PV and Wind area, thanks to the introduction of the FIT and RPS systems. In terms of PV, power generation has increased nearly 30 times to 917,198MWh in 2011 from 31,022MWh in 2006; and Wind increased to 862,884MWh from 238,911MWh. Fuel cells appeared as an electricity source in 2006 and as of 2010, their output was almost 44 times higher, marking 294,621MWh. NRE generation accounted for 17,345GWh (1.24%) of total 501,527,009GWh of electricity generated in 2011. (Waste power generation accounted for 58.8%)



The status of deployment by sources



(Unit : 1,000 toe)

	Source	Solar thermal	PV	Bio	Waste energy	Hydro	Wind	Geo thermal	Fuel cell	Marine	Total
'10	Supply	29	166	755	4,862	792	176	33	42	0.2	6,856
	Share(%)	0.4	2.4	11.0	70.9	11.6	2.6	0.5	0.6	0.0	100
'11	Supply	27	197	963	5,122	965	186	48	63	11	7,583
	Share(%)	0.4	2.6	12.7	67.5	12.7	2.4	0.6	0.8	0.1	100
Fluctuation	Supply	△2	31	209	259	173	10	14	21	11	727
	Increasing rate(%)	△6.2	18.7	27.7	5.3	21.8	5.6	43.0	49.6	4,943.0	10.6

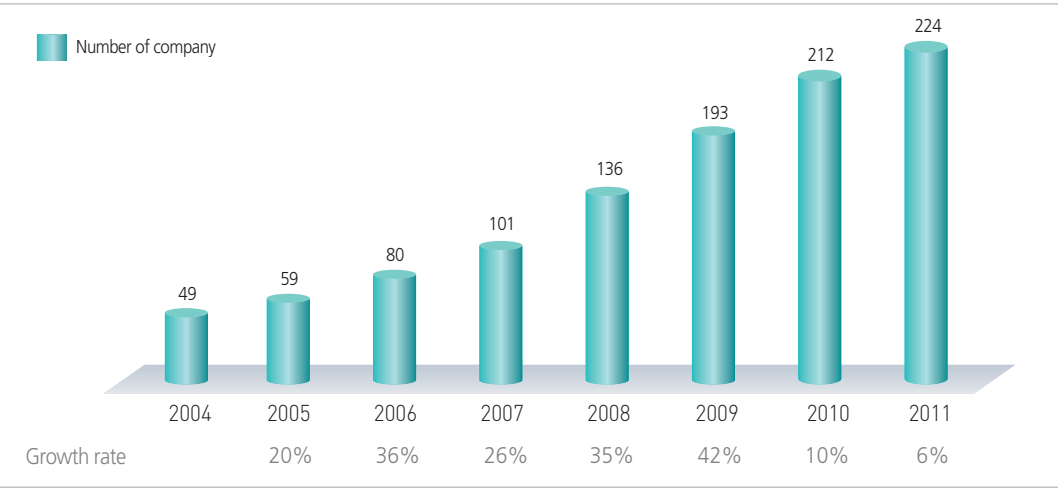
When you see the estimate for future NRE deployment from the 3rd national NRE basic plan, waste and hydro are to turn downward while the increase rates of marine energy, geothermal, solar thermal and wind energy are projected to be high, A share of bio-energy will grow to 31.4% and take the second position just behind waste energy.

3. NRE industry analysis

1) The status of companies

The number of manufacturing companies in the NRE industries has increased from 41 (as of 2004) to 224 (as of 2011). It is an increase of 457% and the annual growth rate is 25%.

Number of companies in the NRE industries



The number of companies by resources as of 2011 is: 98 PV companies (44%), 48 bio companies (21%) and 38 wind companies (17%).

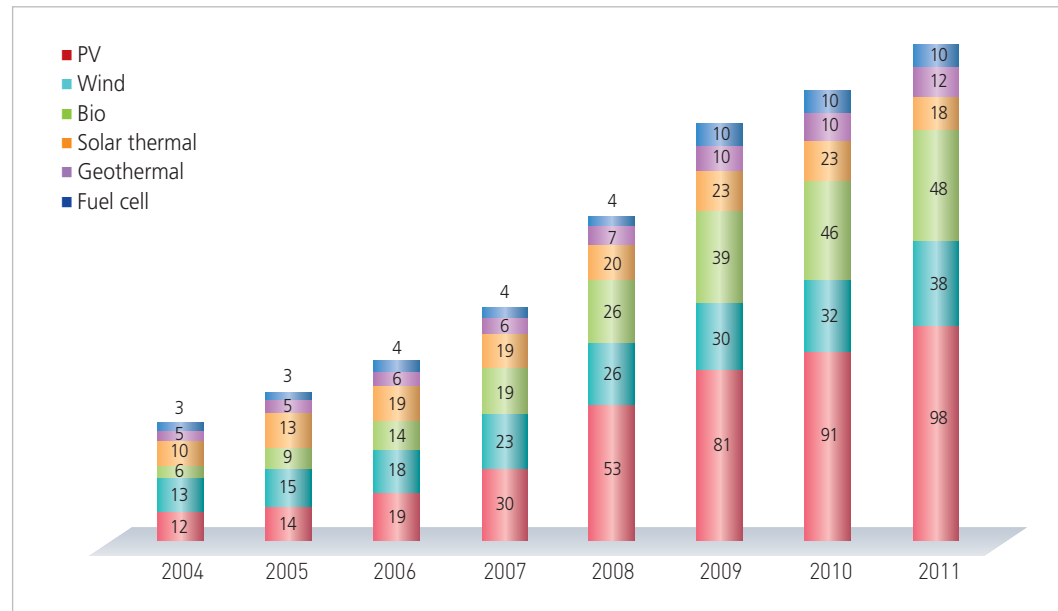
As recently the global semiconductor and display industries are sluggish and the shipbuilding industry is in recession, relevant companies have difficulties in penetrating into PV & Wind industries.

The number of manufacturers in PV industry has been increased from 12 (as of 2004) to 98 (as of 2011). It is an increase of 8.2 times In addition to establishing the value-chain such as ingots, wafers, cells, modules, the number of companies that produces PV equipments, components and materials has relatively and largely increased.

The number of manufacturers in the wind power industry has increased from 13 (as of 2004) to 38 (as of 2011). It is an increase of 2.9 times. Large companies in the shipbuilding and heavy machinery industries have also actively participated in the wind power industry by 2011.

The number of bio energy manufacturers has increased from 6 (as of 2004) to 48 (as of 2011). It is an increase of 8 times.

The number of companies by NRE resources

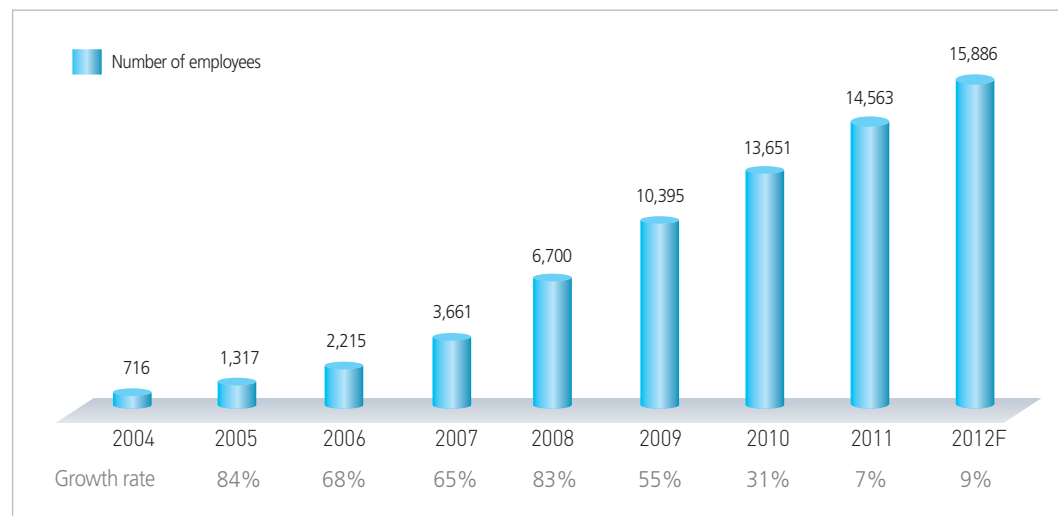


2) Employment

The number of employees in the NRE industries has increased from 716 (as of 2004) to 14,563 (as of 2011). It is an increase of 20.4 times and the annual growth rate is 54%.

The number of employees as of 2012 is estimated 15,886. It is an increase of 9% compared with the previous year.

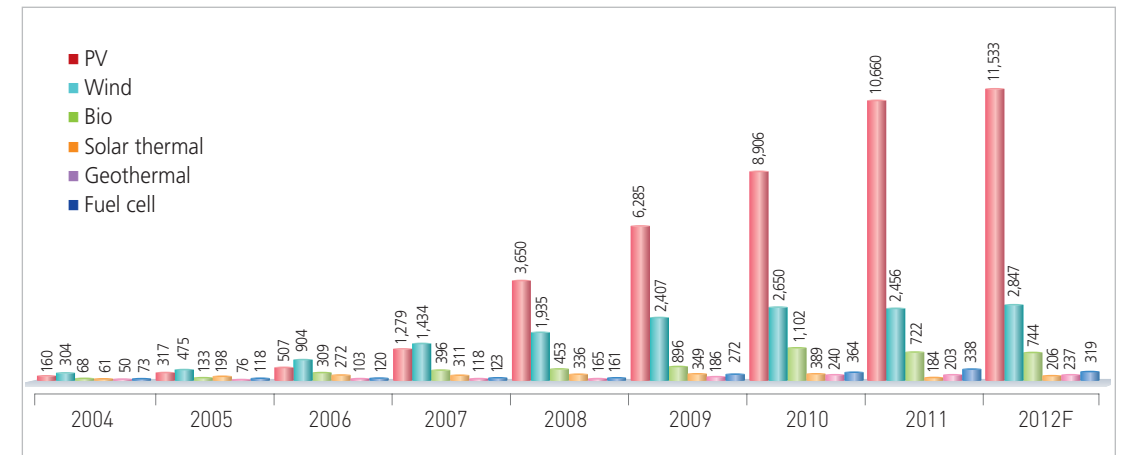
Employment in the NRE industries and prospects



With regard to the number of employees by resources as of 2011, the number of employees in PV and wind power industries is 10,660 that accounts for 73% of the entire employment.

As PV and wind power industries are expected to become a core growth engine for the future, the employment effect will also be significant.

The number of employees by NRE resources



In PV industry, the employment effect was remarkable thanks to the increase of value-chain companies' production capacity.

● Employment in PV industry (persons) : 160 ('04) → 317 ('05) → 507 ('06) → 1,279 ('07) → 3,650 ('08) → 6,285 ('09) → 8,906 ('10) → 10,660 ('11) → 11,533 ('12, estimated)

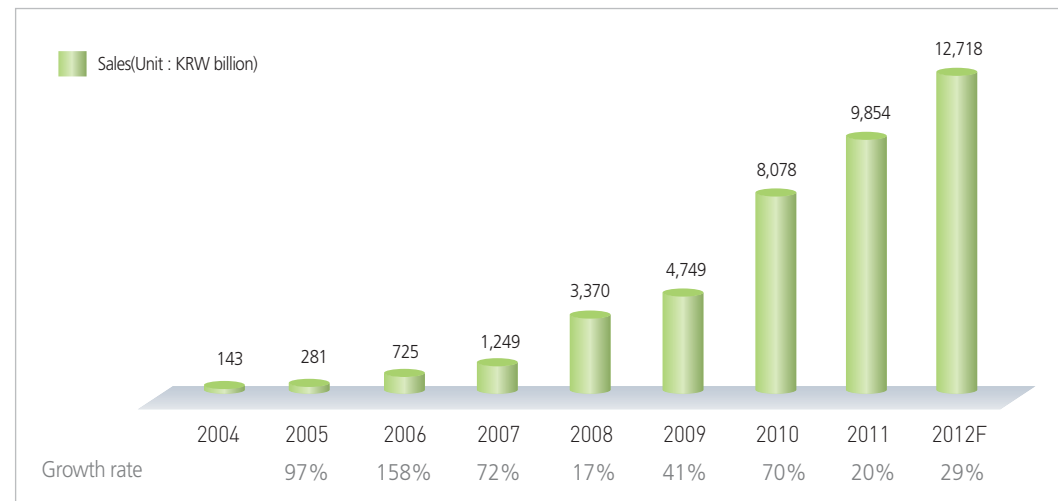
In wind industry, the wrought iron component companies highly contributed to the increase of employment rate until 2008. However, due to oversupplying capacity of existed wind facilities with giga scale, the number of employment of wind industry has been decreased. However, positive expectation of market growth for North America and emerging markets from other regions, Korean government expects domestic wind market employment would increase in 2013.

● Employment in wind industry (persons) : 304 ('04) → 475 ('05) → 904 ('06) → 1,434 ('07) → 1,935 ('08) → 2,407 ('09) → 2,650 ('10) → 2,456 ('11) → 2,847 ('12, estimated)

3) Sales

The sales of the NRE industries have increased from 143 billion KRW (as of 2004) to 9 trillion 854 billion KRW (as of 2011). It is an increase of 68.9 times and the annual growth rate is 83%.

Sales of the NRE industries and prospects



With regard to the sales by resources, wind industry accounted for more than 50% of the entire sales until 2007, but PV industry took away the initiative by 2008.

The sales of PV industry have increased from 33 billion KRW (as of 2004) to 7 trillion 917 billion KRW (as of 2011). It is an increase of 240 times. The sales in 2011 is expected to be 9 trillion 803 billion KRW, increasing by 24% compared to the previous year.

Development of the sales of PV industry (billion KRW) : 33 ('04) → 66 ('05) → 166 ('06) → 441 ('07) → 1,601 ('08) → 2,719 ('09) → 5,859 ('10) → 7,917 ('11) → 9,803 ('12, estimated)

In 2011, the sales of wind industry decreased by 7.3% compared to the previous year due to the decrease of wrought iron component companies' sales influenced by the world economic recession.

As all shipbuilding companies entered into wind industry in 2010, however, the sales in 2012 is expected to be 1,758 billion KRW, increasing by 74% compared to the previous year.

Development of the sales of the wind power industry (billion KRW) : 101 ('04) → 195 ('05) → 462 ('06) → 619 ('07) → 1,357 ('08) → 1,184 ('09) → 1,168 ('10) → 1,008 ('11) → 1,758 ('12, estimated)

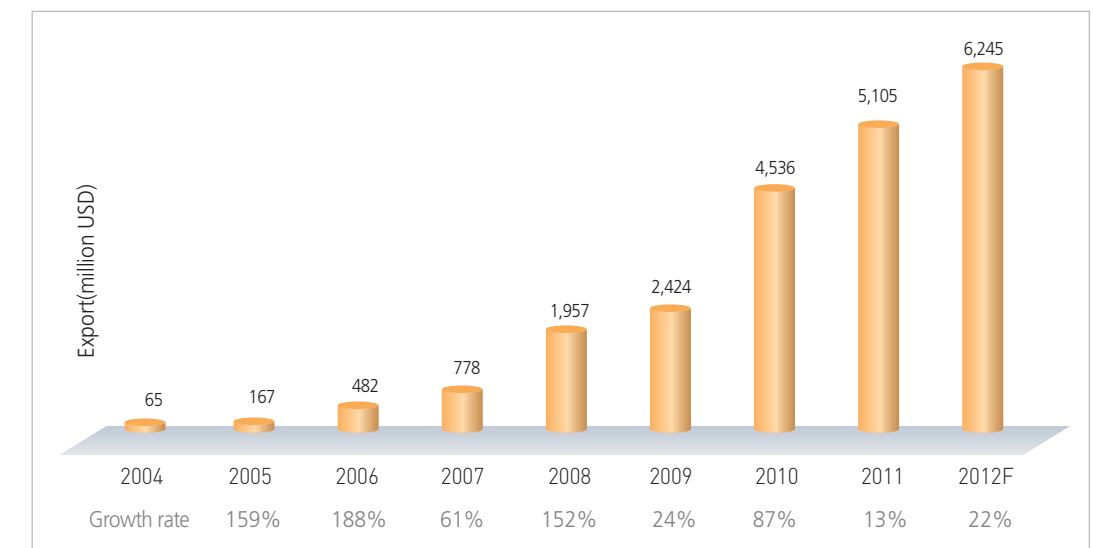
The sales of PV and wind industries take 90% of the total sales of NRE industry. Considering the growth potential in the world market, PV and wind industries are the most remarkable as new growth engines among all renewables.

4) Export

The export sales in NRE industry have increased from 65 million USD (as of 2004) to 5.1 billion USD (as of 2011). It is an increase of 79.5 times.

As the global companies in Korea have completed to enter the industry and overseas expansion is being accelerated, the export sales in 2012 are expected to be 6.2 billion, increasing 22% compared to the previous year.

Export sales of the NRE industries



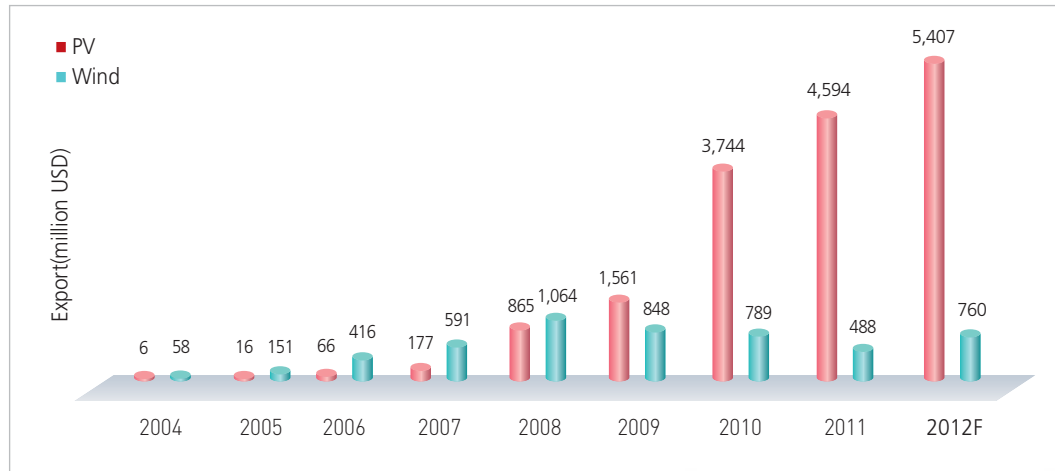
In the total export as of 2011, PV accounts for 90% (4.6 billion USD) and wind 9.6% (488 million USD). PV and wind industries take 99.6% of the total export.

The export in PV industry has been remarkably increasing since 2008 when industries by value-chains were established, which exceeded wind industry in 2009.

In wind industry, components such as towers and wrought iron components accounted for 100% of the export until 2008. However, domestic system manufacturers have also put effort to penetrate into the export market since 2009. However, it is expected that world's wind energy market would be recovered, we are expecting export would be increased 56% compared to 2011 as 760 million USD with main components export in 2012.

Exports in the wind industry (million USD) : 591 (~ '07) → 1,064 ('08) → 848 ('09)
→ 789 ('10) → 488 ('11) → 760 ('12, estimated)

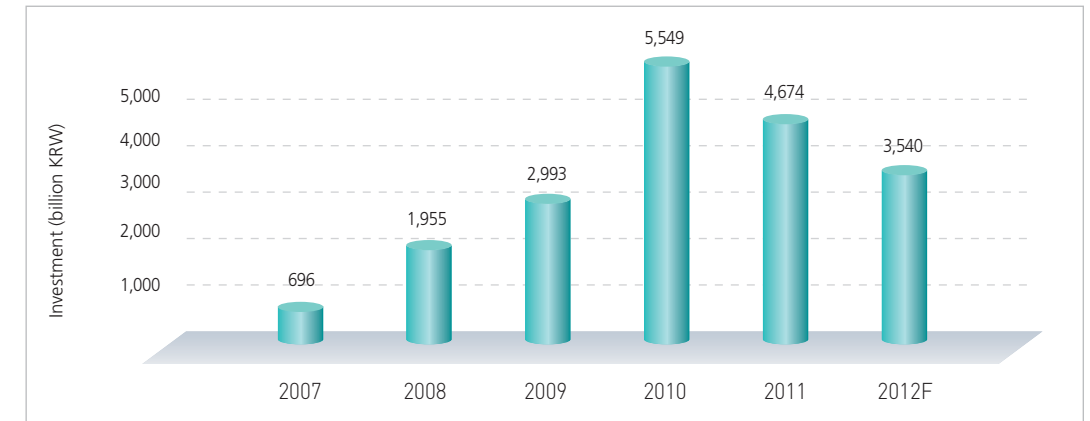
Exports in PV and wind power industries



5) Investment

The investment for the development of NRE technologies and plant expansion by private companies have increased from 696 billion KRW (as of 2007) to 4 trillion 674 billion KRW (as of 2011). It has increased by 6.7 times for 5 years.

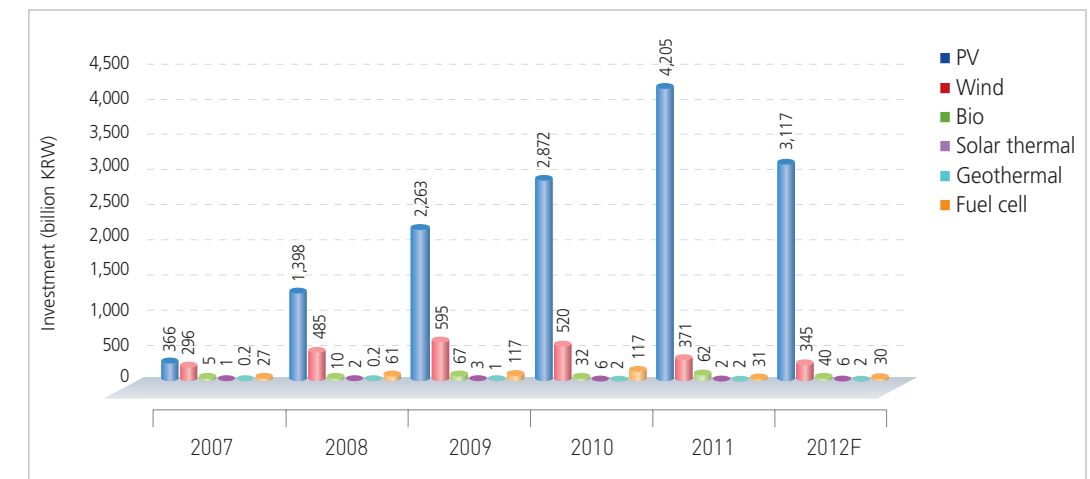
Investment in the NRE industries



With regard to the investment by resources, the investment in PV industry accounts for more than 90% of the total investment.

Influenced by depressed world's wind market and domestic market size, the investment in the wind power industry is expected to be 345 billion KRW in 2012, decreasing by 7% compared to the previous year.

Investment and prospects by resources





III. PROGRAMS for NRE DEPLOYMENT

1. Infrastructure-building programs
2. NRE deployment programs

III. PROGRAMS for NRE DEPLOYMENT

1. Infrastructure-building programs

1) Certificate of NRE system

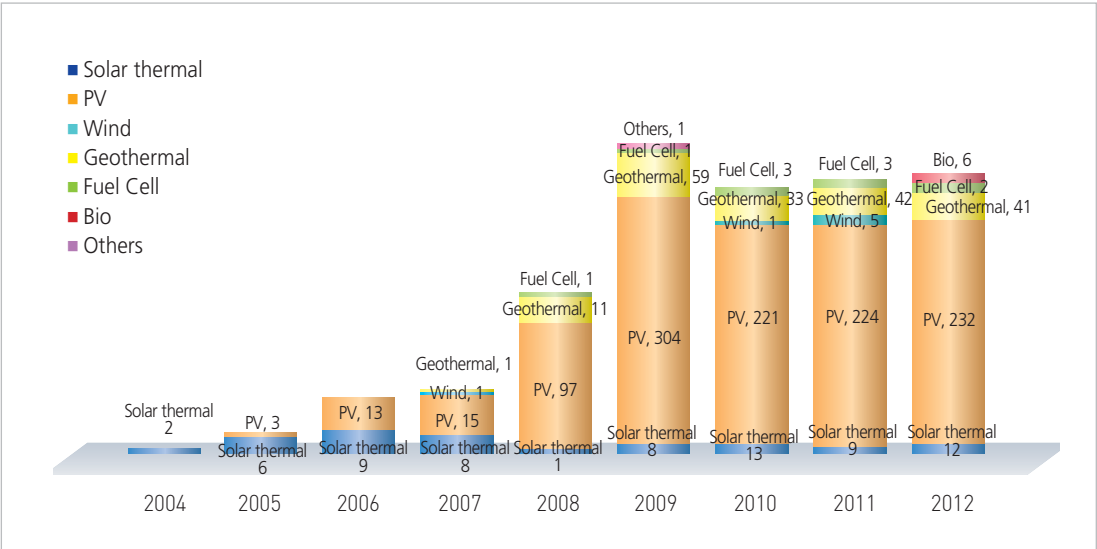
The certification scheme for NRE systems has been designed to guarantee the quality of systems manufactured or imported and enhance the reliability for users, thereby expanding the deployment of NRE systems and helping create the foundation for growth. It focuses on promoting the commercialization of technologies that have already been developed and establishing the infrastructure for further deployment through performance evaluation and standardization.

26 items in six areas including solar thermal, solar PV, wind power, geothermal bio and fuel cell are currently applied to the certification scheme. Some 293 models had received certificate by the end of 2012. (Total: 968)

Certification by energy source				
Energy Source	System		Certification	Institute ¹⁾
Solar -Thermal	• Flat-plate collectors		20	KIER, KTL
	• Evacuated-tube collectors		32	KIER, KTL
	• Fixed-concentrating collectors		-	KIER, KTL
	• Natural circulating water heater (below 600L)		6	KIER, KTL, KITECH
	• Forced circulating water heater (below 600L)		1	KIER, KTL, KITECH
	• Evacuated-tube integrated water heater (below 600L)		-	KIER, KTL, KITECH
Solar-PV	• Grid-tied Inverter (less than 10kW)		44	KIER, KTL, KTC
	• Stand-alone Inverter (less than 10kW)		-	KIER, KTL, KTC
	• Grid-tied Inverter (over 10kW less than 250kW)		-	-
	• Stand-alone Inverter (over 10kW less than 250kW)		-	-
	• Crystalline photovoltaic module		663	KIER, KTL
	• Thin film photovoltaic module		15	KTL
	• Solar cell		-	-
	• Solar collector		-	-
	• DC combiner box		-	-
Wind	• Small scale wind-turbine generating system (less than 30kW)		7	KIER, KNU
	• Large scale wind-turbine generating system (over 30kW less than 750kW)		-	KRISS, KEPRI, KIER, KRS
	• Inverter for Small scale wind-turbine generating system (less than 10kW)		-	KTL
Geothermal	• Water-Water Heat Pump Unit (less than 280kW)		152	KRAAC
	• Water-Air Heat Pump Unit (less than 105kW)		6	KRAAC
	• Water-Air Multi Heat Pump Unit (less than 105kW)		7	KRAAC
Bio	• Wood-pellet water heat boiler (less than 58.14kw)		6	KIER, KTL, KEAA
Fuel Cell	• PE fuel cell system (less than 5kW)	Grid-tied	8	KIER
		Stand-alone	-	
etc	• Battery (less than 4,000A)	lead	-	KERI
		NiCd	1	
	• Charge controller (less than 5kW)		-	-
	• Monitoring unit		-	-
Total			968	

1) KIER (Korea Institute of the Energy Research), KTL (Korea Testing Laboratory), KITECH (Korea Institute of industrial Technology), KERI (Korea Electrotechnology Research Institute), KRAAC (Korea Refrigeration & Air-Conditioning Assessment Center), KNU (Kangwon National Univ), KETI (Korea Electronic Testing Institute), KRISS (Korea Research Institute of Standards and Science), KEPRI (Korea Electric Power Research Institute), KRS (Korean Register of shipping), KEAA (Korea Energy Appliance Industry Association)

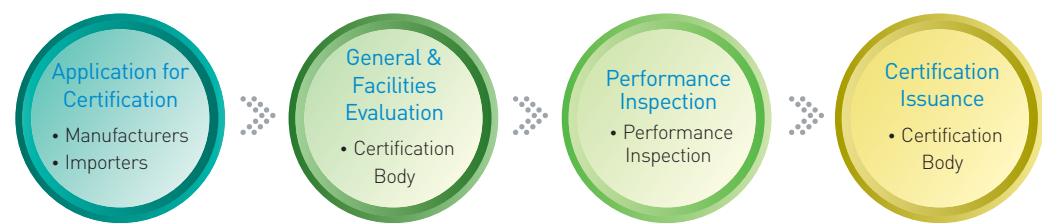
No. of certification by energy source



The certifying body is the New and Renewable Energy Center. Certification procedures are the General Evaluation(factory auditing) and Facilities Evaluation(the performance inspection).

- For certification,
- Manufacturers or importers apply for the certification with required documents.
 - During the General Evaluation, the manufacturer or importer’s quality assurance program, and ex post facto management of NRE systems are closely examined by documents review and factory auditing. While factory auditing, the NRE systems for performance test are randomly sampled by auditor.
 - During Facilities Evaluation, the designated performance test body inspects the performance of systems in according to the criteria. Performance, the durability and safety of systems are evaluated.
 - A certification is issued when test results meet the specified criteria.

Certification procedure of NRE facilities



NREC(the New and Renewable Energy Center) is accredited product certification body by KAS(Korea Accreditation System) in 2007 and as NCB(National Certifying Body) by IECEE (Worldwide System for Conformity Testing and Certification Electrotechnical Equipment and Components) regarding to photovoltaic part in 2008. For the standardization of the NRE systems, NREC is designated as COSD(Co-operating Organization for Standards Development) by KATS(Korea Agency for Technology and Standards) in 2009

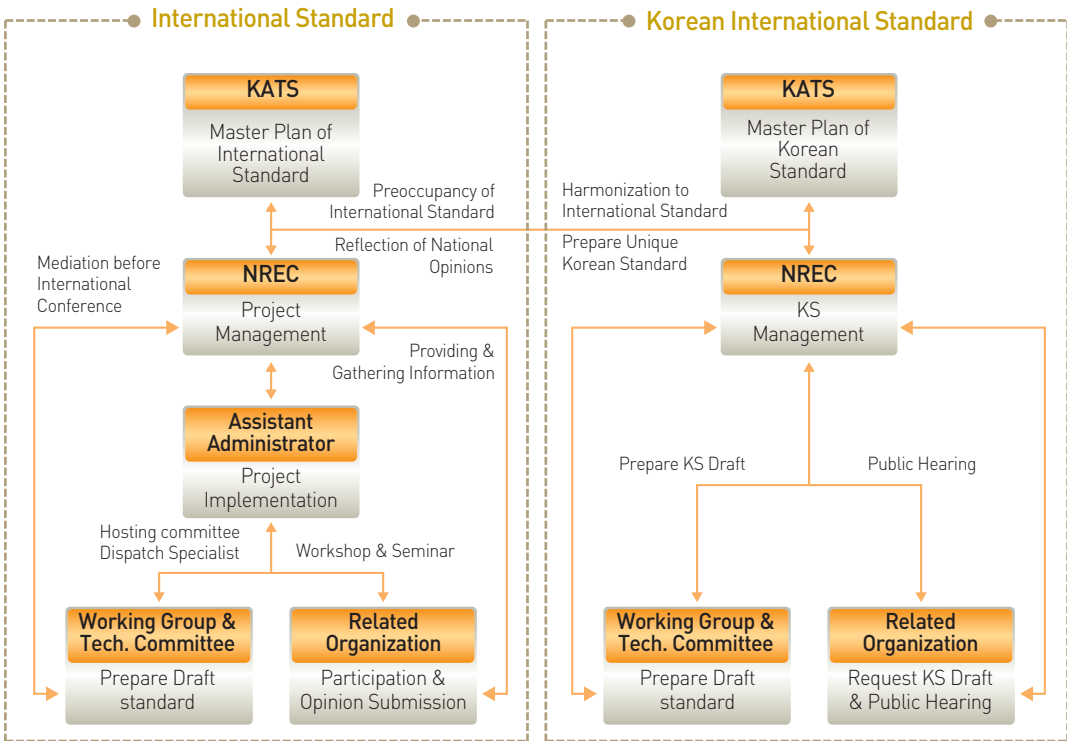
2) COSD(Co-operating Organization for Standards Development)

For the standardization of the NRE systems, NREC is managing KS(Korean Industrial Standard) and coping with IEC(International Electro-technical Commission)/ ISO(International Standardization Organization) standard.

To legislate and revise KS, NREC is designated as COSD(Co-operating Organization for Standars Development) by KATS(Korea Agency for Technology and Standards) in 2009 for Solar thermal, Photovoltaic area. In 2011, Wind Power and Fuel Cell have added.

NREC has organized working group(WG) and technical committee(TC) of members are specialist in the area from manufacturers, testing bodies and universities. By the WG and TC, drafts of KS are made. After the public hearing, final draft are sent to KATS. When KATS approves final draft through deliberation committee.

Also NREC is coping with International Standard Organization like IEC & ISO in New & Renewable energy. There 3 assistant Administrators in Photovoltaic, Wind power and Fuel-cell to help NREC. NREC gathers opinions from related organization like manufacturers, testing bodies and universities and send the specialist to the international conference to reflect the opinions of Korea to the international standard. NREC provides the result of the conference to the public by the assistant Administrators.



Korean Standards in control by NREC

	For Test	For Information	For Production	Total
Fuel-Cell	1	2	1	4
Photovoltaic	24	32	3	59
Solar-thermal	10	11	3	24
Wind	6	4	-	10
Total	41	49	7	97



3) New and Renewable Energy Test-bed

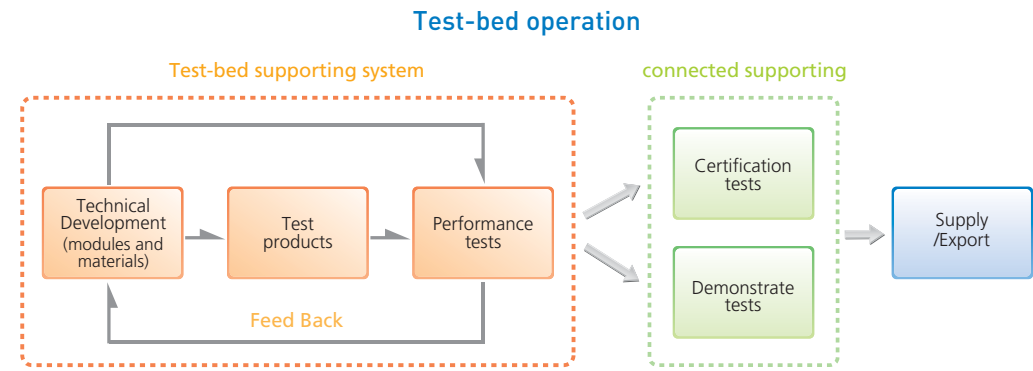
Developing the public infrastructure, including the equipment for testing and analyzing performance of (especially small and medium-sized) companies specialized in solar energy, wind energy, fuel cell, and so forth, at major points in Korea so as to encourage the commercialization and exports of related technologies and products.

Background

- As new and renewable energy represents a relatively fresh, emerging field of industry, there has not been enough developed basis yet for testing and demonstrating the products and technology developed by small and medium-sized companies.
- The project seeks to aid new companies struggling to commercialize their products due to the lack of test beds that is necessary for the production of the products (parts / materials) they have developed.
- To secure an advantageous position for these Korean companies in the rapidly expanding international market, it is mandatory to develop a systematic environment for testing.
- Solar energy: Testing, analyzing, and demonstrating the final products (modules and materials) in terms of quality, efficiency, durability, etc.
- Wind energy: Testing the newly developed parts for performance and establishing track records of power generation systems.
- Fuel cell: Testing, analyzing, and evaluating over 2,000 newly developed parts and materials.

Overview

- Project duration: 3 years (2011 ~ 2013).
- Government expenditure: 48 billion KRW.
- Supporting the development of facilities and equipment for testing, analyzing, evaluating the performance, demonstrating the quality, and verifying the reliability of the new products and technology for each type of new & renewable energy.



* Final products in terms of reliability and efficiency test

Regional Promoters for Test Bed Development

Area	Region	Promoters [8]
Solar energy	Chungcheong	Chungbuk Techno Park
	Daegu-Gyeongbuk	Gumi Electronics Research Institute
	Honam	University-Industry Collaboration Center at Chonbuk University (main), Honam Regional HQ of KITECH (co-promoter)
Wind energy	Southeast	Gyeongnam Techno Park (main), Southeastern HQ of KITECH (co-promoter)
	Honam	Jeonnam Techno Park
Fuel cell	Daegu-Gyeongbuk	University-Industry Collaboration Center at POSTECH

Future Plan

- [1-step] As of till the end of 2013, construction of the equipments and infrastructure of the 6 test-beds.
- [2-step] Development of the cluster linking industries and academies with 6 test-beds as center of diffusion.

4) Overseas Business Supporting Program

Overview

- By promoting and supporting Korean new and renewable energy companies to expand their markets abroad for taking the initiative in the rapidly growing international energy market.
- KEMCO provides a comprehensive range of support system from acquiring required certificates to financial consulting.
 - Assistance in acquiring international certificates : UL(US), TUV(Germany), VDE(Germany) etc.
 - Support for participating in overseas exhibitions, road shows and forums.
 - Support for hosting the international exhibition, 'Renewable Energy Korea'
 - Conducting the feasibility studies of promising projects and operating an export consulting center



Renewable Energy Korea

5) International cooperation

□ International cooperation in New and Renewable Energy
New and Renewable Energy has been currently considered as an effective mean for climate protection as well as major driving force for sustainable economic growth. Recognizing such significance, the Korean government has been involving in a variety of international cooperation activities with international organizations and various overseas counterparts.

▣ Multilateral cooperation

NREC has actively taken part in international community’s effort to expand new and renewable energy use worldwide. NREC has carried out related activities with international organizations as follows:

- **IEA/REWP** : International Energy Agency/Renewable Energy Working Group
 - SolarPACES, PVPS, Bioenergy, HIA, Wind, Geo-thermal
 - * Korea Institute of Geoscience and Mineral Resources(KIGAM) has been participating in Geo-thermal IA as an alternative member of Korea.
- **IRENA** : International Renewable Energy Agency
- **IPHE** : International Partnership for Hydrogen and Fuel Cells in the Economy
- **APEC EGNRET** : Asia-Pacific Economic Cooperation/Expert Group on New and Renewable Energy Technology

With IEA, Korea has joined 6 implementing agreements-Geothermal, Hydrogen, PVPS, Wind, Bioenergy and SolarPACES which are being operated under REWP. And also Korea has been actively participating in PVPS Task 1 & 8, Wind Task 11 & 27 & 30, Bioenergy Task 37 & 39, and SolarPACES Task 1. NREC has played the important role of absorbing valuable policy and technology information and sharing it with key stakeholders including, policy makers, industries and universities.

NREC’s activities in IEA(2012)

	Activities
REWP	• Participation in ExCo 61st & 62nd
SolarPACES	• Participation in ExCo 82nd & 83rd / Task 1, 2
PVPS	• Participation in ExCo 39th & 40th / Task 1, 8
Bioenergy	• Participation in ExCo 69th & 70th / Task 37, 39
Hydrogen(HIA)	• Participation in ExCo 66th
Wind	• Participation in ExCo 69th & 70th / Task 11, 27, 30
Geo-thermal	• Participation in 4 Annex

Also, NREC has participated in various cooperation activities in partnership with APEC and IPHE by pursuing technical breakthroughs and developing countermeasures to curb greenhouse gas emissions within Asia Pacific Region.

As growing demand for promoting renewable energy worldwide, IRENA was founded in 2009 as a crucial agency in renewable energy field. With making a valuable contribution to IRENA, the Korean government has been taking key roles since its foundation for renewable energy adaption in global scale. As for now, Korea has been making all-out efforts to improve its international reputation in renewable energy field and NREC has played as IRENA’s technical focal point of Korea since 2009 for the agency’s development of work programs, etc.

- IRENA 2nd Assembly(‘12.1 UAE), IRENA 3rd Council Meeting(‘12.6 UAE), IRENA 4th Council Meeting(‘12. 11 UAE)
- APEC EGNRET(‘12. 6 New Zealand, ‘12. 12 China)
- IPHE (17th Steering Committee, ‘12. 5 Republic of South Africa), (18th Steering Committee, ‘12. 11 Spain)

▣ Bilateral cooperation

NREC has maintained close relations with its counterpart organizations overseas to exchange information and develop collaborative programs. In order to promote our programs, we organize joint seminars, business matchmaking, cooperation agreements and intergovernmental collaboration committees and so on and carry out joint research projects. Our counterpart countries are mainly Germany, Spain, Algeria, Italy, Belgium, Chile, and UAE.

A joint-seminar has been in progress to build up relations with those countries by exchanging current key policies and technological information in various areas such as PV, solar thermal and wind energy. With regard to follow up actions for these partnerships, this would be a great opportunity for both nation’s related parties to identify mutually beneficial areas in the field of NRE.



IRENA 3rd Council Meeting
(‘12. 1 UAE)



Korea-Germany Husum Wind Exhibition Business Meeting
(‘12. 9, Germany)



Korea-Europe Wind Plaza Forum
(’12. 9, Germany)



Korea-Italy NRE Cooperation Forum
(’12. 9, Italy)

6) Constructing support facilities in port for offshore wind

- In 2012 June, Korean government designated Gunsan at south-west of Korea as supporting harbor for offshore wind. Construction supporting facilities in Gunsan port would be completed by 2013. Afterwards, these facilities would support to construct 100MW offshore wind demonstration complex by 2014 and 400MW dissemination complex by 2016.

Plans for constructing support facilities in port

Year		2012	2013	2014
- Plan		- Secure supporting ports - Announcement and Implementation	- Start reinforcement work for bay - Install Crane	- Supporting construction of offshore wind complex
Budget	Government	7 bil KRW	6 bil KRW	-
	Private	7 bil KRW	6 bil KRW	-

2. NRE deployment programs

1) Building subsidy program

The government provides subsidy for NRE facility users to accelerate NRE deployment. The objective of the subsidy program is to create an initial market for new technologies and systems developed domestically, and to establish and activate the deployment infrastructure of commercialized technologies and equipments. These subsidies are classified into two categories which are the test-period deployment subsidy and the general deployment subsidy.

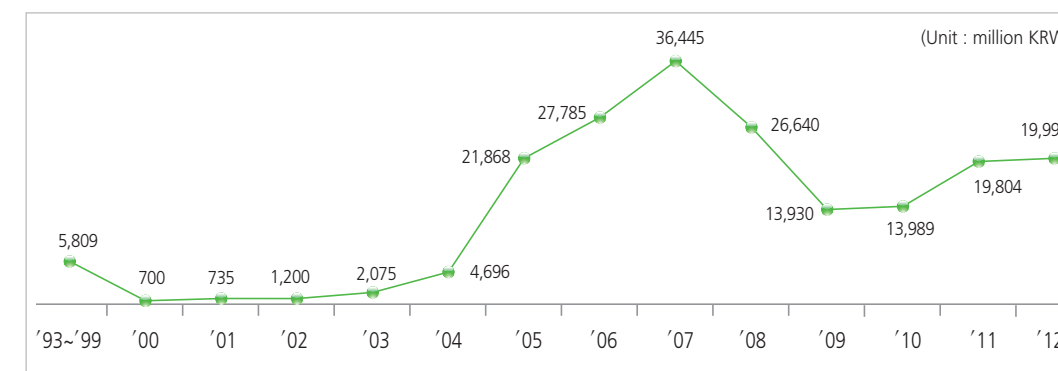
The test-period deployment subsidy program has been initiated to help the developed technologies and systems, which have been verified through demonstration, to advance into the market and to strengthen their competitiveness. Those who want to install NRE systems can be provided subsidy from the government up to 80% of total installation costs through the review process.

We have general deployment subsidy program to activate the market for NRE systems, which have been commercialized already, to facilitate consumer choices and to enhance the effects of public relations. The government provides the subsidy up to 50% of installation cost for these commercialized systems.

The government plans to focus its deployment on PV, fuel cell, wind, bio, small wind which will drive the future growth, in order to increase the NRE supply up to 11% in the total primary energy supply by 2030. The government also supports market-friendly areas such as solar thermal and geothermal continuously.

The total subsidies provided from 1993 to 2012 amounts to 195 billion KRW(\$1=1,200KRW). The status of government subsidy amount and installed systems until now is as follows:

Government subsidy



The status of installed systems in 2012

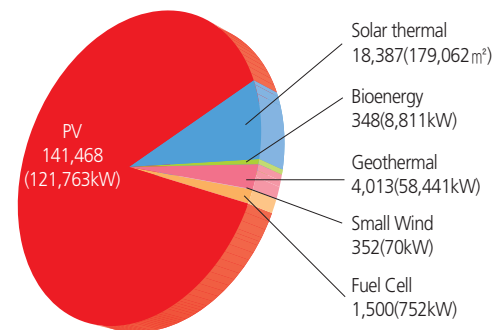
By NRE source	PV power systems	Solar thermal heating systems	Geothermal systems	Solarthermal heating-cooling systems	Bio systems
Total installation capacity	2,292kW	14,607m³	11,993kW	1,313m³	600kW
No. of systems	115	193	22	3	1

2) Home subsidy program

In an effort to encourage NRE deployment, the government has initiated a program which was called ‘1 million green homes program’. The official name has been changed from “1 million green homes program” to “Home subsidy program” since 2013. This is one kind of subsidy program to facilitate installing NRE facilities in residential areas such as private houses, multi-family houses and public rental houses.

“1 million green homes program” was launched in 2004 and exiting 100,000 solar-roof installations program was emerged into this project. The government will support a certain portion of total installation cost. Although 100,000 solar-roof deployment project was to install PV system in residential houses, Home subsidy program focuses on a variety of resources such as PV, solar thermal, geo-thermal, and small wind. In addition, there are several types of home which range from detached houses to apartment houses.

The status of Home subsidy program in 2012



Solar water heating system in Daedeok



Home subsidy program for PV installation

3) Regional deployment subsidy program

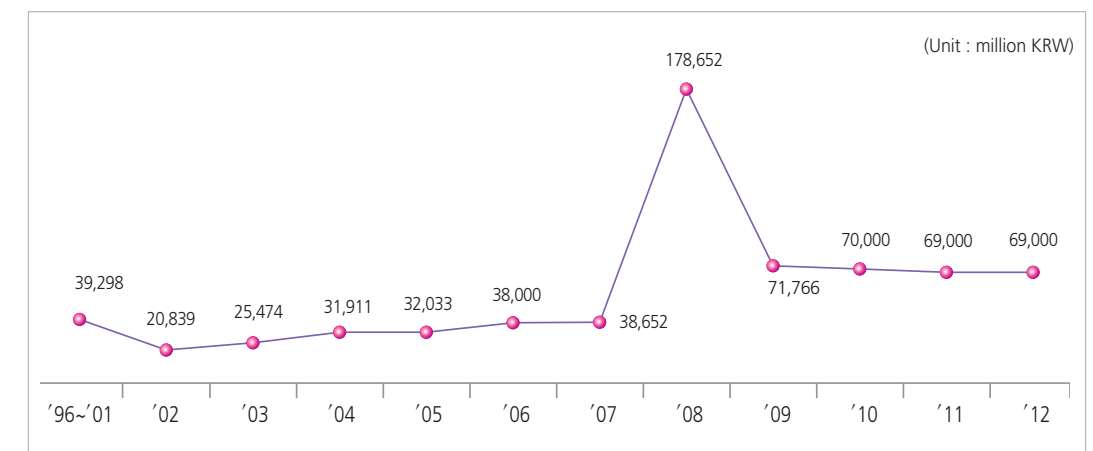
In an effort to improve the energy supply & demand condition and to promote the development of regional economies by supplying region-specific NRE that are friendly to the environment, the government has been promoting regional deployment subsidy program designed to support various projects carried out by local governments.

This program, which started in 1996, supported both NRE and energy-saving areas until 2005. However, the two areas have been divided in 2006 in accordance with “The Act on the Promotion of Development, Use, and Dissemination of NRE.”

Depending on the support ratio of the government subsidy and the nature of project, subsidies can be classified into two categories until 2010 : for building the infrastructure and for installing NRE systems. But government has been promoting regional deployment subsidy program for only installing NRE systems from 2011.

- The subsidy for building the infrastructure : feasibility study, human resources development, and public relations for development and utilization of region-specific energy(supports up to 100%)
- The subsidy for installing NRE systems : deployment of NRE systems such as PV and wind power etc. (supports up to 50%)

Government subsidy for regional deployment



4) Certification of Buildings Using New and Renewable Energy

Purpose

- ❑ Certifying newly constructed buildings in the private sector in different levels depending on the levels of new & renewable energy supply so as to encourage the introduction of new & renewable energy facilities.
- ❑ Encouraging buildings to save energy required for maintenance, to convert to systems that allow for auto-generation of environment-friendly energy, and to minimize their carbon emissions by promoting buildings with new and renewable energy systems.



Green house complex system in Gyeong-ju



Gwangyang small-hydro power plant in Jeon-nam province



Wind Power in Mt. Mae-bong



Wind power in Ansan city

Overview

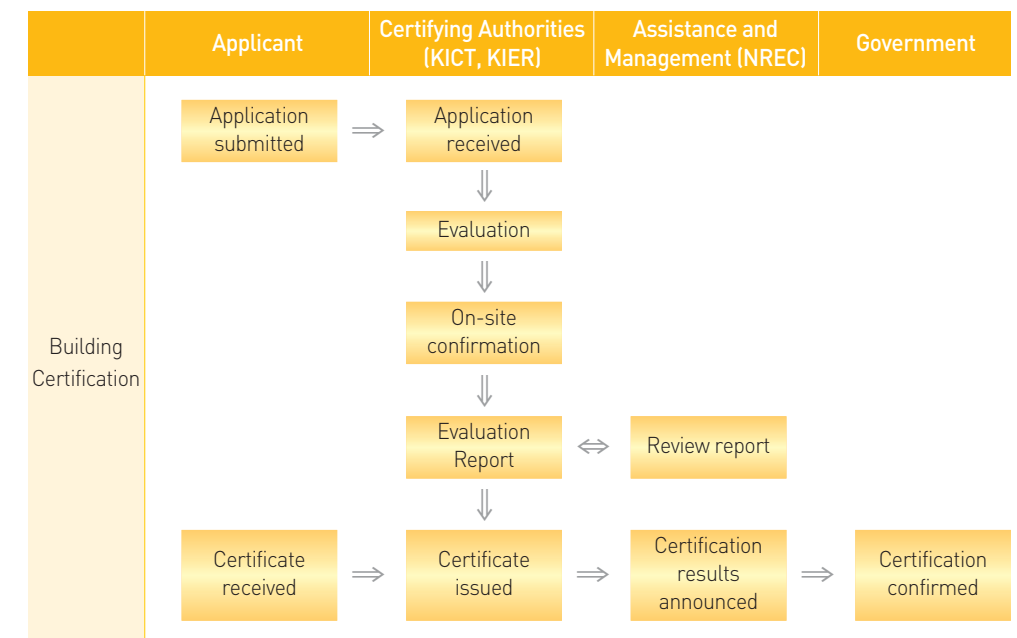
- ❑ The owner of a building with the gross floor area of 1,000m² or greater may have his/her building certified as a user of new & renewable energy if certain proportions of the total amount of energy used by the building are supplied by new & renewable sources of energy (effective as of April 13, 2011).

* “Total Amount of Energy Used”: represents the sum of the “amount of energy used,” as defined by the Rules on Certification of Building Energy Efficiency Levels and the “amount of new & renewable energy generated.”

Legal and Systemic Basis

- ❑ Eligible Sources of New and Renewable Energy:
 - Sunlight, solar energy, geothermal energy, fuel cells.
- ❑ Certifying Authorities:
 - For certification support and management: New and Renewable Energy Center, KEMCO.
 - Certifying authorities: Korea Institute of Construction Technology, Korea Institute of Energy Research.
- ❑ Certification Process:
 - Applicants :
 - Building owners.
 - Application process :
 - Apply online through on the New & Renewable Energy Center website.
 - Pay the processing fee to any of the certifying authorities and submit the required documents.
 - * Required documents: building designs (architectural, mechanical, & electric designs), specifications, energy saving plan, plan for installing new or renewable energy systems, etc.
 - * It takes about 50 days from the receipt of the application to completed the evaluation (except in cases requiring further proof).

○ Certification process :



❑ Calculation Formula

○ **Criterion** : “Rate of New & Renewable Energy Supplied”

Rate of New & Renewable
Energy Supplied

=

Amt. of New & Renewable Energy Generated

Total Amt. of Energy Used

× 100

○ **How to calculate the “total amount of energy used”** :

The amount is calculated by a special program, designed in accord with such international standards as the ISO13790 (Standard on Measuring the Amount of Energy Required for Building Energy Performance and Air-conditioning), for comprehensive evaluation of building energy performance.

Calculating the Amounts of New/Renewable Energy Generated

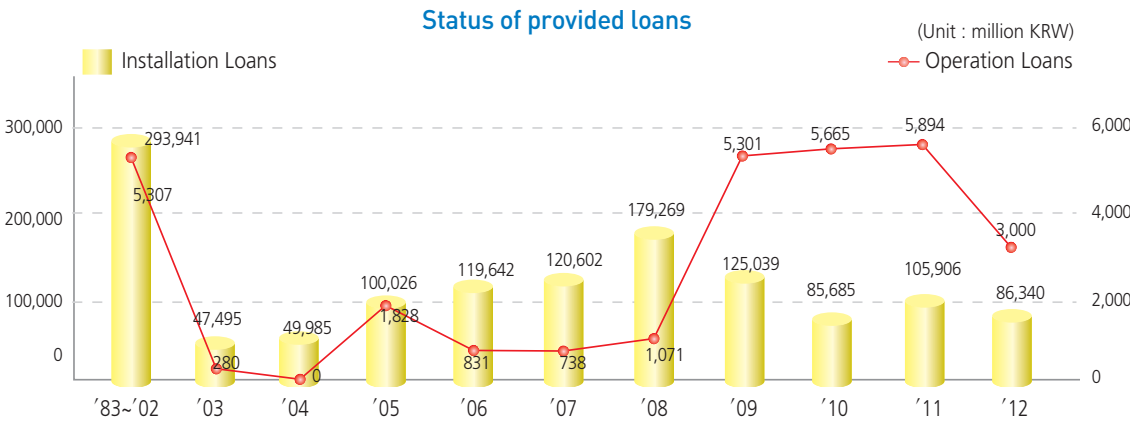
Energy Source		Conversion Coeff.	Remarks
PV		0.292 toe/kW per year	Use rate: 15.5%
Solar Thermal		0.064 toe/m² per year	System efficiency: 44%
Geothermal	Air-conditioning	0.174 toe/RT per year	Load factor: 60%
	Heating	0.444 toe/RT per year	Load factor: 40%
Fuel cells		1.789 toe/kW per year	Use rate: 95%

❑ Certification Levels

Level	New & Renewable Energy Supply Rate
1	Over 20%
2	15 ~ 20%
3	10 ~ 15%
4	5 ~ 10%
5	3 ~ 5%

5) Loans and tax incentive program

The government provides long-term, low-interest loans for the customers or manufacturers of NRE systems which have been completely commercialized. The objective of the program is to expand the deployment of NRE systems as well as to promote commercialization of large-scale facilities.



Installation loans are provided when customers install NRE systems, while operation loans are provided to the manufacturer of NRE facilities or to operate and manage such facilities. Loans are provided for up to 90% of the total cost(up to 50% for large corporations). As well, about 10% of total investment in installation of NRE systems can be deducted from the income tax or corporate income tax.

6) Feed-in-tariffs

The government compensates for differences between the electricity costs of NRE and fossil fuel power generation to promote the production and use of such sources. Such compensation is referred to as feed-in-tariff (FIT). The standard prices for NRE, initially formulated in 2002, have been modified several times.

FITs opened an opportunity window for NRE investment. Conspicuous performances were brought about in the fields such as PV and Wind. Annual total volume of PV dissemination, for example, had been just over 200kW before 2004. However, as the FIT system was announced and recognized by investors, PV installation increased dramatically and reached about 497MW in 2011.

Power source		Capacity for application	Classification		Standard price(KRW/kWh)		Remarks
					Fixed Price	Fluctuating Price	
Wind power		Over 10kW	-		107.29	-	Decremental rate : 2%
Hydro power		Under 5MW	Typical	Over 1MW	86.04	SMP+15	
				Under 1MW	94.64	SMP+20	
			Non-typical	Over 1MW	66.18	SMP+ 5	
				Under 1MW	72.80	SMP+10	
Bio energy	LFG	Under 50MW	Over 20MW		68.07	SMP+ 5	fossil fuel use: Under 30%
			Under 20MW		74.99	SMP+10	
	Biogas	Under 50MW	Over 150kW		72.73	SMP+20	
			Under 150kW		85.71	SMP+25	
	Biomass	Under 50MW	Ligneous bio		68.99	SMP+15	
Waste energy	Waste energy	Under 20MW	-		-	SMP+ 5	
	RDF	Under 50MW	-		-	SMP+15	
Ocean energy	Tidal power	Over 50MW	Tidal range is over 8.5m	Embankment	62.81	-	
				No Embankment	76.63	-	
			Tidal range is under 8.5m	Embankment	75.59	-	
				No Embankment	90.50	-	
Fuel cell		Over 200kW	using Biogas		227.49	-	Decremental rate : 3%
			using other fuels		274.06	-	

* SMP: System Marginal Price (2010 average: 117.77KRW/kWh).

* If a government subsidy forms over 30% of the total price paid, then the FIT program cannot be accessed.

* The decremental rates will be applied to wind power from 2009, to fuel cell energy from 2008, starting Oct. 11 every year.

There was a substantial change in FITs for PV. With the PV business overheating, the government reengineered the structure of support for PV as a new system called RPS (Renewable Portfolio Standard) has been introduced since the year 2012 and replace FITs.



Youngduk wind farm



Fuel cell power generation in Kwangyang

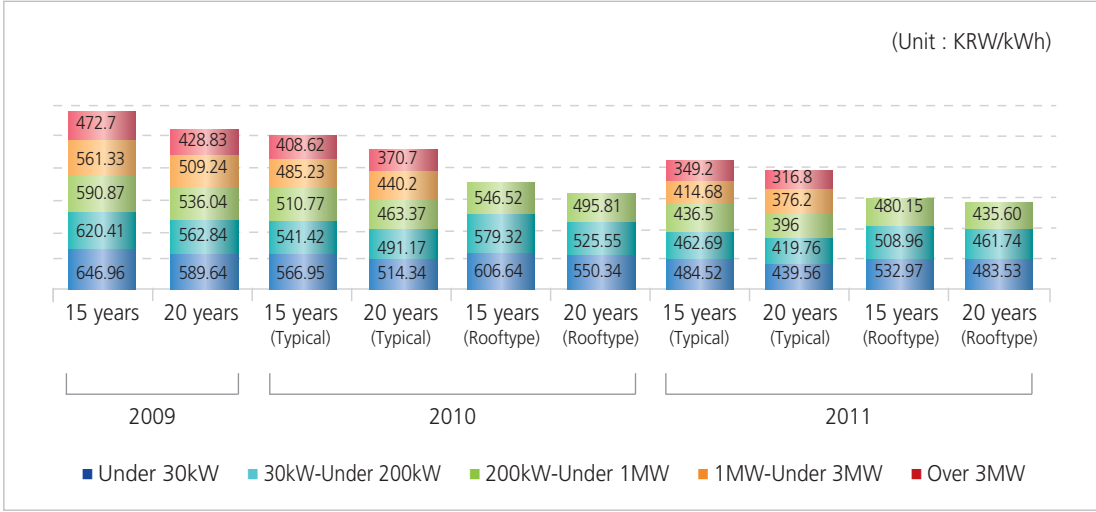


Shinan Solar power plant



Fuel cell power generation in Seoul

Standard prices of PV power source



7) Renewable portfolio agreement (RPA)

Background and overview

The Korean government has signed a renewable portfolio agreement with nine energy-related public organizations including Korea Electric Power Corporation(KEPCO), Korea Hydro & Nuclear Power Co, Ltd (KHNP), Korea South-East Power Co, Ltd (KOSEP), Korea Midland Power Co, Ltd (KOMIPO), Korea Western Power Co, Ltd (WP), Korea East-West Power Co, Ltd (EWP), Korea Southern Power Co, Ltd (KOSPO), Korea District Heating Corp (KDHC), and Korea Water Resources Corporation (K-Water). The RPAs were signed in 2005 and were effective from 2006 to 2011.

Under the RPA, public companies voluntarily pledge to take a leading role in using NRE, supporting R&D activities, and staging public relations campaigns.

Performance

The first phase RPA (2006 - 2008)

Through the first agreement launched in 2006, the nine companies invested KRW 124.6 billion in 2006, KRW 240.9 billion in 2007, and KRW 520 billion in 2008. In total, they have pledged to invest KRW 885.5 billion in NRE for the first 3 years of RPA.

The participating companies have installed 17 NRE facilities through the RPA, including 28MW-scale power plants and 28 Gcal/h-scale heaters.

The second phase RPA (2009 - 2011)

The nine major stated-owned energy companies signed an agreement with government that they will invest KRW 338.2 billion in PV for 3 years from 2009 to 2011 and to build PV plants with a supply of 51.5MW. And they will buy REC (Renewable Energy Certificates) with a supply of 49.8MW.

8) Renewable portfolio standard (RPS)

The RPS is a system that enforces power producers to supply a certain amount of the total power generation by new and renewable energy.

England, Sweden, Canada and Australia introduced the RPS and are running the system. The U.S. (Currently 29 states are operating the RPS) is also promoting the introduction of a RPS act in federal level (June 2009, the Lower House).

Applicable area in RPS

PV, wind power, hydro power, fuel cell, ocean energy, bio energy and other energy prescribed by Korean government.

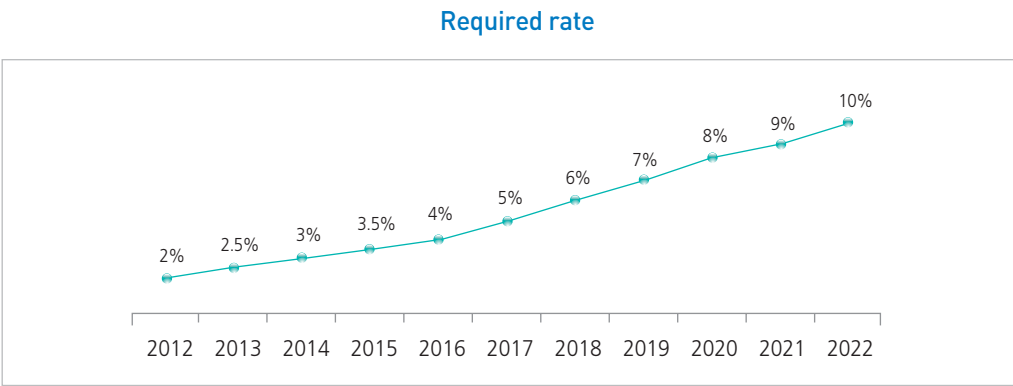
Obligators

Companies that have power plants generating 500,000 kilowatts (NRE power plants excluded).

* Applicable companies : Korea Hydro & Nuclear Power Co., Ltd., Korea South-East Power Co., Korea Midland Power Co., Korea Western Power Co., Korea Southern Power Co., Korea East-West Power Co., Korea District Heat Corporation, Korea Water Resources Corporation, Posco Energy, SK E&S, GS EPS, GS Power, MPC Yulchon.

Obligatory supply rate by suppliers

Starting from 2% at the beginning (2012), the rate will increase up to 10% in 2022.



Multiplier

Grouping	Multiplier	Eligible Resources		
		Installation type	Land Type	Capacity
Solar Energy	0.7	In case of not use 'Building and Existing Facilities'	5 lands(Rice field, Dry field, Orchard, Pasture, Forest land)	
	1.0			
	1.2		Other	Excess 30kW
	1.5	Building and Existing Facilities, Installing Facilities on the surface of the water		
General Renewable	0.25	■ IGCC ■ By-Product gas		
	0.5	■ Waste ■ LFG(Land Fill Gas)		
	1.0	■ Hydro ■ Wind(on-shore)		
		■ Bio-gas ■ Bio-mass		
	1.5	■ Tidal I (construction under having its tide embankment)		
		■ RDF		
	1.5	■ Off-shore Wind(connecting point length is under 5km)		
		■ Bio-mass		
	2.0	■ Off-shore Wind(connecting point length is over 5km)		
	2.0	■ Tidal II (newly construction its tide embankment)		
		■ Fuel-cell		



Gochang Solar Plant



Biomass cogeneration in Korea District Heat Corporation



Asan intergrated type Biogas facility



Jeju Bio cogeneration plant

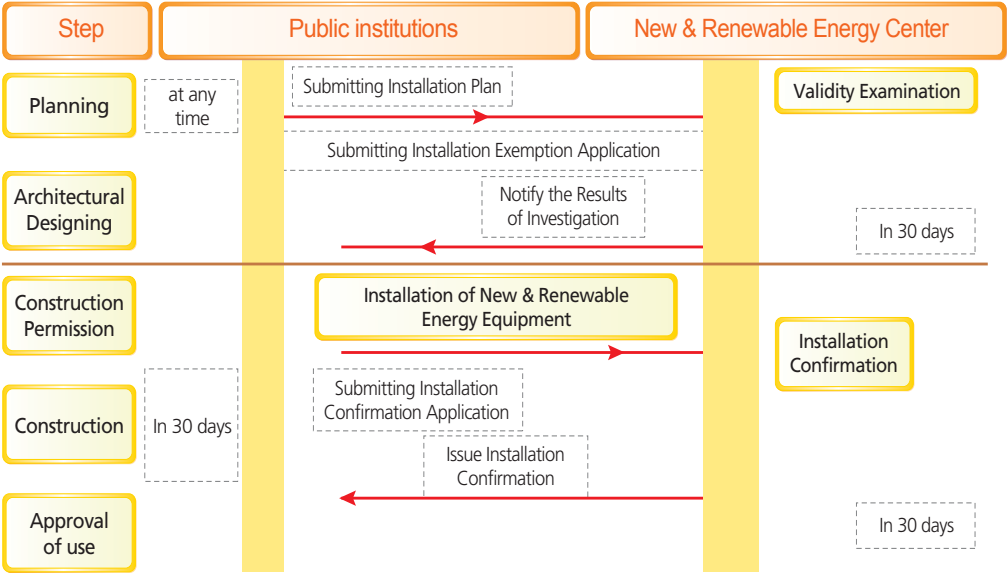
Comparison between the Feed-in-tariff and the RPS

	Feed-in-tariff (FIT)	Renewable Portfolio Standard(RPS)
Mechanism	■ To purchase generated power at fixed price ■ The amount of power is decided by the company	■ The amount of power is decided in advance ■ Price is determined according to supply and demand
Benefits	■ The accomplishment of the target amount is flexible	■ The policy objective can be easily accomplished by supply obligation
Selection of power source	■ All power generated by the target power sources should be purchased	■ Target amounts can be set by power resources
Cost effectiveness	■ The price is pre-fixed so the volume flexibility is low	■ Costs can be reduced by competitive environment
Strong points	■ Effective for new investment attraction ■ Certainty and simplicity of investment	■ Cost minimization ■ Accomplishment of intended supply goals
Weak points	■ Uncertainty of target setting ■ Market imperfection (Excessive producer's surplus)	■ Investors bear the risk ■ Complicated operation (excessive management costs) ■ Concerns about low-cost oriented power supply

9) NRE mandatory use for public buildings

The new buildings of public institutions, the floor area of which exceeds 1,000 square meters, are obliged by law to use more than 10% of their total expected energy uses to install renewable energy resource systems. Public institutions include state administrative bodies, local autonomous entities, and state-run companies. The following diagram details how the system operates from the planning to the approval stage.

Procedure of NRE mandatory use for public buildings



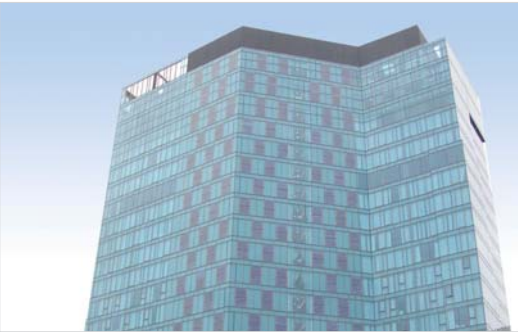
Between March 2004 and 2012, public institutions submitted 2,202 installation plans.

* Policy change ('11) : Depending on the cost of consumption (more than 5%) →
→ Depending on the energy consumption (more than 10%)

The status of NRE mandatory use for public buildings

(Unit : million KRW, kwh/yr, %)

Year	The No. of installation plan(Total)	Investment expenses for NRE systems				Investment expenses for NRE systems			
		The No. of installation plan	Construction expenses (A)	Investment expenses for NRE systems (B)	Investment ratio of NRE systems (B/A)	The No. of installation plan	Expected energy consumption (C)	Production of NRE systems (D)	Investment ratio of NRE systems (D/C)
2004	32	32	227,140	16,169	7.12	-	-	-	-
2005	115	115	911,700	53,693	5.89	-	-	-	-
2006	123	123	1,260,114	67,803	5.38	-	-	-	-
2007	107	107	1,062,661	55,343	5.21	-	-	-	-
2008	146	146	1,124,989	64,650	5.75	-	-	-	-
2009	391	391	3,938,493	233,718	5.93	-	-	-	-
2010	386	386	4,039,038	251,936	6.24	-	-	-	-
2011	307	112	1,456,468	86,850	5.96	195	1,744,663,581	212,496,854	12.18
2012	595	-	-	-	-	595	3,212,689,475	377,251,829	11.74
Total	2,202	1,412	14,020,603	830,162	5.92	790	4,957,353,056	589,748,683	11.90

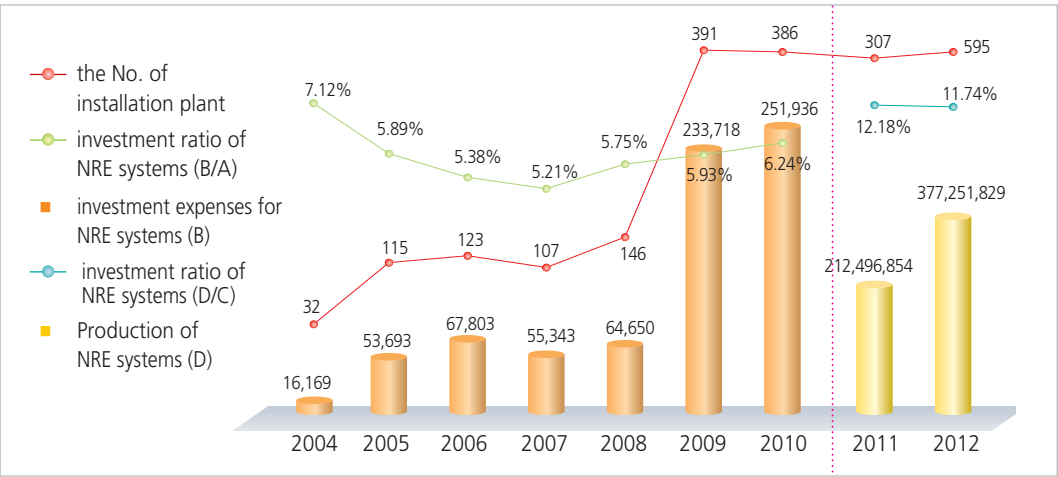


BIPV system in Incheon



Geothermal heat pump in Namyangju

NRE deployment plan



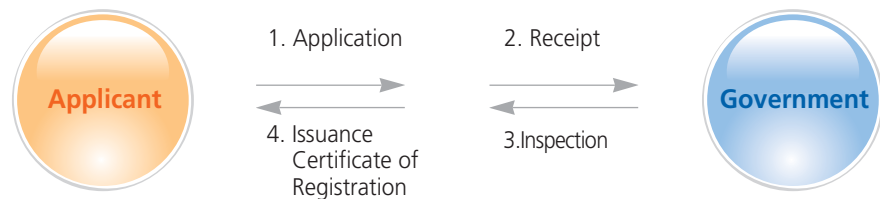
※ Due to change of criteria, results are different since 2011

10) Renewable energy service companies

In 2005, the RESCOs (Renewable Energy Service Companies) program was introduced to resolve problems such as a lack of expertise and low levels of capital in NRE system installation companies, and ultimately to contribute to the development of the domestic industry.

Legal ground and registration process

Legal ground : 「Promotion Act for NRE Development, Utilization and Deployment」



Progress in the RESCO program

Since the introduction of the RESCO Program according to the 「Promotion Act for NRE Development, Utilization and Deployment (2005)」, the number of companies registering as RESCOs has risen each year. In 2008, 2,854 companies registered as RESCOs, and there are now 8,777 companies registered by energy source. (2012)

Number of registered RESCOs by Year

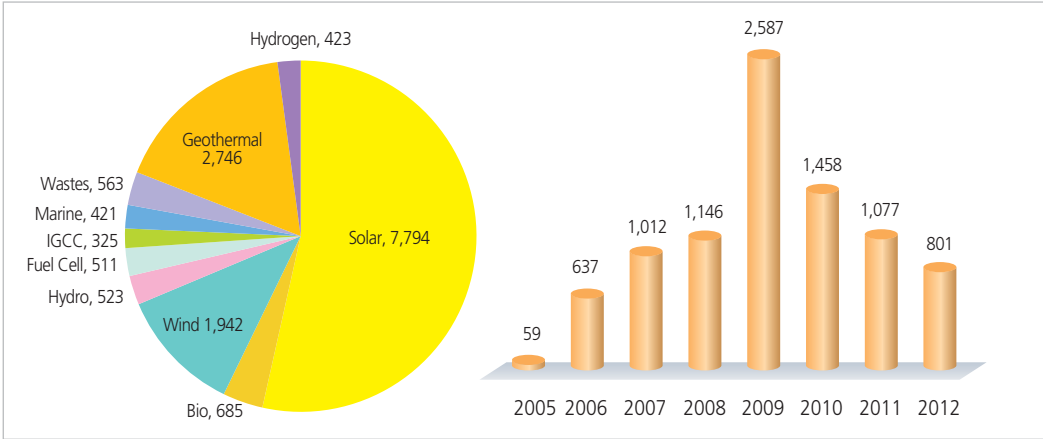
2005	2006	2007	2008	2009	2010	2011	2012	Total
59	637	1,012	1,146	2,587	1,458	1,077	801	8,777

Number of registered RESCOs by energy source

Solar	Bio	Wind Power	Hydro	Fuel cell	IGCC	Marine	Wastes	Geothermal	Hydrogen	Total
7,794	685	1,942	523	511	325	421	563	2,746	423	15,933

* Please note that the statistics above has not been considered a duplication as some manufacturers concurrently engage in a wide array of renewable energy areas such as solar and wind energy.

Number of Registered RESCOs by Year

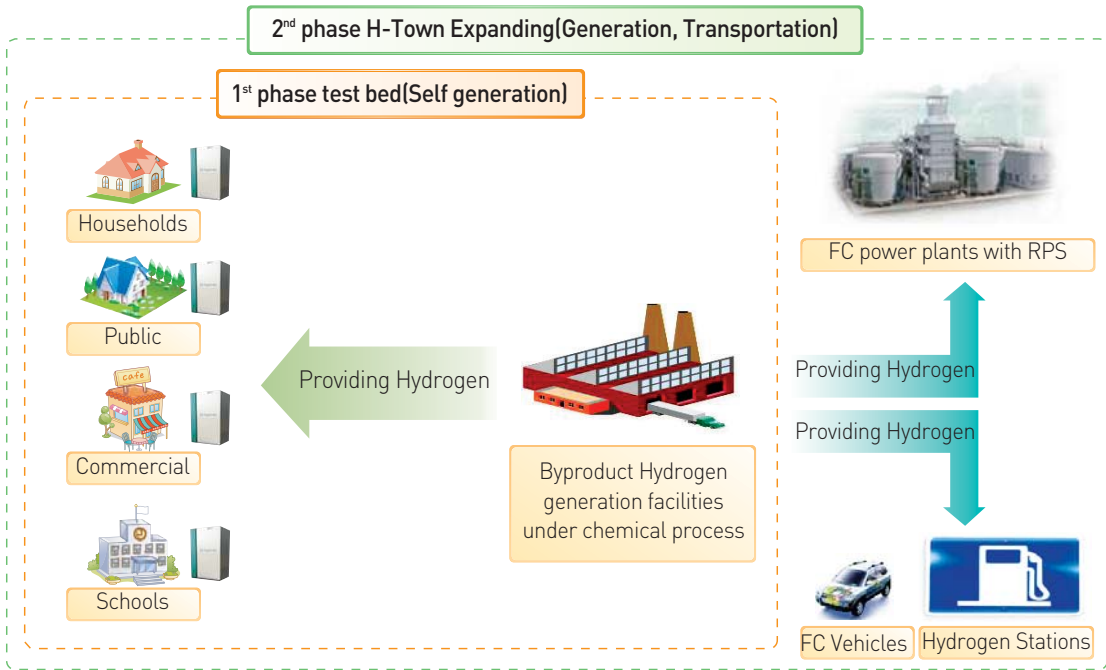


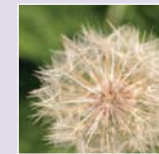
11) H-Town(Hydrogen) demonstration project

To expand hydrogen market and nurture related industries, Korean government launched H-Town demonstration project in Ulsan, Korea. This aims to secure fuel cell's price competitiveness by using byproduct hydrogen under chemical process since Ulsan area is well known as chemical industry complex and finally to achieve diversification of new & renewable energy dissemination and usage.

This H-Town construction would be completed by 2013. April with self generation fuel cell's facilities (on-grid) through 140 households, 3 public & private buildings in total 154kW capacity in Ulsan.

Byproduct hydrogen H-Town plan





IV. Prospect for NRE in Korea

(The 3rd basic plan for NRE technology development and deployment by 2030)

IV. Prospect for NRE in Korea

(The 3rd basic plan for NRE technology development and deployment by 2030)

✱ This 3rd basic plan would be revised to the 4th basic plan in 2013

The 3rd basic plan for NRE technology development and deployment established in December 2008, which handles Korea’s medium-long term target for NRE development and deployment and provides action plans and basic strategies. The 3rd Basic Plan aims at facilitating the NRE industries into a new growth engine for the Korean economy.

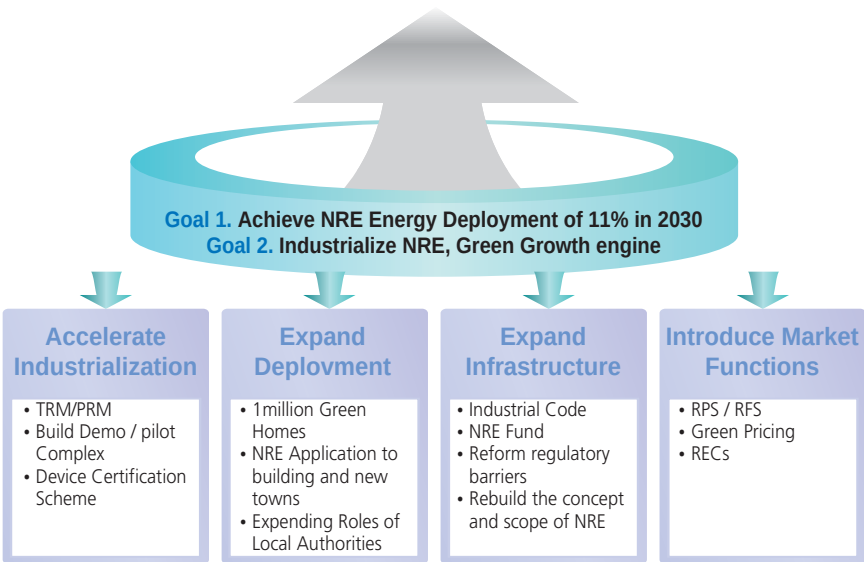
Background

- To divide into the fields to focus on accomplishing the supply and R&D activities
- To set basic directions to efficiently cope with political environment of the new and renewable energy such as resources depletion and climate changes.
 - To re-evaluate each energy source’s value considering the energy security, diversification of energy mix and environmental benefits.
 - To activate the green pricing system and renewable energy certificates (RECs) system considering a customer-oriented objective.
 - To deploy a variety of energy systems in new and renewable energy-oriented houses, villages and towns.
 - To establish a sustainable energy supply system that develops, supplies and consumes NRE suitable to each region’s characteristics, centering on local governments.
- To suggest supply goals with concrete standards to meet international trends and domestic goals.
 - Domestic standards (primary energy standard, final energy standard), IEA standards, EU standards, etc.
- For the consistency with the national master plan, the implementation period consists of the mid term (2011 - 2020) and the long term (2009 - 2030).

The Fundamental directions of the plan are:

- To classify renewable energy sources into deployment-oriented groups (wind, bioenergy, waste and geothermal) and an R&D-oriented group (PV, hydrogen and fuel cell)
- To respond to the climate change and exhaustion of fossil fuels
- To provide the prospect of medium-long term NRE deployment

Establish NRE-based Sustainable Energy System



Target 1 Achieve NRE deployment rate of 11% in 2030

Target 2 Industrialize NRE as a green growth engine

Strategy 1 Facilitate industrialization

- TRM/PRM
- Reinforce NRE certification system
- Build pilot complex
- Foster export industry

Strategy 2 Increase dissemination

- Deploy 1 million green homes
- Role enhancement of local authorities
- Reinforce NRE application into buildings & new towns
- Develop integrated technology

Strategy 3 Expand infrastructure

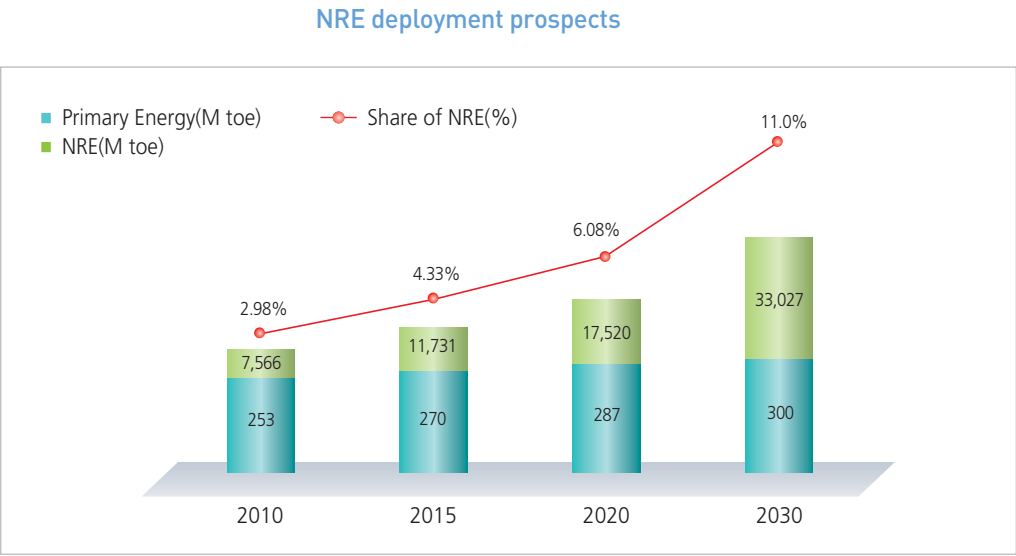
- Establish industry codes
- Reduce regulatory barriers
- Create NRE fund
- Sophisticate statistical system

Strategy 4 Introduce market functions

- RPS / RFS
- Integrated deployment policy
- Green pricing
- RECs

NRE deployment targets

According to the BaU scenario, the NRE share of primary energy supply will account for 3.6% in 2015, 4.2% in 2020 and 5.7% in 2030.



In the target scenario, the NRE share of primary energy supply will account for 4.3% in 2015, 6.1% in 2020 and 11.0% in 2030.



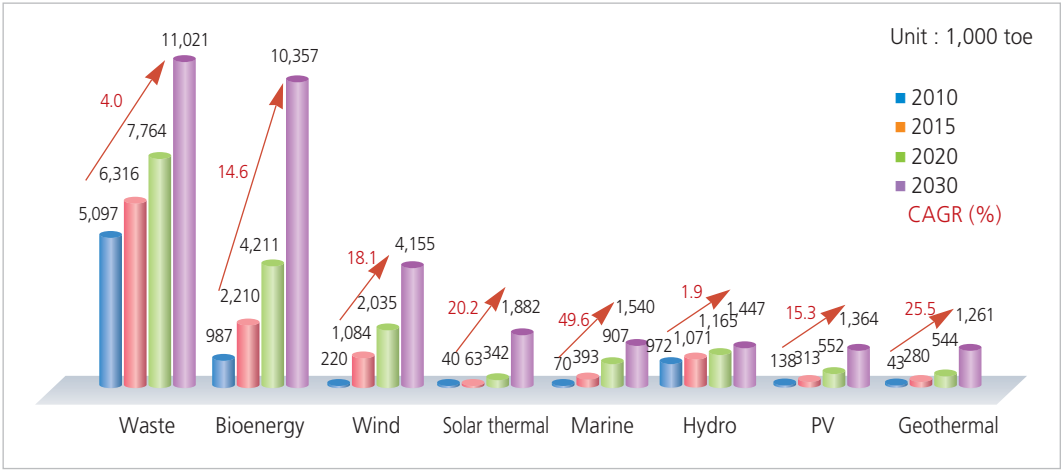
Solar thermal heating system in Yang san

Long-term target for NRE deployment

NRE deployment prospects (by sources)

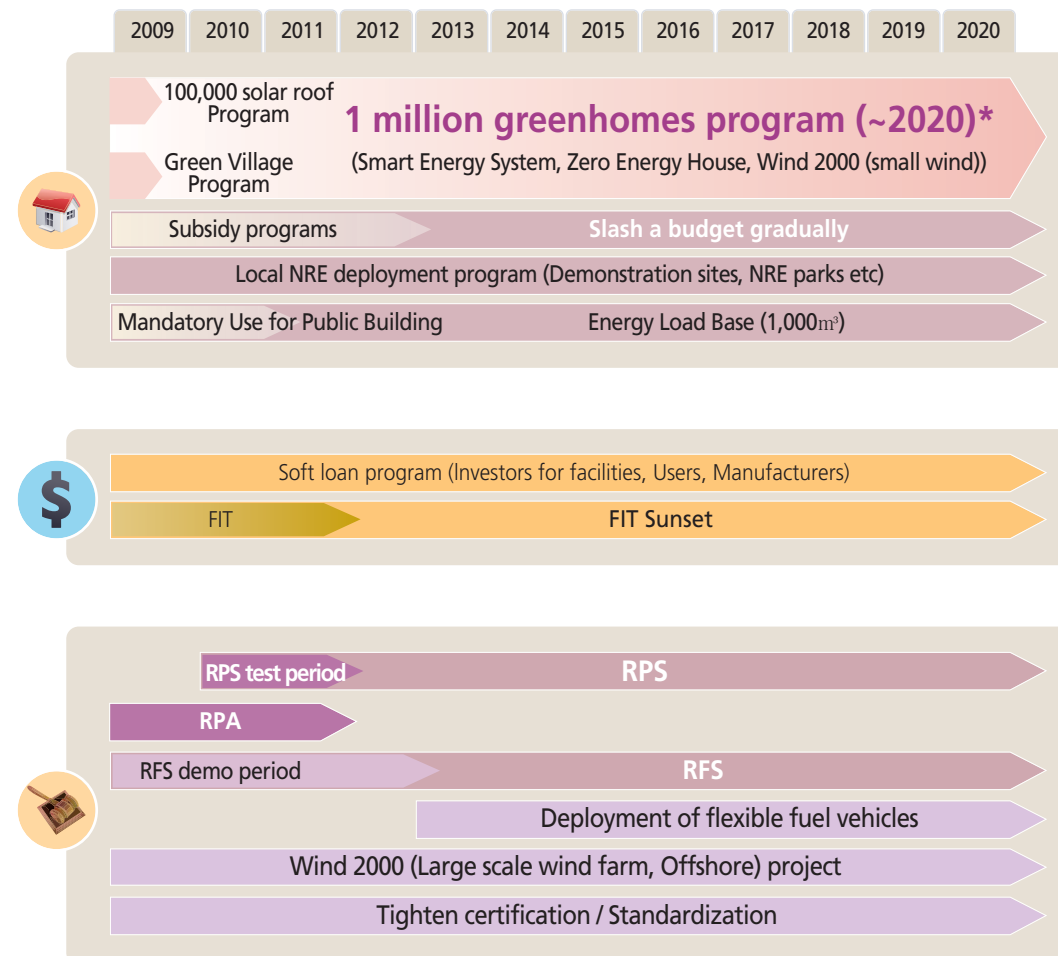
Unit : 1,000 toe, %

	2010	2015	2020	2030	Annual increase[%]
Solar thermal	40 (0.5)	63 (0.5)	342 (2.0)	1,882 (5.7)	20.2
PV	138 (1.8)	313 (2.7)	552 (3.2)	1,364 (4.1)	15.3
Wind	220 (2.9)	1,084 (9.2)	2,035 (11.6)	4,155 (12.6)	18.1
Bioenergy	987 (13.0)	2,210 (18.8)	4,211 (24.0)	10,357 (31.4)	14.6
Hydro	972 (12.8)	1,071 (9.1)	1,165 (6.6)	1,447 (4.4)	1.9
Geothermal	43 (0.6)	280 (2.4)	544 (3.1)	1,261 (3.8)	25.5
Marine	70 (0.9)	393 (3.3)	907 (5.2)	1,540 (4.7)	49.6
Waste	5,097 (67.4)	6,316 (53.8)	7,764 (44.3)	11,021 (33.4)	4.0
Total	7,566	11,731	17,520	33,027	7.8
Primary Energy (M toe)	253	270	287	300	0.9
Share	2.98%	4.33%	6.08%	11.0%	



NRE deployment ro map

- Deployment expansion through the participation by private companies
- Focusing on integrated deployment target and policy
- Strengthening interconnection between deployment policy and technological development



* The official name has been changed from "1 million greenhomes program" to "Home subsidy Program" since 2013.

SAVE ENERGY SAVE EARTH!!



Smart Lifestyle
Green Lifestyle
Creating Lifestyle