New & Renewable Energy Development , Nuclear Power and Regional Cooperation in Asia

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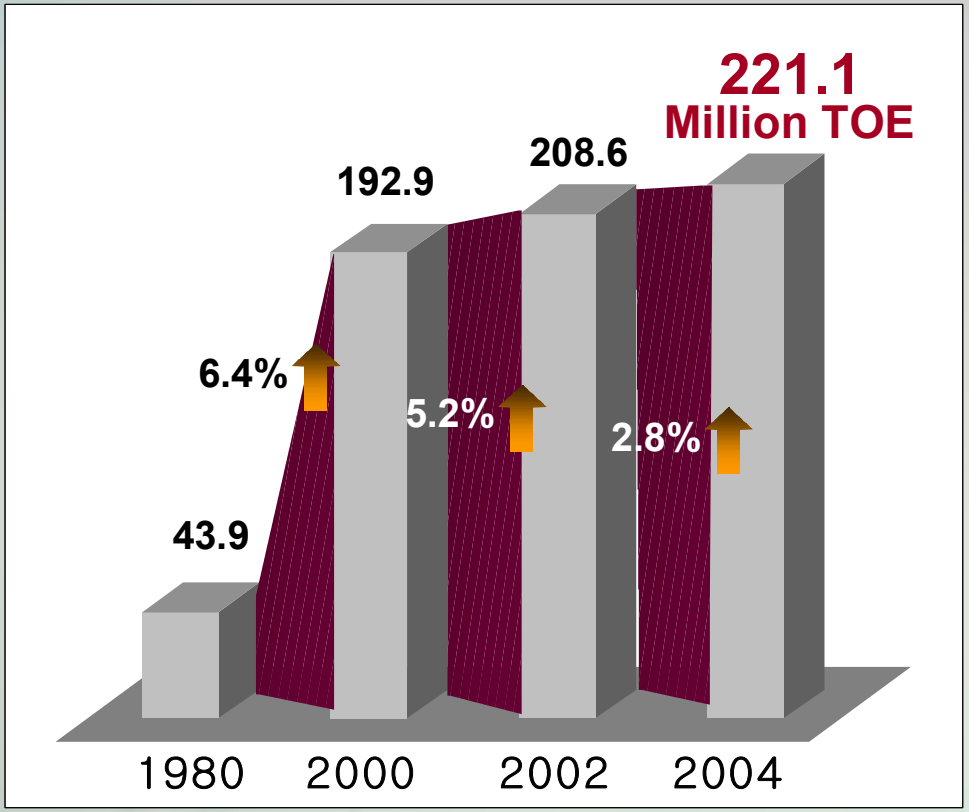
New & Renewable Energy Policy in Korea

Contents

Ⅰ. Energy Status

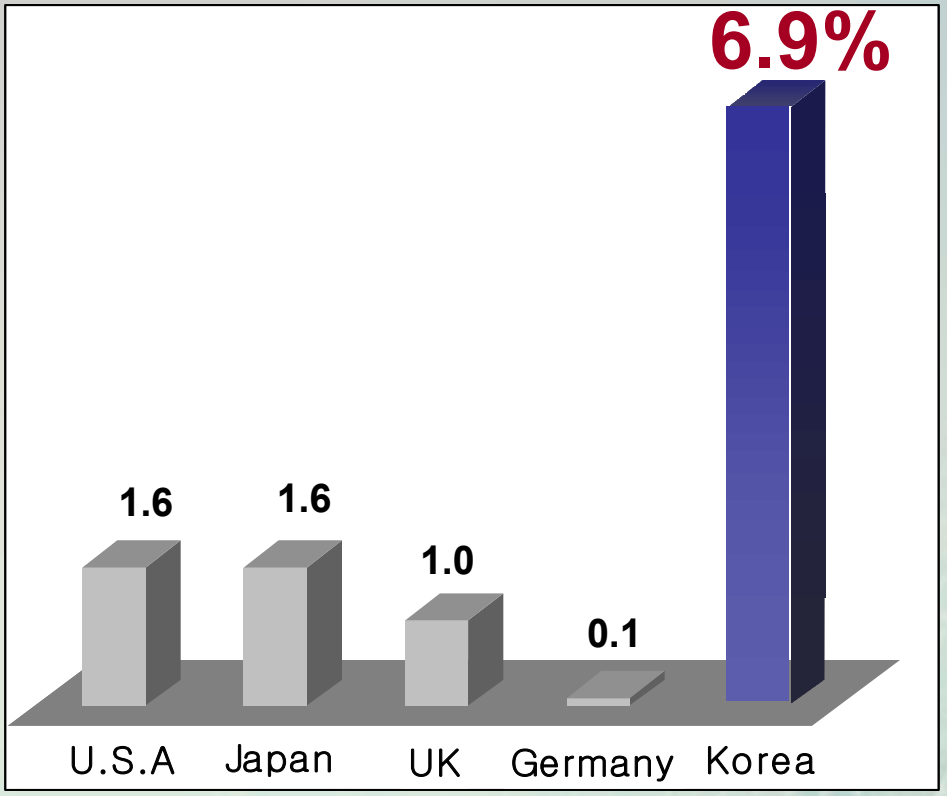
Continuous Increase in Energy Consumption

Growth Trend of Energy Consumption



Source : MOCIE (2005)

Average Growth Rate of Energy Consumption ('91~'01)



Source : IEA (2001)

Ⅰ. Energy Status

High dependency on energy imports

- Imports about 97% of the energy used
- More than 78% of oil from the Middle East

Energy Imports

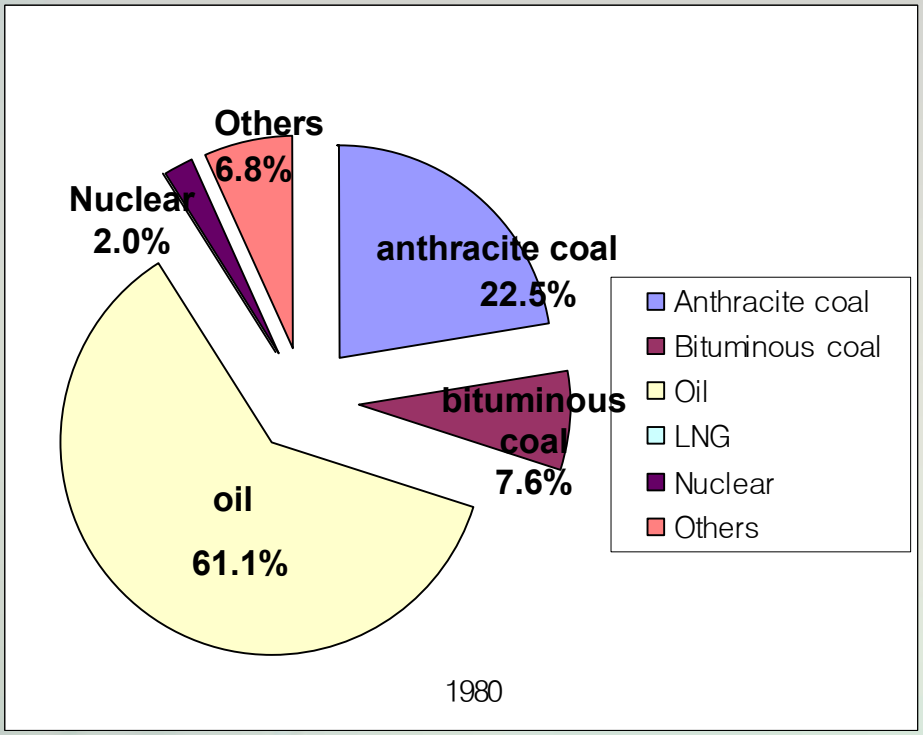
(unit : %)

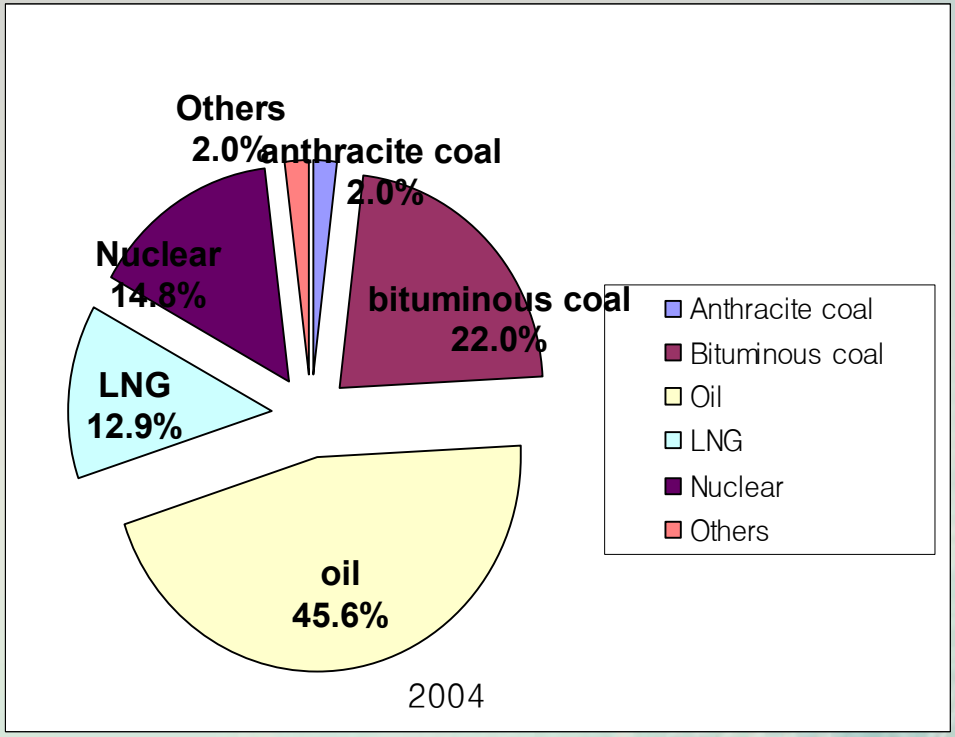
Classification	’80	’90	’00	’02	’04
Overseas Energy Dependency	73.5	87.9	97.2	97.1	96.6
Oil in total energy	61.1	53.8	52.0	49.1	45.6
Import from the Middle East of total oil	98.8	73.7	76.9	73.3	78.1

Source : MOCIE (2005)

Change in Energy Consumption Mix

- Ratio of oil and anthracite coal decrease
- Ratio of nuclear power and LNG increase

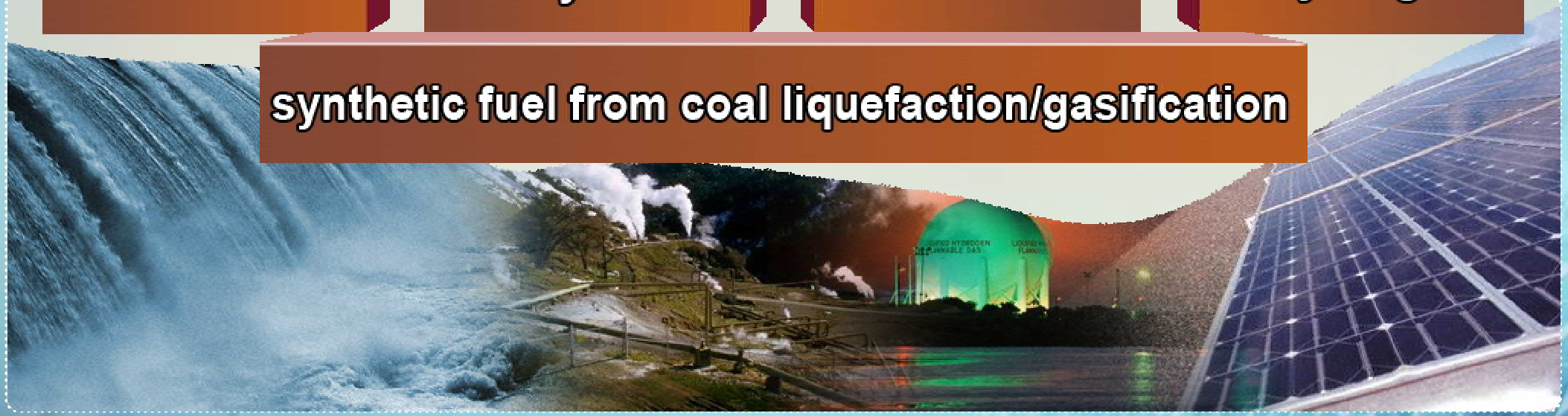




Ⅱ. Category of NRE

11 types are included in the promotion Act for NRE

- Solar thermal
- Photovoltaic
- Bio
- Marine energy
- Wind
- Waste
- Geothermal
- Hydro
- Fuel cell
- Hydrogen
- synthetic fuel from coal liquefaction/gasification



Ⅲ. History of NRE Policies

1987 — Promulgation of the Promotion Act for NRE Development
- Making the legal basis of NRE Technology Development

1997 — Amendment of the Promotion Act for NRE Development, Utilization & Dissemination
- Making the legal basis of NRE Dissemination

2002 — Amendment of the Promotion Act for NRE Development, Utilization & Dissemination
- Including Obligation to the Public Office, Certification, F-I-T etc.

2003 — 10 Year National Basic Plan For NRE Technology Development and Dissemination
- Target : 3% by 2006, 5% by 2011

2004 — Amendment of the Promotion Act for NRE Development, Utilization & Dissemination
- Including Standardization, RESCO etc

Ⅳ. Investment For NRE

Budget from 1988-2004 amount to a total of 688.7 million US$

- **R&D : 221.5 million, Subsidies : 156.5 million, Loans : 310.7 million**

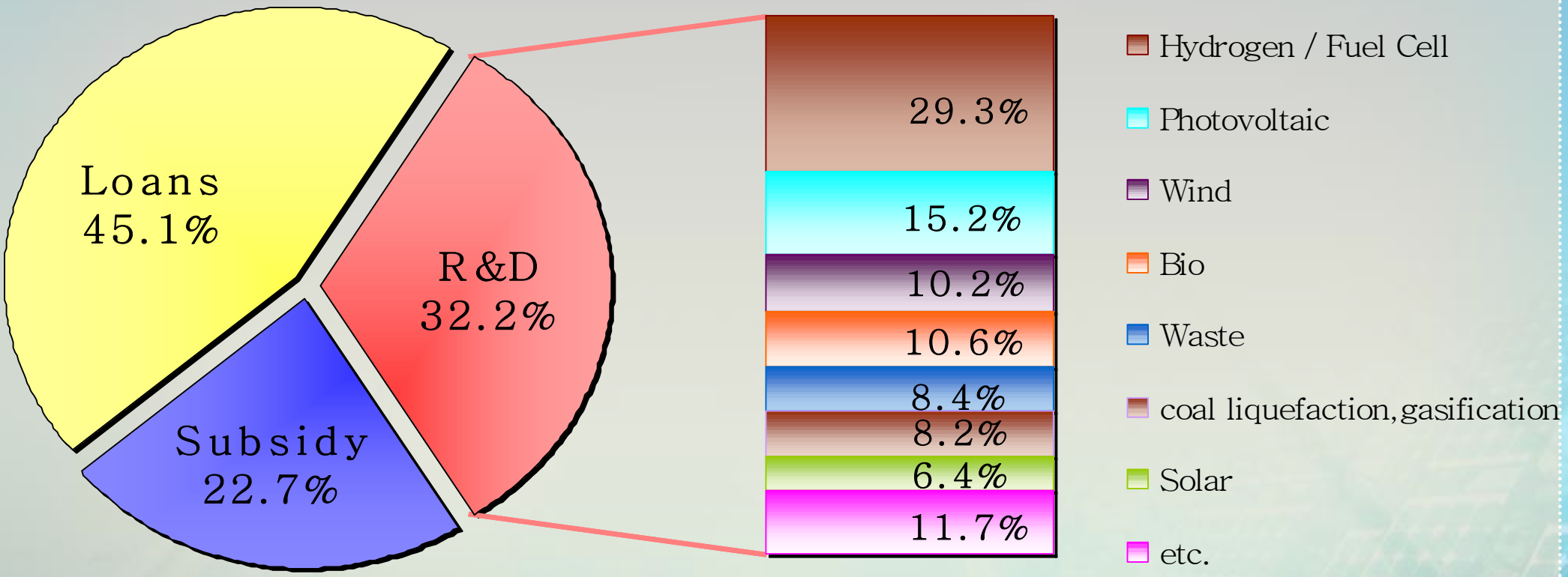
(unit : million US$)

Classification		Government	Private	Total
R & D	Solar Thermal	14.255	4.649	18.904
	Photovoltaic	33.618	18.365	51.983
	Bio	22.523	11.672	34.195
	Waste	18.625	17.202	35.827
	coal liquefaction,gasification	18.128	11.465	29.593
	Wind	23.570	12.008	35.578
	Hydrogen / Fuel Cell	64.801	55.108	119.909
	etc.	25.999	3.784	29.783
	Sum	221.519	134.253	355.772
Subsidy		156.438	28.315	184.753
Loans		310.727	-	310.727
Total		688.684	162.568	851.252

Ⅳ. Investment For NRE

Portion of the Budget from 1988-2004

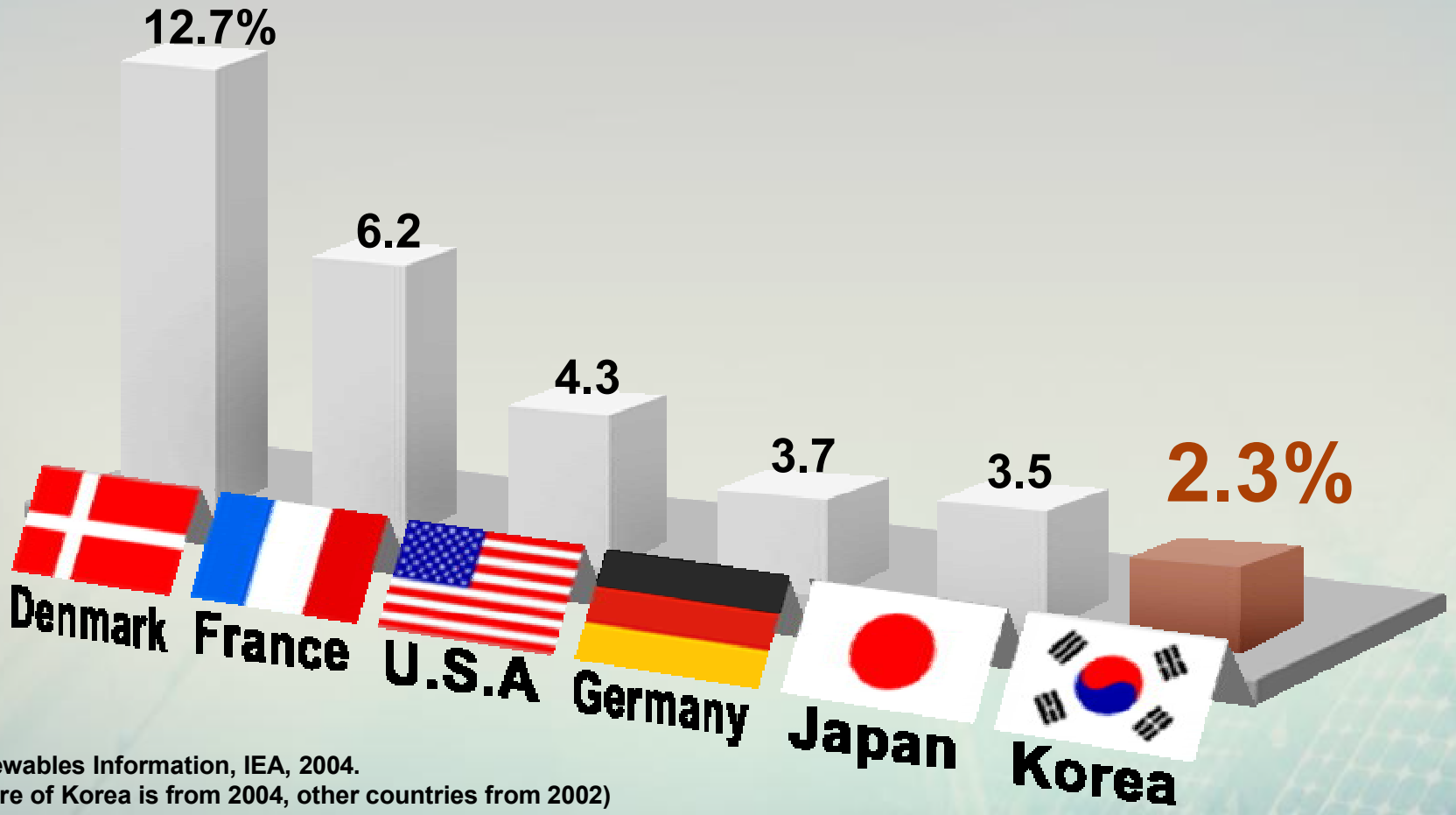
- Hydrogen/Fuel Cell : 29.3% , Photovoltaic 15.2% , Wind : 10.2%



Ⅴ. Achievements In NRE

Ratio on NRE/Total Energy Consumption is 2.3%

- Very low compared to advanced countries



Source : Renewables Information, IEA, 2004.
(Figure of Korea is from 2004, other countries from 2002)

Ⅴ. Achievements In NRE

Waste & Hydro power accounted for the most

- Amount and percentage of supply by individual energy resources(2004)

Resource	Details	Amount (1000toe)	%
Waste	480 unit of Industrial and Municipal solid waste incinerators	3,769.7	74.8
Hydro	Small : 51 MW, 35 unit Large : 1,529 MW, 16 unit	1,082.3	21.5
Bio	115 unit of Industrial and Municipal biogas system	135.0	2.7
Solar Thermal	191,491 Solar Hot Water System	36.1	0.7
Wind	28.9 MW in 136 units, in Jeju Island etc	11.8	0.2
Photovol-taic	8.5MW for Electrification and Street light, etc	2.5	0.1

Ⅵ. Dissemination Target

5% of total energy Consumption by 2011

Annual Target (%)

Resources	2003	2006	2011
Waste	68.5	71.3	57.3
Hydro	27.6	17.1	12.3
Bio	3.0	7.1	7.8
Solar Thermal	0.7	1.5	2.4
Photovoltaic	0.1	0.6	2.5
Wind	0.1	2.2	9.7
Geothermal	-	1.1	8.0
Goal	2.1	3	5

Ⅶ. NRE Policies

1. R & D and Infrastructure

R & D

Maximization of R&D investment effect by priority selection and concentration

Hydrogen / fuel cells, photovoltaic and wind will receive major support

- 1,000 people from industry, academia and research institutes will participate
- 227 million US$ for five years (2004-2008) will be invested

Ⅶ. NRE Policies

1. R & D and Infrastructure

The infrastructure

- Establishing a masterplan and a mid-to-long-term vision on the “hydrogen economy”

- Evaluating performance of developed products, carrying out field tests
  -expanding research complexes for field tests and institutions for performance evaluation

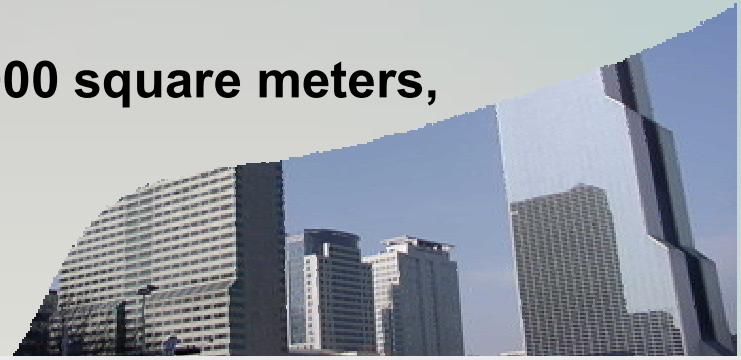
- Strengthening International cooperation at multilateral and bilateral levels
  - Multilateral Cooperation : IPHE, IEA, REEEP etc
  - Bilateral Cooperation : Korea-Mongolia, Korea-China joint research project

Ⅶ. NRE Policies

2. Dissemination programs

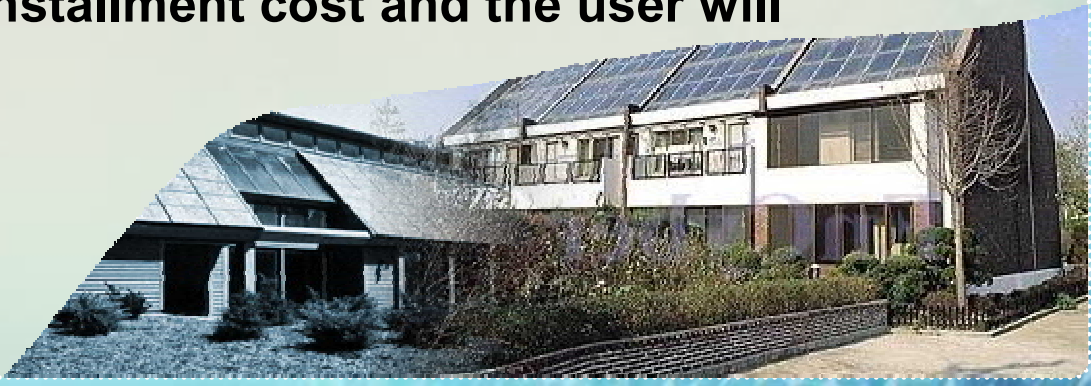
Mandatory programs for NRE facilities Installation at public Institutions

- When constructing a public building exceeding 3,000 square meters, 5% of total construction costs should be used in installing NRE facilities.



100,000 photovoltaic house programs by 2012

- The government covers 70% of the installment cost and the user will cover the remaining 30%



Ⅶ. NRE Policies

2. Dissemination programs

Establishment of 'Green Village'

- A village made up of around 50 houses that depend wholly on NRE.

General subsidies program for dissemination of NRE facilities

- The support measures are equal to that of the program for distribution of photovoltaic houses.

Feed-in Tariff for NRE electricity generation

- Subsidies which are currently provided to electricity generated from NRE. They are financed with the government funds.
- The subsidy program will be expanded to bio and IGCC in the Future

Ⅶ. NRE Policies

2. Dissemination programs

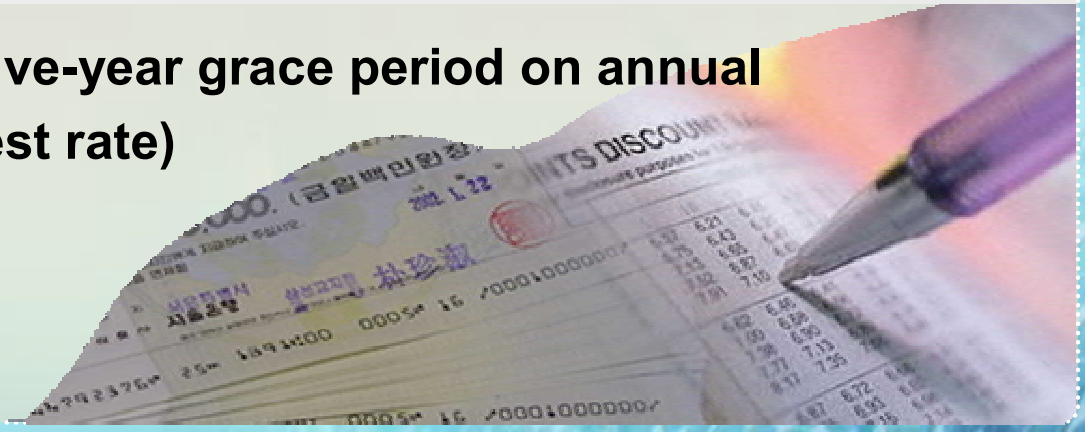
- Fixed Prices of individual resource (won / KWh)

Resource	Photovol-taic	Wind	Small hydro	Landfill gas	Tide power
Fixed Price (US$*)	746.40 (0.68)	107.66 (0.098)	73.69 (0.067)	65.20 (0.059)	62.81 (0.057)

(* : Convert Won into Dollars)

Loan program

- 10-year installment payment with a five-year grace period on annual interest rate of 2.75% (floating interest rate)



Ⅶ. NRE Policies

3. Organizations supporting the NRE initiative

MOCIE

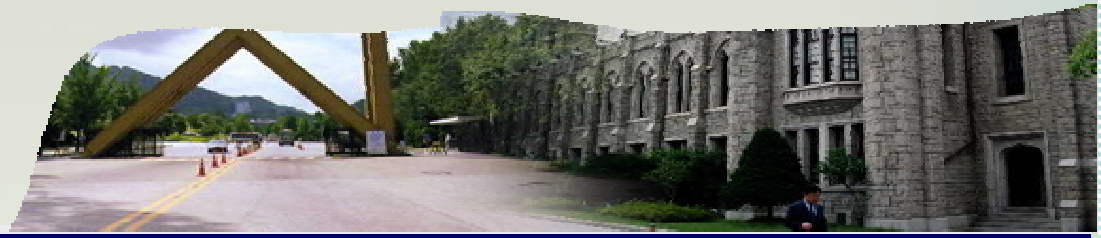
- New & Renewable Energy division consisting of 10 staff members

KEMCO (New & Renewable Energy Center)

- an umbrella organization of MOICE with 70 employees

Three organizations in charge of R&D

- Hydrogen / fuel cells : KIST
- Photovoltaic : Korea University
- Wind : Seoul National University



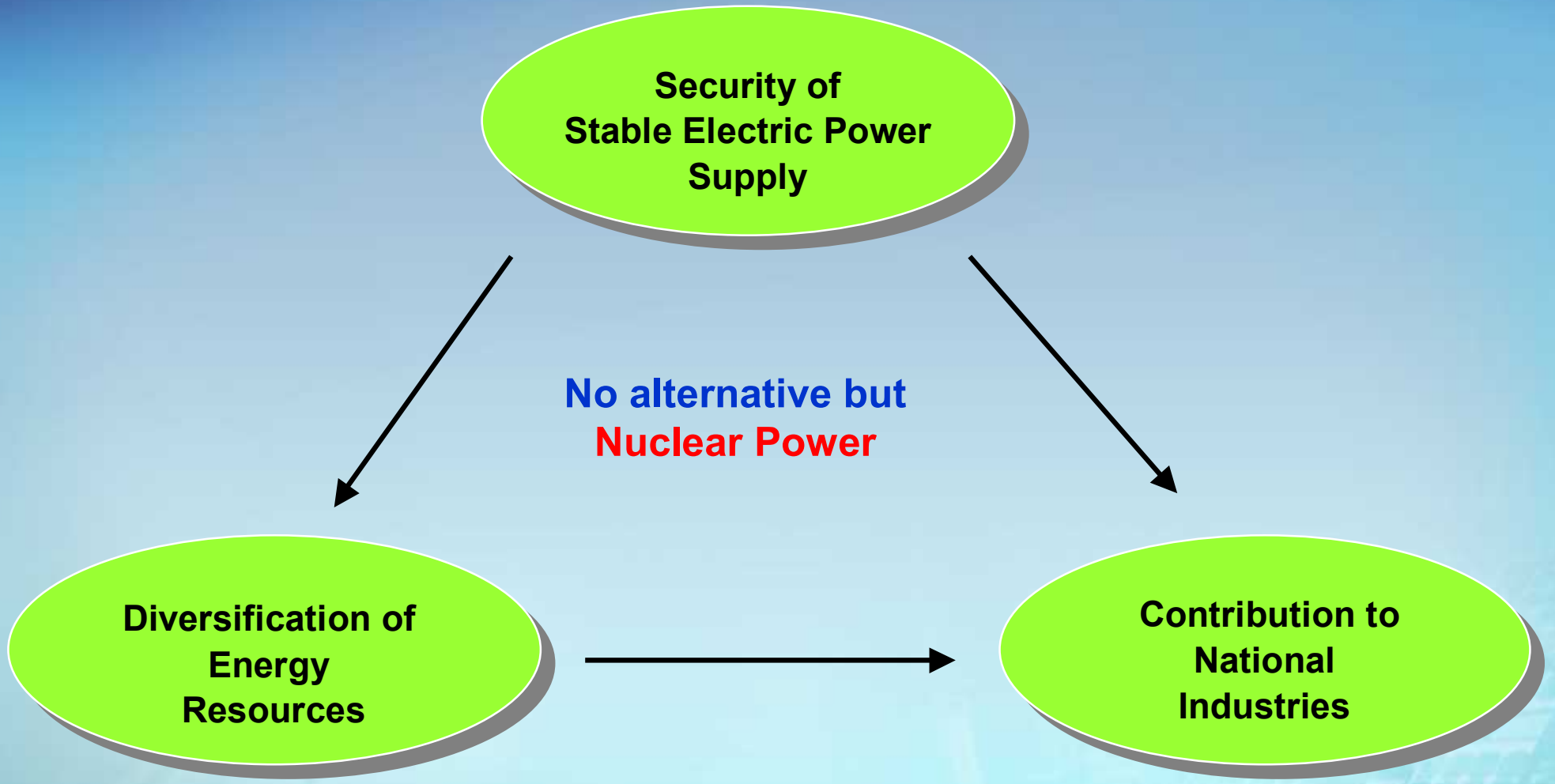
Seven technology advisory groups

- 80 advisors in seven areas i.e solar thermal, bio, Small hydro, waste, Marine, coal liquefaction / gasification and geothermal

Korea Nuclear Power Industry

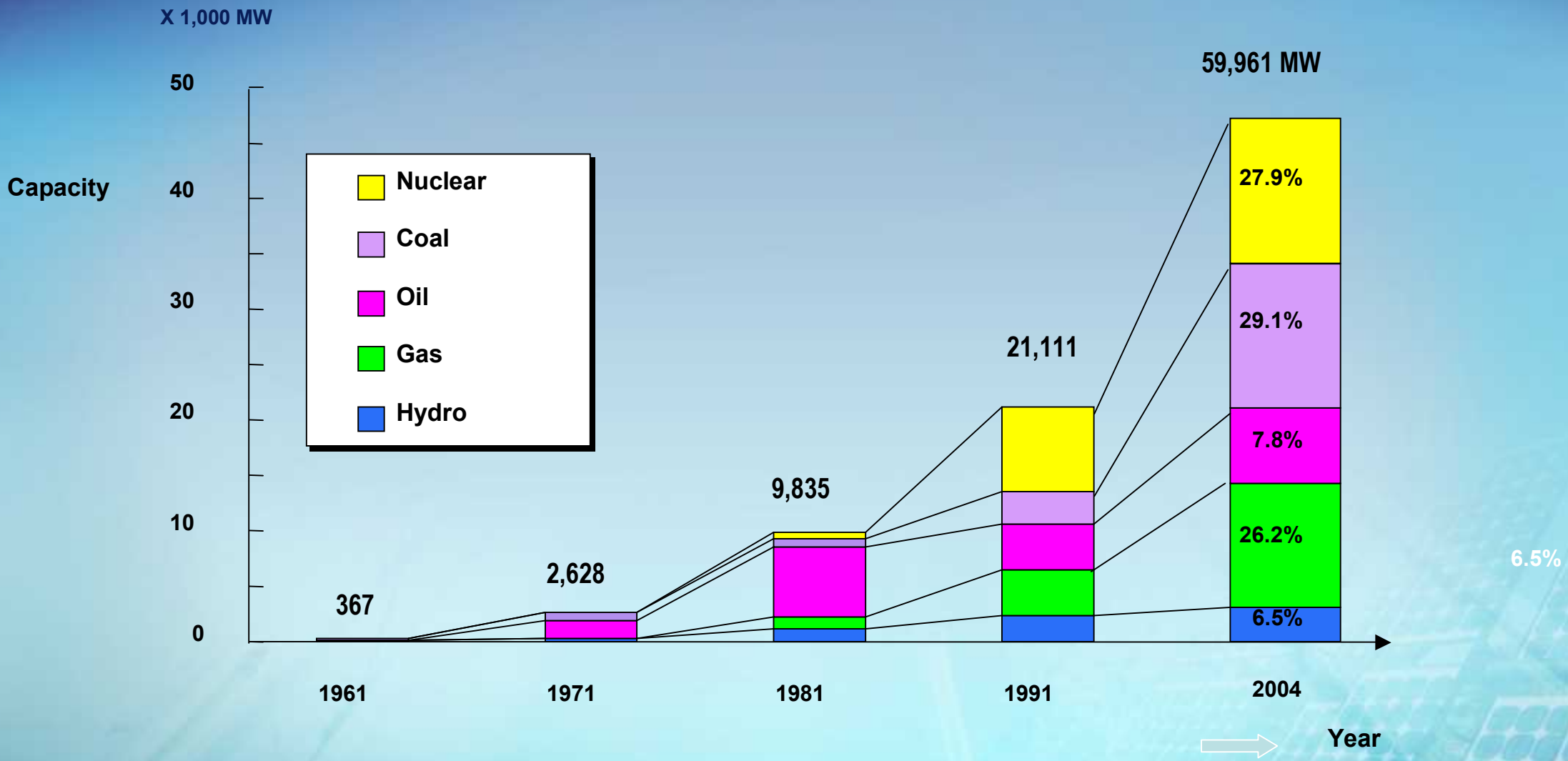
contents

Ⅰ.Why Nuclear Power in Korea?



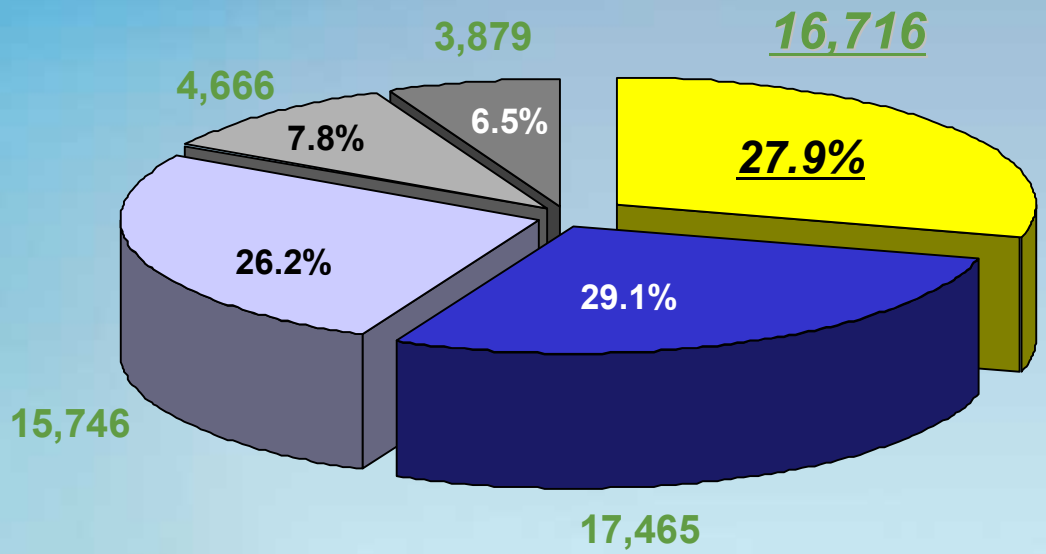
Ⅱ.Current Status

Installed Capacity



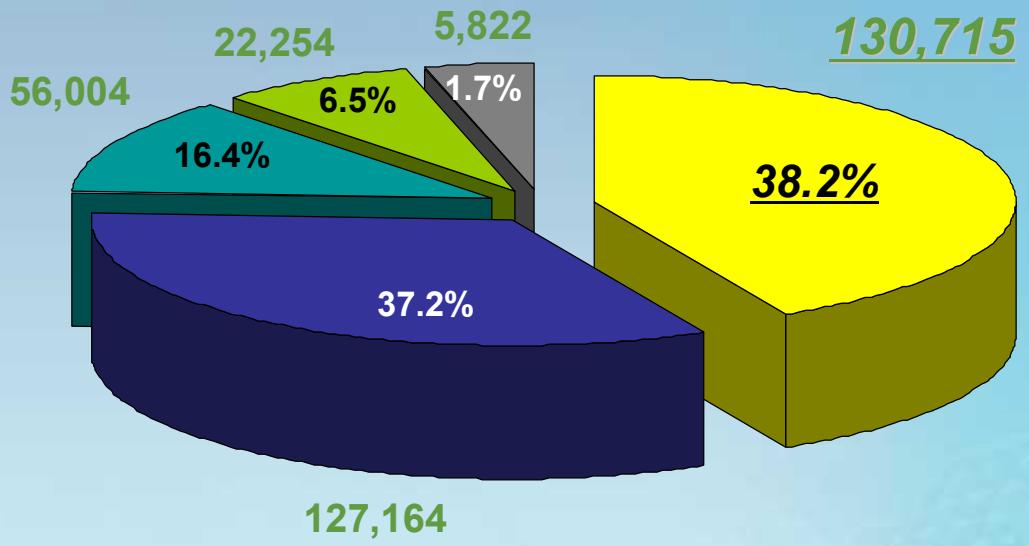
Status of Electric Power (As of the end of 2004)

Installed Capacity



Total: 59,961 MW

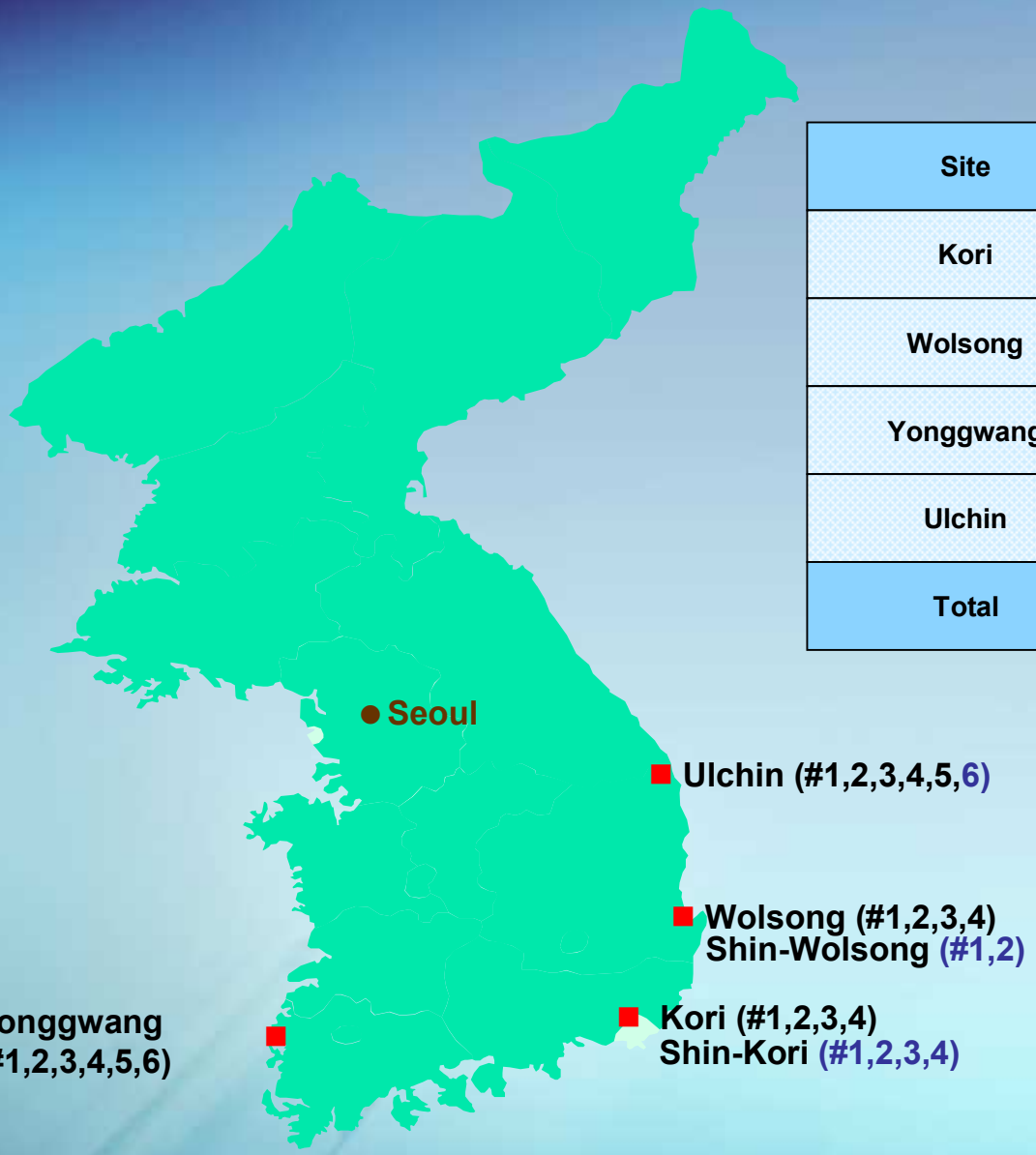
Electricity Generation



Total: 341,959 GWh

Nuclear	Coal	Gas	Oil	Hydro

Status of Nuclear Power Plants



Units (MW)

Site	In Operation	Under Const.	Total
Kori	4 (3,137)	4 (4,800)	8 (7,937)
Wolsong	4 (2,779)	2 (2,000)	6 (4,779)
Yonggwang	6 (5,900)	-	6 (5,900)
Ulchin	5 (4,900)	1 (1,000)	6 (5,900)
Total	19 (16,716)	7 (7,800)	26 (24,516)

Ⅲ.History of Nuclear Power

1960s	1970s	1980s	1990s
Preparation of Nuclear Energy	Introduction of Nuclear Power	Promoting Localization	Technology Self-reliance
			
Joining IAEA ('57) Research Reactor('62)	Construction of Kori #1('71-'78)	Establish Localization Plan('84)	KSNP Development('95)

19 NPPs in operation (16,716 MW)

Korea : 6th largest nuclear power country in the world

KHNP : 5th largest nuclear power company in the world

Technology Self-reliance

Step-by-Step Approach

1970's

- Introduction of NPP
- Turnkey Approach

Foreign Contractors

1980's

- Accumulation of NPP Technology
- Component Approach

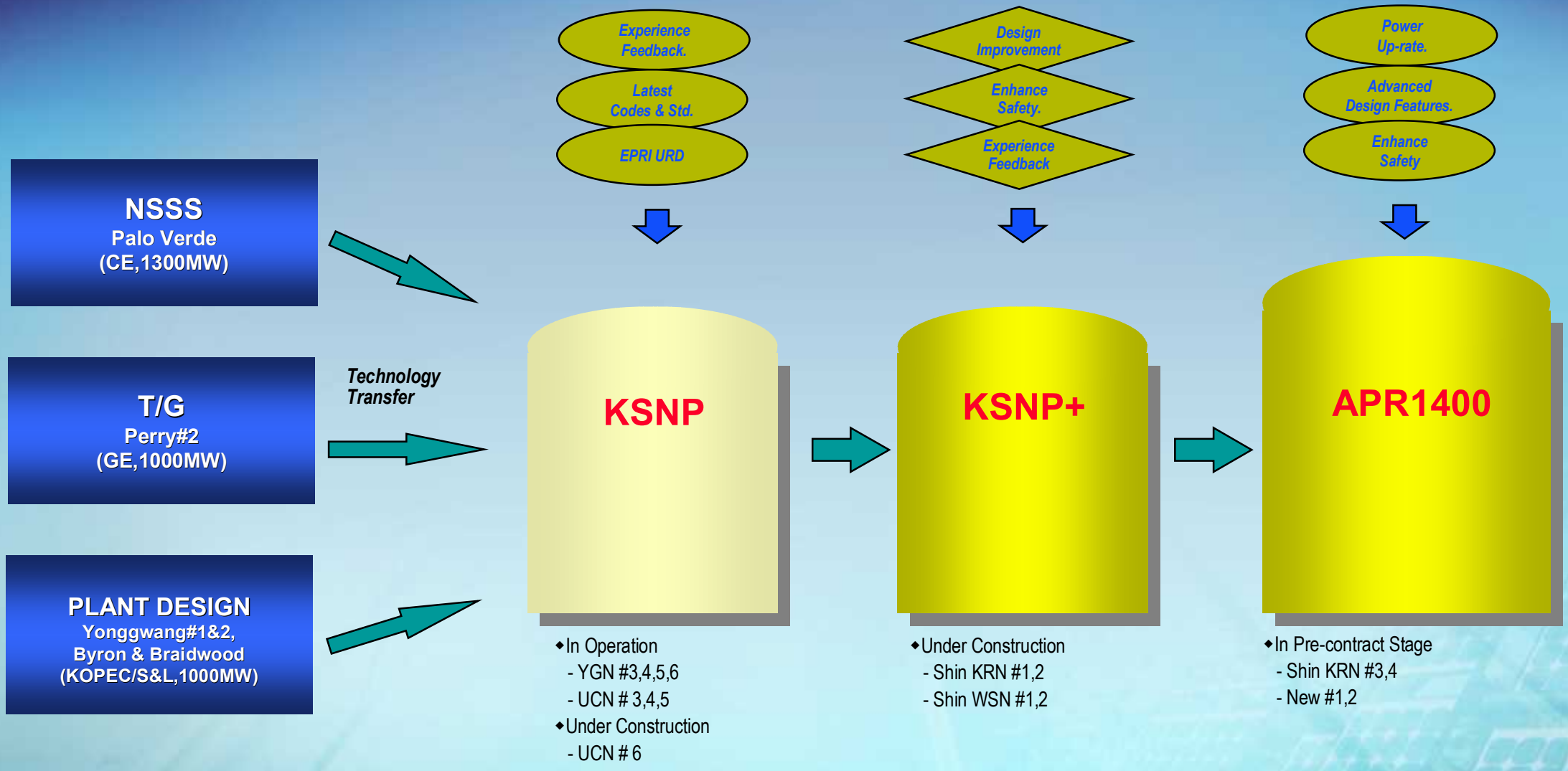
Foreign - Local Joint Design, Joint Manufacturing
- Foreign : Prime Contractors
- Local : Sub-contractors

1990's

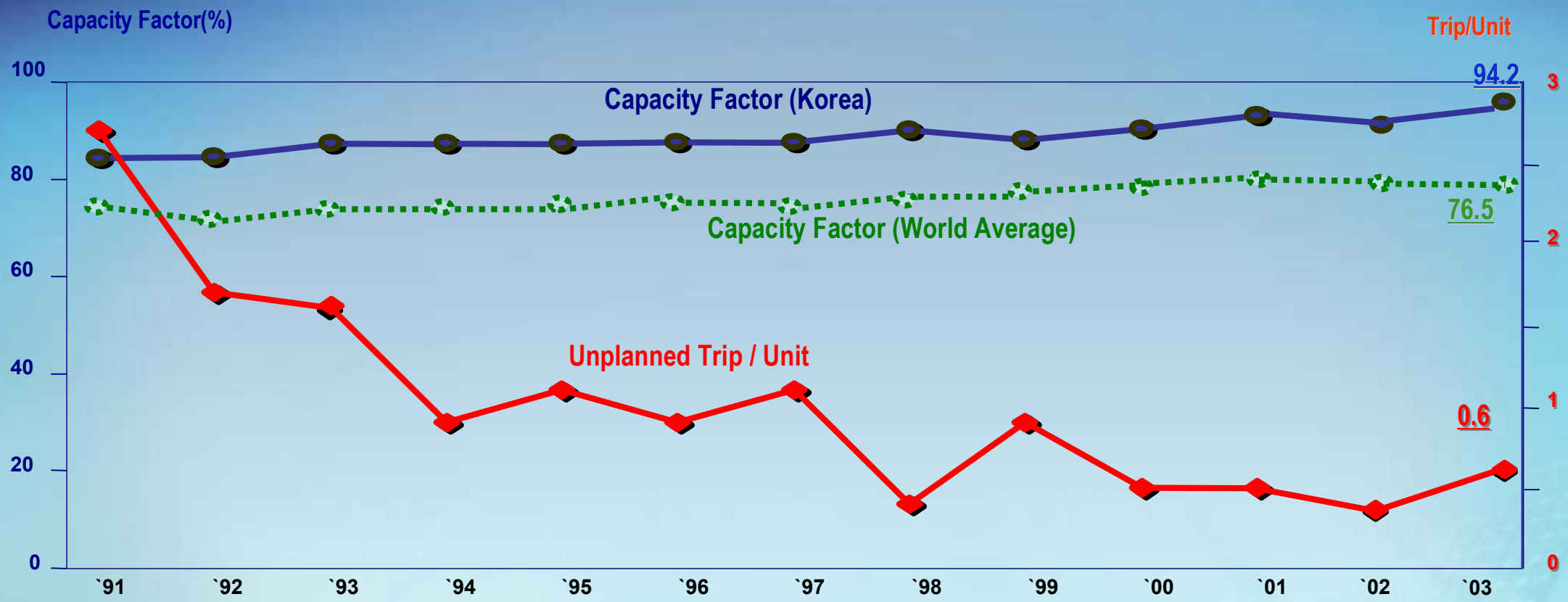
- Technology Self-Reliance
- Development of KSNP
- Development of APR1400

Led by Local Contractors
- Local : Prime Contractors
- Foreign : Sub-contractors

Evolution of Self-Reliance



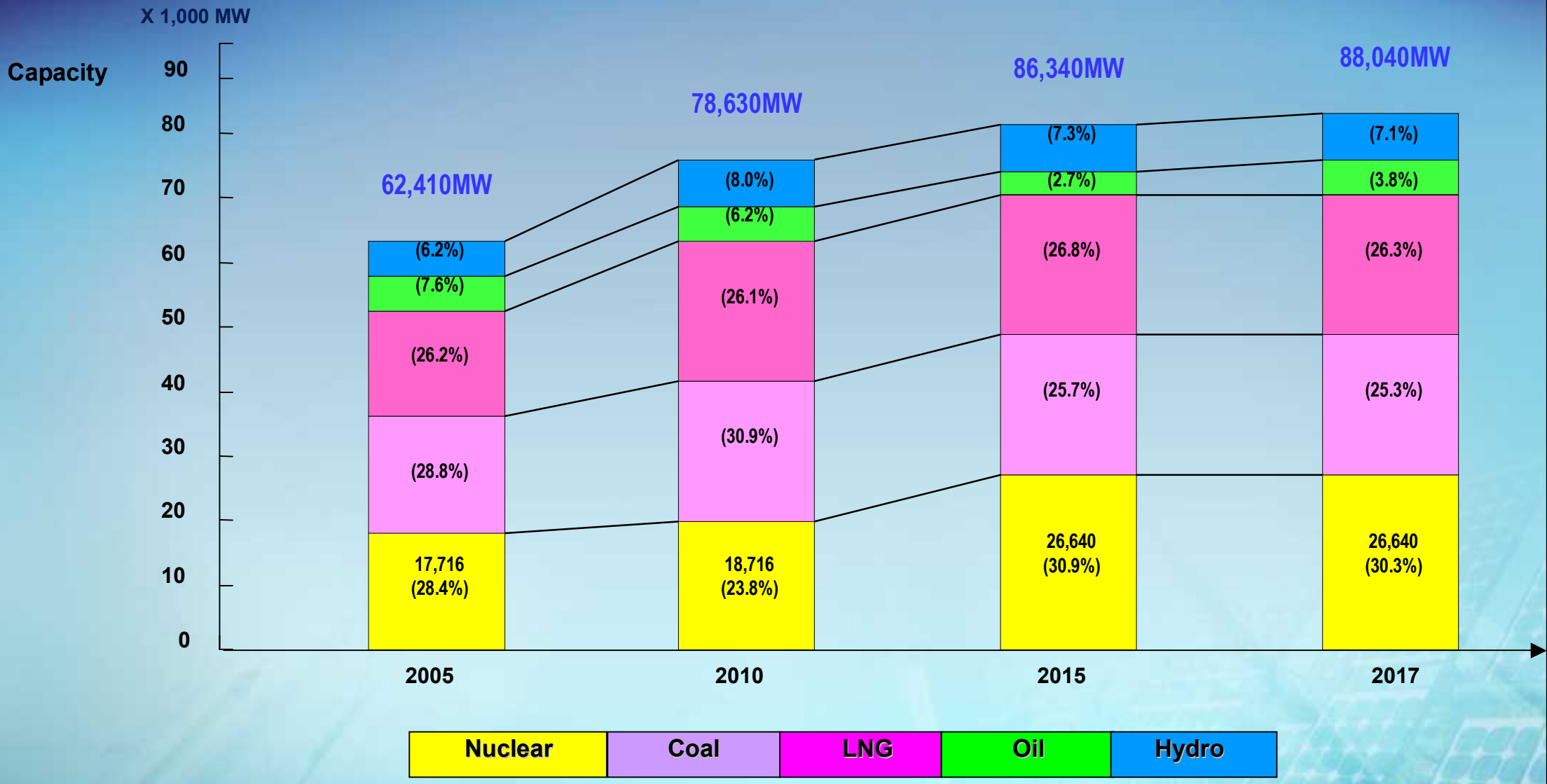
Performance of Operation



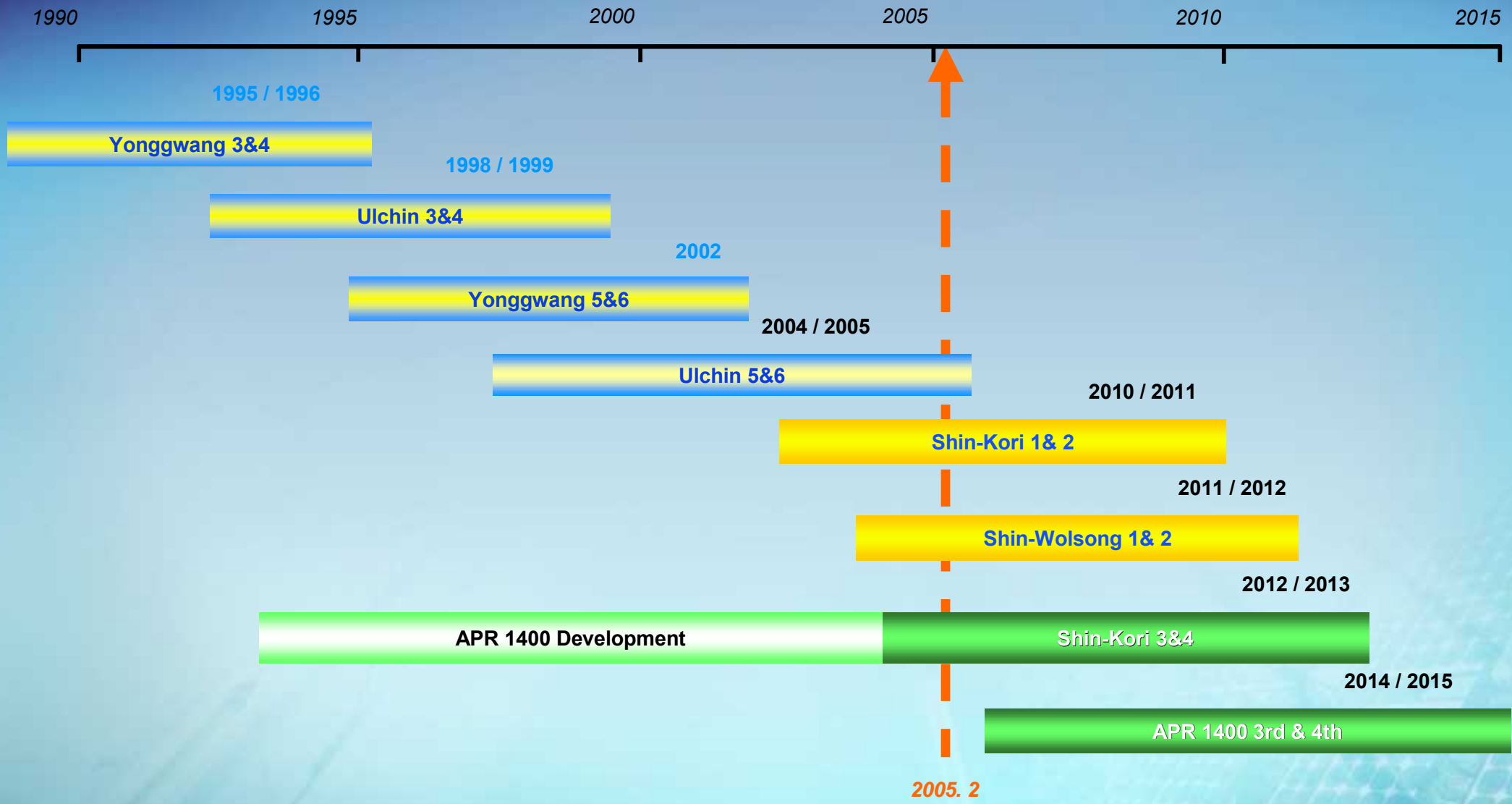
C.F.(%)	84.4	84.5	87.2	87.4	87.3	87.5	87.6	90.3	88.3	90.4	93.2	92.7	94.2
Trips	2.7	1.7	1.6	0.9	1.1	0.9	1.1	0.4	0.9	0.5	0.5	0.4	0.6

Ⅳ.Prospect

Energy Mix in Power Generation Capacity



Nuclear Power Development Plan



Regional Cooperation in New and Renewable Energy, and Nuclear Power

Necessities

1. Economies of scale : huge R&D amount , market enlargement
2. Technology Transfer
3. Public Awareness

Methodology

1. Seminar , Forum , etc
2. Joint Research
3. International Partnership
4. Cooperation with International Energy Organizations (IEA , APEC etc)
5. Code and Labelling Standardization

Thank You!

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