Investor Relations

Global Leading Energy Solution Partner

KEPCO E&C
KEPCO ENGINEERING & CONSTRUCTION COMPANY, INC.

Disclaimer

This material has been produced to provide investors with various information in order for them to get more understanding about KEPCO E&C based on the objective facts as best as we can.

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Company Overview

Korea's Leading Power Plant Engineering Company

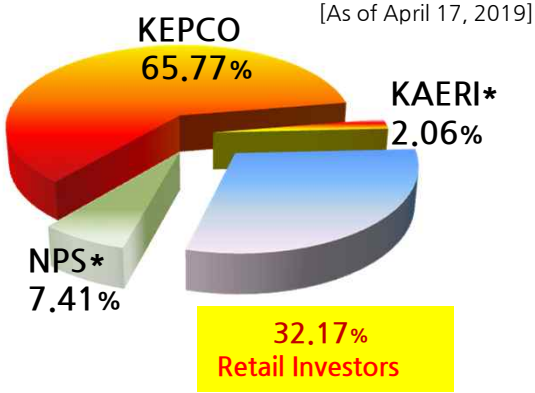
- Korea's leading provider of design and engineering for nuclear, thermal and hydro-electric plants with over 40 years of experience
- Current 100% market share in nuclear power plant design in Korea
- The world's most competitive engineering company specialized in the two sectors: A/E and NSSS
- Expanding its business to Thermal EPC, energy-related business, environment-friendly business, etc.

Corporate Information

CEO & President	Lee, Bae Soo • Former vice president, KEPS • Former advisor, Samsung Engineering
Foundation Date	October 1, 1975
Employees	2,339 (As of Sep 30, 2019)
Business Area	Power plant design & engineering, etc.

Ownership

[As of April 17, 2019]



* KAERI - Korea Atomic Energy Research Institute
* NPS - National Pension Service

IPO Information

Shares Outstanding *Common shares 100%	38,220,000
Listing Date	December 14, 2009
Offered Securities	7,644,000

Dividends

[Unit : KRW]

FY	2015	2016	2017	2018
Dividend Propensity*	25%	24%	40%	41%
Amount (per a share)	200	110	220	140

* Dividend Propensity - Dividend/Net Income *100

Business Overview

Business Area

• Design & Engineering

- Nuclear Power Plant
- Thermal Power Plant
- Combined Cycle Power Plant
- Cogeneration Power Plant

• Energy Solution Package

- Funding
- Consulting
- Procurement
- Post-management

• Eco-friendly Business

- FGD System / DeNOx System
- ESCO, Renewable Energy
- Water Pollution Control
- Wastewater Treatment Facilities

• O&M (Operations & Maintenance)

- Technology & Engineering Support for Operating Power Plants

• National Project

- Government's task

Business Area - Design & Engineering

Leading the standard designs of nuclear power plants and coal-fired power plants

Major Project Experience

•Nuclear power/Reactor

Project	Project Period	Contract Amount (*)	Client
Shin-Kori #5,6	Apr '14 ~ Mar '23	4,167	KHNP
Shin-Hanul #3,4	Mar '16 ~ Dec `23	4,247	KHNP
UAE#1,2,3,4	Mar '10 ~ Dec '20	7,509	Kepco
SMART PPE BOP	June '16 ~ Feb '19	581	KAERI
Baraka Nuclear Power Plant LTEA	Jan '18 ~ Jan '31	3,400	Nawah Energy Company

Others

Project	Project Period	Contract Amount (*)	Client
APR 1400 NRC DC	Apr '14 ~ Sep '19	793	KHNP

(*) Unit : 100 million won.

•Thermal power

Project	Project Period	Contract Amount (*)	Client
Boryeong#4,5,6 Performance Improving	Nov '18~Mar '24	273	KMP
Shin-seocheon	June '14~Dec '19	668	KMP
Goseong Greenpower	May '14~Jan '22	884	SK E&C
Gangneung Anin	Feb '14~Sep '20	960	Samsung C&T
Taean #9,10	June '11~July '19	1,125	KWP

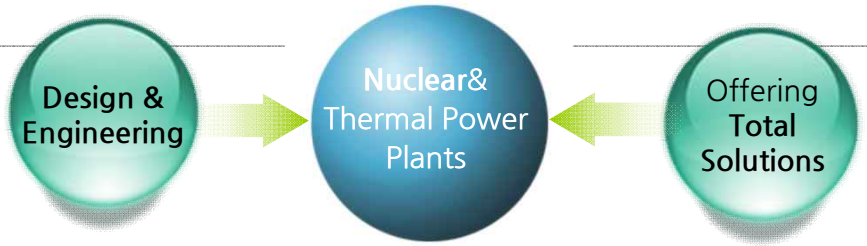
Services performed

- Site selection and feasibility survey
- Engineering and design
- Construction/Project management, licensing support, quality assurance and inspection
- Support for purchasing, owner support, education/training

Business Area - O&M

Contribution to the Improvement of the Operating Power Plants' Operability, Efficiency and Safety

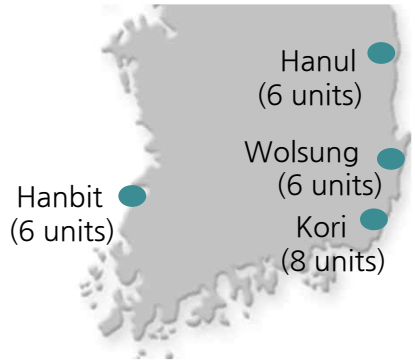
• O&M (Operations & Maintenance)



• Nuclear Power Plants in Operation in Korea

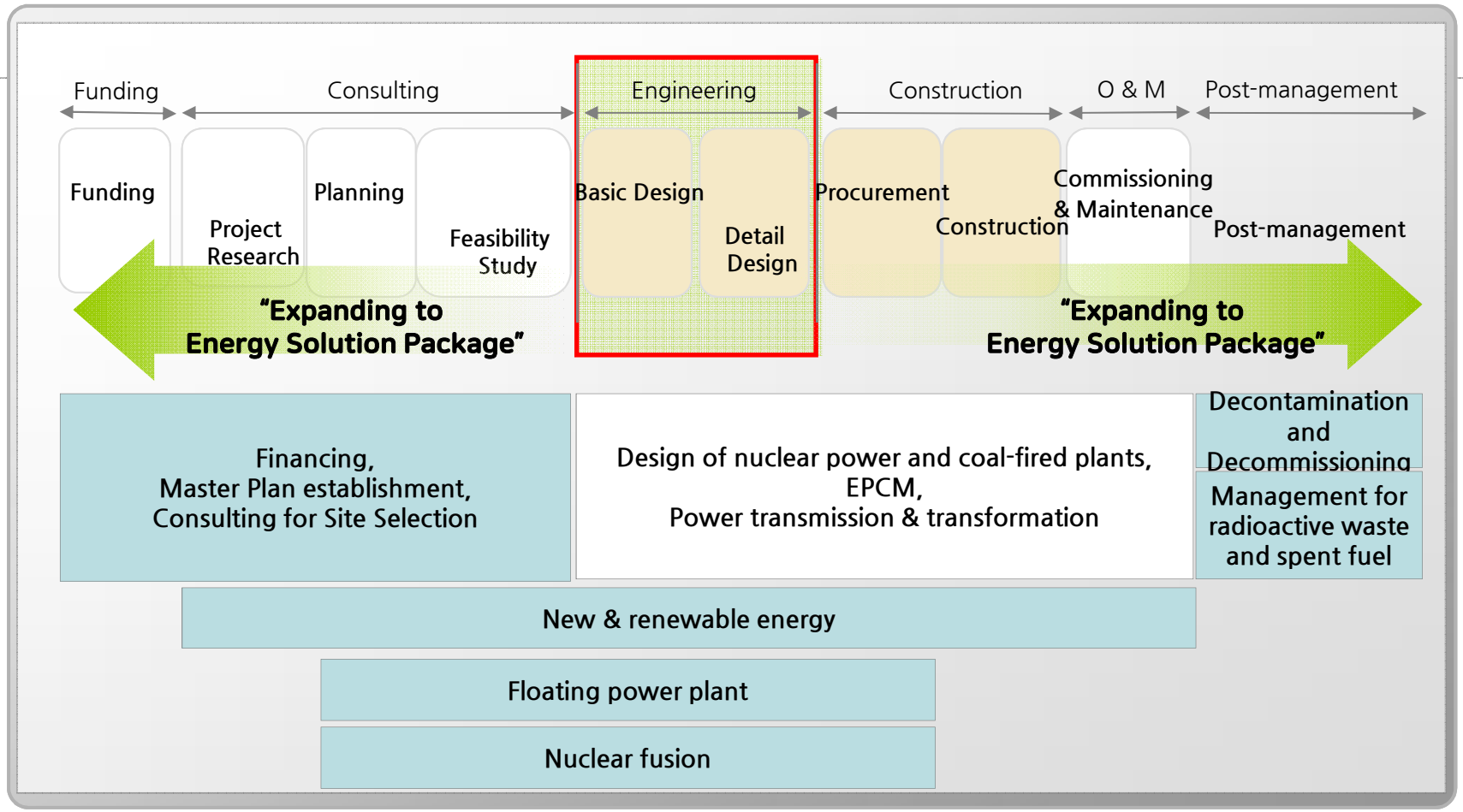
Reactor	Project	First Power	Design
APR 1400	Shin-Kori #3,4	2016 / 2019	KEPCOE&C
OPR 1000+	Shin-Wolsung #1,2	2012 / 2015	KEPCOE&C
	Shin-Kori #1,2	2011 / 2012	KEPCOE&C
OPR 1000	Hanul #5,6	2004 / 2005	KEPCOE&C
	Hanbit #5,6	2002 / 2002	KEPCOE&C
	Hanul #3,4	1998 / 1999	KEPCOE&C
	Hanbit #3,4	1995 / 1996	KEPCOE&C-WEC
CANDU PHWR	Wolsung #3,4	1998 / 1999	AECL-KEPCOE&C
	Wolsung #2	1997	AECL-KEPCOE&C
	Wolsung #1	1983	AECL-CANATOM
PWR	Hanul #1,2	1988 / 1989	Framatome
	Hanbit #1,2	1986 / 1987	Bechtel-KEPCOE&C
	Kori #3,4	1985 / 1985	Bechtel-KEPCOE&C
	Kori #1,2	1978 / 1983	WEC-Gilbert

*The Uljin was renamed Hanul
*WEC - WestingHouse Electric.
*AECL - Atomic Energy of Canada Limited



Business Area - Energy Solution Package

Expanding its business areas to the overall value chain, including pre- and post-management of power plants



Business Area - Eco-Friendly Business and National Business

Developing eco-friendly business and leading the development of national technology as the only listed public-company specialized in engineering

Eco-Friendly Business

Removal of Sulfur oxide and Nitrogen oxide, Development of eco-friendly technology such as CCS

Prevention of optical smog, respiratory system and skin diseases/ Being accordance with Paris Agreement

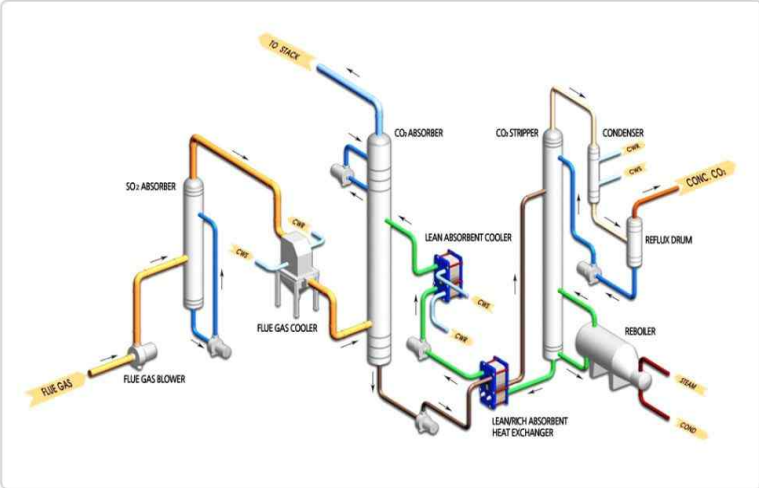
- Flue gas desulfurization
- Flue gas denitrification
- CCS(Carbon Capture Storage)
  : Lowering the level of greenhouse gas
- Prevention of water pollution/
  Location selection and Environmental evaluation

National Business

The only listed public-company specialized in engineering

Leading the development of national technology

- **CCS Engineering**



Technology - Nuclear Power Plant

Korean Nuclear Power Plant Design Development

OPR 1000
Optimized Power Reactor

- Improved Safety
- Improved Operability, Maintainability and Accessibility
- Hanbit Units 5,6
  Hanul Units 3~6

OPR+
Improved OPR

- Optimization of plant arrangement
- Optimization of system design and Equipment capacity
- Shin-Wolsong Units 1,2
  Shin-Kori Units 1,2

1990s - GEN. III

APR 1400
Advanced Power Reactor

- 1,400MW Class large capacity
- A Korean nuclear power reactor improved economic factor
- Shin-Kori Units 3,4
  Shin-Hanul Units 1,2
  BNPP(UAE) Units 1~4

SMART
System-integrated Modular Advanced Reactor

- 90MW
- Reactor, steam generator, pressurizer & coolant pumps integrated in one vessel
- The completion of PPE project

2010s - GEN. III+

- Under Development

APR+
Improved APR

- 1,500MW
- New light water nuclear reactor

VHTR
Very High Temperature Reactor

SFR
Sodium Cooled Fast Reactor

APR 1400
(For Europe, 2017.11)

APR 1400
(US NRC DC*, 2018.9)

2020s - GEN. IV

- **The Competing Reactors**

France	USA	Japan	Russia
AREVA	WH-Toshiba	Mitsubishi	ASE
EPR1600	AP1000	APWR+	VVER-1500

※ All of the reactors in this box are PWR type reactors.

* US NRC DC: United States Nuclear Regulatory Commission Design Certification

Technology - Thermal Power Plant

Coal-Fired Power Plant Design Development

Standard Coal Fire Power Plant (1000MW)

- Ultra-supercritical, highly efficient
- 1,000MW class large capacity
- Development completed as at 2007

Samcheok 1,2
Goseong Hi 1,2
Gangneung Anin 1,2
Dangjin 9,10
Shin-Boryeong 1,2
Taean 9,10

- Dangjin #1~4- World Best Project Awarded <US, Power Engineering, 2001>

Standard Coal Fire Power Plant (800MW)

- Improved heat efficiency through the increase of steam temperature
- 3D CAD model design

Yeonghung 1~4

- Boryeong #3,4 - World Best Project Awarded <US, Electric Power International,1996>

Standard Coal Fire Power Plant (500MW)

- Use of supercritical pressure steam, highly efficient operation
- Environment-friendly design

Boryeong 3~8
Taean 1~8
Dangjin 1~8

Standard Coal Fire Power Plant (200MW)

- Circulating fluidized bed boiler
- High compatibility of fuels

Tonghae 1,2
Yongwol 3

Focus on 10 core businesses in 5 areas

New Growth Businesses for KEPCO E&C

KEPCO E&C's New Growth Businesses

Post management of nuclear Power plant

- Decontamination and Decommissioning of nuclear power plant
- Management for Radioactive waste and spent fuel

New reactor for export

- SMART reactor
- ITER

Converging Technology

- Industry4.0
- Floating Power Plant
- Configuration Management

Clean thermal power plant

- To enhance thermal power plant's performance

New & Renewable Energy

- New & renewable energy
- Fusion & integration

New Growth Businesses - SMART and ITER

• SMART export plan

▫ **SMART - Integral type reactor**
- steam generator, pressurizer, and coolant pump are all integrated into one vessel.

▫ 90MW of electricity output, 40,000ton/day of desalination capacity
- can supply a city with a population of 100,000

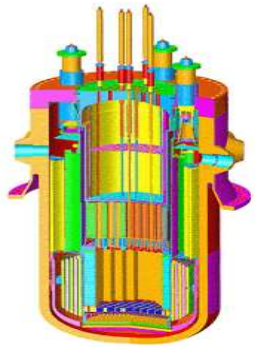
▫ Year 2012 : Acquired SDA(standard design approval) in Korea. (the first SDA as integral type reactor in the world)

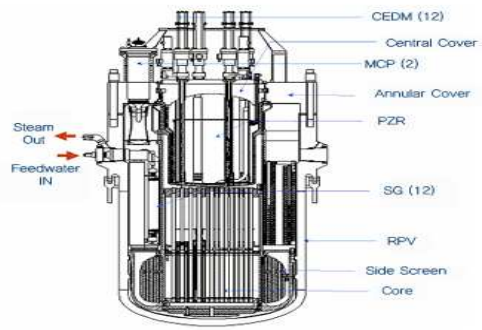
▫ Year 2013 : Cooperation agreement with Saudi Arabia on the introduction of SMART in Saudi Arabia

▫ Year 2015 : Signed a deal to jointly invest in studying the prospect of building at least two SMART in Saudi Arabia

▫ Year 2017 : Performing PPE(Pre-Project Engineering) to build two SMARTs in Saudi Arabia

▫ Year 2019 : Completion of PPE(Pre-Project Engineering) project





• Participation in the international project - ITER

▫ International Thermonuclear Experimental Reactor(ITER) Project

▫ 7 countries that run the project - EU, U.S., Russia, China, Japan, India and South Korea

▫ Total amount of orders KEPCO E&C has received : 63.8 KRW bn. (expecting more orders)

New Growth Businesses - Decommissioning

Expanding businesses for post-management of the early nuclear power plants due to the upcoming closing

• Decommissioning

▫ The early nuclear power plants in Korea

Plant	Commercial operation	Planned close	
KORI #1	1978	2017	license extended 2007 → 2017
Wolsung #1	1983	2012	license extended 2012 → 2018
KORI #2	1983	2023	
KORI #3	1985	2024	
KORI #4	1986	2025	

- Kori-1, the first nuclear power plant in Korea, is scheduled to become the first reactor to go dormant.
  - it had 30-year lifespan expired in 2007, but gained approval of additional 10-year operation.
- The Korean government announced in June, 2015 that the development of the 17 decommissioning techniques that have yet to be finished would be completed by 2021.

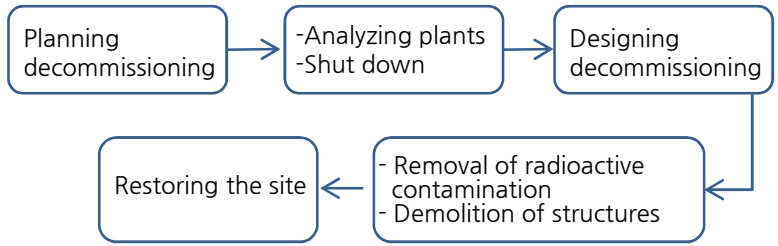
• Decommissioning?

- series of various follow-up processes upon the completion of operation regarding nuclear power plant facilitates.

• Minimization of radioactive contamination from facilities after decontamination and decommissioning.

• Republic of Korea and UK have strengthen cooperation in the research on nuclear decommissioning.

• Decommissioning Flow



New Growth Businesses - Configuration Management

Application of Configuration Management

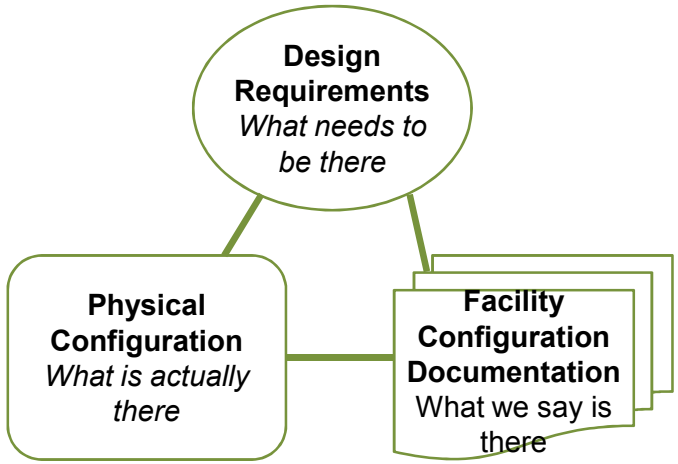
• Need of Configuration Management for prevention of critical accident

Situation	Purpose	Project
• 25~29% of accidents in nuclear plants relating with error of Configuration Management • Satisfaction of regulatory requirements	• IT-basis establishment of Configuration Management • Maintaining consistency between structure, systems and components • Assurance of that operational information consistent with design requirments is available	• Project : Establishment of system of Configuration Management for Shin-kori #5,6 • Contract Period : 2019.1 ~ 2023.10 • Contract Amount : KRW 27.1billion

• Definition

Configuration Management

Definition. The process of identifying and documenting the characteristics of a facility's structure, systems and components (SSCs) (including computer systems and software) and of ensuring that consistency is maintained between the design requirements, physical configuration, facility configuration and documentation.

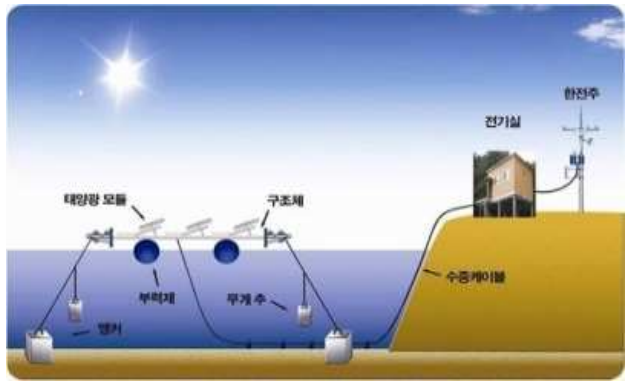


New Growth Businesses - New and Renewable Energy

Expanding the portion of new & renewable energy by the government's policy

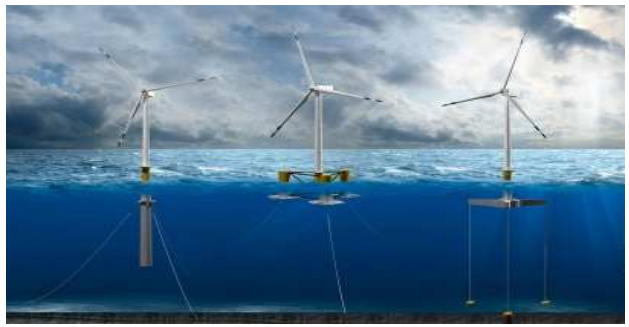
The 3rd Energy Plan : Transition to Clean and Safe Energy Mix (2019.6)

- Reducing the number of nuclear power plants and coal-fired power plants
- Expanding the portion of renewable energy to 30~35%(2040)
- Lowering the level of fine dust and performing the 2030 Road map to reduce the level of greenhouse gas

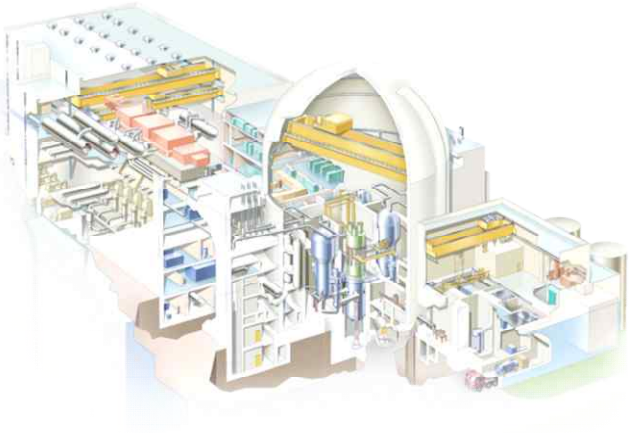


Developing and Performing Businesses for New & Renewable Energy

- Wind Power Plant : In Jeju Island, Preparing the business
- Solar Power Plant : Research for development of diverse solar-power module



- Other Businesses : Fuel cell, Biogas, Coal gasification, Energy Independent Island, Zero energy building



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