KEPCO,
The Best Partner for your Nuclear Future

June 1, 2011
1. Introduction of KEPCO
2. Status of Korean Nuclear Industry
3. Competitiveness of Korean Nuclear Power Plant
4. Localization Experience in Korea
Part 1

Introduction of KEPCO

- Overview of KEPCO
- Power Group Leader
- Domestic Power Plants in Operation
Overview of KEPCO

Government

KEPCO Group

- **Total Assets**: $82 billion
- **Revenues**: $30 billion
- **Market Capitalization**: $20 billion
- **Employees**: 45,000 persons
- **Credit Rating**: A1, A (Moody’s, S&P)

KEPCO

Generation: 94%
Transmission: 100%
Distribution: 100%
Power Sales

KEPCO Group

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- **Revenues**: $30 billion
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- **Employees**: 45,000 persons
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Power Group Leader

(As of January 31, 2011)

**GENCOs**
- **KOSEP** (100%)
  - Thermal & Renewable
- **KOMIPO** (100%)
  - Thermal & Renewable
- **W P** (100%)
  - Thermal & Renewable
- **KOSPO** (100%)
  - Thermal & Renewable
- **E W P** (100%)
  - Thermal & Renewable

**Nuclear Subsidiaries**
- **KHNP** (100%)
  - Nuclear & Hydro Generation
- **KEPCO E&C** (77.9%)
  - Engineering Service
- **KEPCO KPS** (75.0%)
  - Maintenance & Repair
- **KEPCO KNF** (96.4%)
  - Nuclear Fuel
- **K D N** (100%)
  - IT Service

* ( ) : % of KEPCO’s ownership
### Domestic Power Plants in Operation

<table>
<thead>
<tr>
<th></th>
<th>Nuclear</th>
<th>Oil</th>
<th>LNG</th>
<th>Coal</th>
<th>Hydro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>21 units</td>
<td>18 units</td>
<td>99 units</td>
<td>50 units</td>
<td>27 units</td>
</tr>
<tr>
<td>Energy</td>
<td>148,000 GWh (18 GW)</td>
<td>20,000 GWh (7 GW)</td>
<td>65,000 GWh (18 GW)</td>
<td>193,000 GWh (24 GW)</td>
<td>6,000 GWh (6 GW)</td>
</tr>
<tr>
<td>Percent</td>
<td>35%</td>
<td>5%</td>
<td>15%</td>
<td>44%</td>
<td>1%</td>
</tr>
</tbody>
</table>

**Total:** 215 units / 434,000 GWh
Part 2

Status of Korean Nuclear Industry

- Nuclear Power Plants in Korea
- Korean Nuclear Industry
- Plentiful Construction & Operation Experience
- Reactor Technology of Korea
- Status of NPP Construction
Nuclear Power Plants in Korea

In operation:
21 units
(18,716 MW)

Under construction:
7 units
(8,600 MW)

Under planning:
10 units
(15,400 MW)

Seoul

Yong-gwang: 6 units

Kori: 8 units

Ulcin: 8 units

Wolseong: 6 units
Regulatory Body

Ministry of Education, Science & Technology
- KINS
- KINAC

Leading Company

Brand Power
- Leading Role
- Financing Capability
- Global Experience

Nuclear Safety
- Licensing
- Inspection

Safeguards
- Export Control
- Physical Protection

Research and Development

Operation and Management

Design and Engineering

Nuclear Fuel

Maintenance and Services

Equipment Manufacturing

Construction
Plentiful Construction & Operation Experience

- **1970s**
  - Completion of Kori Unit 1 (1978)
  - First unit complete
  - 8 units complete

- **1980s**
  - Introduction of Nuclear Power
  - Technology Accumulation
  - 8 units complete

- **1990s**
  - Development of OPR1000
  - Completion of First OPR1000 (1995)
  - 7 units complete
  - 7 units under construction

- **2000s**
  - Development of APR1400
  - Completion of First APR1400 (2013)
  - 5 units complete
  - 7 units under construction
APR1400 (Evolutionary Gen - III Reactor)

<table>
<thead>
<tr>
<th>Type</th>
<th>PWR</th>
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</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>60 Years</td>
</tr>
<tr>
<td>Electric Output</td>
<td>1,400 MWe</td>
</tr>
<tr>
<td>Construction Period</td>
<td>54 Months</td>
</tr>
<tr>
<td>Seismic Design Basis</td>
<td>0.3 g</td>
</tr>
</tbody>
</table>

OPR1000 (Proven Technology)

<table>
<thead>
<tr>
<th>Type</th>
<th>PWR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>40 Years</td>
</tr>
<tr>
<td>Electric Output</td>
<td>1,000 MWe</td>
</tr>
<tr>
<td>Construction Period</td>
<td>52 Months</td>
</tr>
<tr>
<td>Seismic Design Basis</td>
<td>0.2 g</td>
</tr>
</tbody>
</table>

- APR1400: Advanced Power Reactor 1400MW
- OPR1000: Optimized Power Reactor 1000MW
8 units : Under Construction / 9 units : In Operation

**OPR1000 Project**

**Shin-Kori #2**
- Progress Rate : 99%
- #1 Completion : Dec. 31, 2010

**Shin-Wolseong #1,2**
- Progress Rate : 87%
- #1 Completion : Mar. 31, 2012

**APR1400 Project**

**Shin-Kori #3,4**
- Progress Rate : 66%
- #3 Completion : Sept. 2013

**Shin-Ulchin #1,2**
- Excavation : Apr. 2010
- #1 Completion : June 2016

**UAE BNPP #1,2,3,4**
- APR1400 4 units
- #1 Completion : May 2017
Competitiveness of Korean Nuclear Power Plant

- World’s Best Operation Performance
- Enhanced Safety
- Optimized Construction Period
- Robust Supply Chain
- Excellent Nuclear Human Resources
- Nuclear Human Resources Development
Annual Average Capacity Factor

- Over 15% higher than the world average
- Higher than the figures of major supplier countries
- Highest among countries running 10 units or more

※ Source: Nucleonics Week, April 2010
Korea’s 3-year average unplanned capability loss factor is 0.6%.

Compared to the global average of 5.4%, Korea’s loss factor is significantly lower than that of other supplier countries.

※ Source: IAEA PRIS, July 2010
WANO PI Index as of June 2009

Average collective radiation exposure as of end-2008

Unit: man-Sv/yr/unit
Enhanced Safety

Enhanced Gen-Ⅲ Design
- Advance design features to comply with ALWR URD
- Severe Accident Mitigation System
- Fortified seismic design basis

International Standards
- Application of up-to-date Korean, US NRC regulatory requirements
- Compliance with IAEA Safety Standards and requirements

OPR 1000
1,000 MWe Optimized Power Reactor
- In Operation - YGN #3,4 ('95/'96) - UCN #3,4 ('98/'99)
- Under Construction - SKN #1, #2, #3, #4

Improved OPR 1000
- In Operation - YGN #5,6 ('02/'02) - UCN #5,6 ('04/'05)
- Under Construction - SKN #1, #2, #3, #4

APR 1400
1,400 MWe Advanced Power Reactor
Under Construction
- SKN #3,4, SUN #1,2

* ALWR URD: Advanced Light Water Reactor User Required Design
Optimized Construction Period

**Experience Feedback**

**Standardization**

**Application of the Latest Technology**

**OPR1000**

- Yonggwang #3,4: 63 months
- Ulchin #3,4: 61 months
- Yonggwang #5,6: 58 months
- Ulchin #5,6: 55 months
- Shin-Kori #1,2: 53 months
- Shin-Wolsong #1,2: 52 months

18% Reduction

**APR1400**

- Shin-Kori #3,4: 58 months
- UAE Braka #1,2: 61 months
- Shin-Ulchin #1,2: 54 months
- Target: 48 months

(Unit: Month)
Korea nuclear industry possesses highly skilled manpower in the various fields of nuclear power based on its continuous NPP construction and operation.
Nuclear Human Resources Development

Well-Organized Training System

Industry

KEPCO-INGS
- International Nuclear Graduate School
  - Nuclear Business & Technology Expert
  - Master’s/Doctoral Courses

KHNP (Korea Hydro & Nuclear Power Co.)
- Nuclear Power Education Institute
  - NPP Construction & O&M Personnel
- Nuclear Site Training Center (4 facilities)
  - Operator / Local Engineer

KPS (Korea Plant Service & Engineering Co.)
- Nuclear Maintenance Engineer

Academy

KAERI (Korea Atomic Energy Research Institute)
- Nuclear Training & Education Center
  - Nuclear Policy and R&D Manpower
  - International Nuclear Training Program

KINS (Korea Institute of Nuclear Safety)
- International Nuclear Safety School
  - Nuclear Safety & Regulatory Manpower
  - International Nuclear Safety Master’s Program

Universities
- Seoul National University
- Korea Advanced Institute of Science & Tech. (KAIST)
- Hanyang University
- Kyung-Hee University, etc
KEPCO International Nuclear Graduate School
-The world’s first graduate school focusing exclusively on nuclear power plant studies.

- Purpose: To foster nuclear leaders
- Degree: MS/Doctor of Technology
- OPEN: 2012. 3
- Capacity: 200 Persons
  - Domestic graduate student: 50%
  - Foreign graduate student: 50%

(※ In case of country on the priority to introduce Korean Reactor, all educational expenses will be free of charge.)
Part 4

Localization Experience in Korea

- Step-by-Step Approach for Localization
- Localization Results
- Adoption of Step by Step Approach
- Localization Policy Structure
- Equipment Localization Plan
- Establishment of Localization Program
Step-by-Step Approach for Localization

1st Phase (1970s)
- Introduction of NPP
- Turnkey Approach

Led by Foreign Contractors

2nd Phase (1980s)
- Accumulation of NPP Technology
- Component Approach

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

3rd Phase (1990s)
- Technology Self-Reliance
- Development of OPR1000
- Development of APR1400

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

<table>
<thead>
<tr>
<th>Equipment</th>
<th>1st Phase</th>
<th>2nd Phase</th>
<th>3rd Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>0</td>
<td>37</td>
<td>75</td>
</tr>
<tr>
<td>Equipment</td>
<td>8</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

Localization Ratio (%)

- Kori #1
- Kori #2
- Wolsong #1
- Kori #3,4
- Yong gwang #1,2
- Ulchin #1,2
- Yong gwang #3,4
- Ulchin #3,4
- Yong gwang #5,6
Adoption of Step by Step Approach

1st Step
Technology Accumulation
Implemented by KEPCO with local participation

2nd Step
KEPCO - Local Joint Implementation
Implemented by local companies with KEPCO assistance

3rd Step
Accomplishment of Technology Self-Reliance
Implemented by local prime contractor with KEPCO assistance as sub-contractors
Equipment Localization Plan

- Prepare Equipment List
- Vendor Survey

Korea’s Localization Experience

Localization Planning Committee
- Prepare Localization Plan

Plant Owner / KEPCO
- Vendor Qualification & Selection

Plant Owner / KEPCO
- Purchase Equipment
Government’s strong support

- Legislation and financial assistance to promote systematic cooperation among local suppliers and plant owner/KEPCO

Connected with National Industry Development Plan

- Covering all industrial sectors: heavy machinery, electrical, chemistry, etc as well as nuclear industry

Assessment of local industries

- For A/E, NSSS (Design & Manufacture), T/G, BOP, Construction, Start-up and Overall Project Management
KEPCO's Commitment

KEPCO is ready to realize your country’s Nuclear Power Program

- on committed Time
- within a reasonable Budget
- with guaranteed Performance
KEPCO is ready to be a reliable and dedicated partner contributing to the development and prosperity of your country.