Infrastructure & Localization of Korean Nuclear Power
1 History of Korean Nuclear Power
Beginning of Nuclear Power in Korea

**Kori Unit 1**

- Korea’s 1st commercial reactor
- Capacity: 587 MW
- Project Type: Turn-key
- Main Contractor: Westinghouse
- Project Cost: US$320 million
- Start of Construction: March 1971
- Commercial Operation: April 1978

*Groundbreaking ceremony for Kori Unit 1, March 1971*
History of NPP Development in Korea

- **1970s**
  - Korea’s First NPP (turnkey)
  - Kori Unit 1

- **1980s**
  - Localization (Non Turn-key)
  - Wolsong Unit 1
  - Kori Units 2-4
  - Yonggwang Units 1-2
  - Ulchin Units 1-2

- **1990s**
  - Technical Independence
  - OPR1000 Development (1995)
    - Yonggwang Units 3-4
    - Ulchin Units 3-4
    - Wolsong Units 2-4

- **2000s**
  - APR1000 Construction
    - APR 1400 Development (2001)
      - Yonggwang Units 5-6
      - Ulchin Units 5-6

- **2015**
  - Completion of Shin-Ulchin Units 1-2 (2015)
  - Technical Self-Reliance
    - Today:
      - 5 units under construction
      - 4 units exported (UAE)

- **1986**
  - Chernobyl accident

- **1979**
  - TMI accident
Status of Nuclear Power Plants

- **In Operation**: 23 units (20,716 MW)
- **Under Construction**: 5 units (6,600 MW)
- **Planned (by 2023)**: 6 units (8,400 MW)
Under Construction

4 units

Korea

Under Construction

5 units

Simultaneously Constructing 9 NPPs
2 Infrastructure of Korean Nuclear Industry
Nuclear Institutions and Organizations

Korea's Wholehearted Commitment & Support for Nuclear Power

Government
- Ministry of Foreign Affairs & Trade
- Ministry of Knowledge Economy
- Knowledge Economy Committee

Industry
- Overseas Project
- Operation & Management
- Design & Engineering
- Equipment Manufacturing
- Maintenance & Services
- Nuclear Fuel
- Construction

Organizations
- Nuclear Safety and Security Commission
- MKE
- Nuclear Institutions and Organizations
- Education & R&D
- R&D
- Public Acceptance
- Radwaste Management
- Export
- Control
- Nuclear Safety
- Nuclear Medical
- Export Support

Associations
- Korean Nuclear Society
- The Korean Society for Nondestructive Testing
- Women Interested in Nuclear
- Korea Atomic Industrial Forum
- Korea Coating Experts Society
Manpower Resource Chain

Equipment Design & Manufacturing: 15,000
Operation & Maintenance: 10,000
Design & Engineering: 10,000
Construction & Project Management: 15,000
Nuclear Support (R&D, QA, Nuclear Safety, HRD): 10,000

60,000

A Pillar for the Development of the Korean Nuclear Industry
Robust Supply Chain

- Commissioning & Operation
- Nuclear Fuel
- Maintenance
- Design & Engineering
- Manufacturing
- Construction

Companies:
- ICHNP
- KEPCO NF
- KEPCO KPS
- KEPCO E&C
- DOOSAN
- Westinghouse
- HYUNDAI
- HYOSUNG
- Samsung
- GS E&C
- DAEIL

Soci Value, Better Life
Over 300 Korean BOP Vendors
40 years of Continuous Construction Experience
**Post-Fukushima Safety Review**

### IAEA IRRS Results

**Purpose:** To review the effectiveness of Korea’s framework for nuclear safety

**Results:** Identified 15 good practices and verified the excellence of Korean nuclear safety regulatory regime

“Korea’s response to the accident at Fukushima has been prompt and effective...”

* IRRS: Integrated Regulatory Review Service

### Safety Enhancement Measures

After Fukushima accident, all 21 of Korea’s operating NPPs were inspected

**Results:**
- Safe against expected earthquake and tsunami
- Plan to invest US$1bn in 5 years to improve the safety of NPPs against unexpected natural catastrophes
“We will continue our policy to promote nuclear power.”

Korean President Lee Myung-bak
UN Nuclear Safety Meeting (Sept. 22, 2011)

40 NPPs in operation by 2030

60%
Localization of Korean Nuclear Power
Localization Experience in Korea

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
- Local: Prime Contractors
- Foreign: 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 Experience in Korea

Localization Results

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<th>Phase</th>
<th>Equipment (%)</th>
<th>Design (%)</th>
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Localization Ratio (%)
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
Localization Policy Structure

Government

Electric Power Policy

Plant Owner

Industrial Policy

Establishment of Overall Nuclear Power Localization Plan

- Design
- Equipment
- Construction
- Fuel
- O & M
Equipment Localization Plan

- Equipment List
- Vendor Survey

Korea’s Localization Experience

Localization Planning Committee
- Localization Plan

Plant Owner / KEPCO
- Vendor Qualification & Selection

Plant Owner / KEPCO
- Purchase of Equipment
Establishment of Localization Program

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, electronics, 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 support

Independent Construction & O&M

Long term Partnership
- Maximum Use of KEPCO’s robust supply chain
- Continuous Localization support

Nuclear Fuel
- Nuclear fuel manufacturing technology transfer
- Joint development for uranium mine

Equipment Manufacturing
- Localization planning committee
- Assessment of Local company
- Certification of ASME section III

O&M skill
- Korea’s world class O&M skill transfer though training program

Human Resource Development
- Nuclear policy & planning
- Nuclear laws & regulation
- Design & engineering
- Project management, etc.
KOREA’s Commitment

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

Thank you

with guaranteed Performance

within a reasonable Budget