Managing Special Nuclear Materials in Commercial SNF in the ROK
- THE ERA OF ENERGY TRANSITION -

YONGSOO HWANG
June 2018
The Recent Change in the National Policy for the Nuclear Energy Installation

- **New National Policy**
  - No new NE Installation
  - No lifetime extension

- **The 8th Electricity Supply Plan w PSE for New Kori Units 5-6**
  - National debate for the continuation of the construction for two units
  - S/D of two symbolic units
    - KORI UNIT 1: 2017 June
    - WOLSONG UNIT 1: 2018 June
  - Cancellation of two new sites

- **The Upcoming National Basic Energy Plan**
  - Gradual Phase-out of the NE Installation Fleets
  - Emphasis on the New Build for the Renewable Energy
Picture for the Nuclear Power Generation - 23 in operation & 2 shut downed

- **Kori Complex**
  - Original Kori: Units 1, 2, 3, 4
  - New Kori: 1, 2, 3, 4, 5, 6

- **Wolsong Complex**
  - Original Wolsong (CANDUs): Units 1, 2, 3, 4
  - New Wolsong (PWRs): 1, 2, 3, 4

- **Ulchinn Complex**
  - Original Ulchinn: 1, 2, 3, 4, 5, 6
  - New Ulchinn: 1, 2, 3, 4

- **Younggwang Complex**
  - Original Ulchinn: 1, 2, 3, 4, 5, 6
New Energy Supply Picture

NE Gradual Phase-Out & Renewable Energy Increase by 400%

Year 2016

- Coal: 39.3%
- Nuclear: 30.7%
- LNG: 18.8%
- Oil: 6.5%
- Renewable: 4.7%

Year 2030

- Coal: 37%
- Nuclear: 25%
- LNG: 20%
- Oil: 18%
- Renewable: 4.7%

Ref KEPCO
Public and Stakeholder Engagement

- **2006-2007 KPSE TF**
  - Deliberative Approach
  - Two Way Dialogue
  - Storage Installation with Clear Vision on SNF Disposal
  - Creation of KORAD

- **2014-2015 PECOS**
  - Road Map
  - Roadmap
  - Dispute....

- **2018 PSE**
  - Deliberative Approach
  - Pre-PSE on-going
  - Supporting Project
Current Road Map

- **2024**
  - ISFSI At Reactor Site
  - KHNP

- **2028**
  - Candidate Site
  - Uno Site for URL, National ISFSI, and Repository
  - KORAD

- **2035**
  - National ISFSI
  - KORAD

- **2053**
  - National Repository
Road Map and Scenario Studies

Korean Nuclear Fuel Options Analysis

Simulation Options
- Use nominal reactor discharge rates
- Select the reactor overflow storage
- Youngkwang + All Others
- Select the reactor SNF storage types:

<table>
<thead>
<tr>
<th>Storage Type</th>
<th>Reactor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kori</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>Wolsong</td>
<td>CANDU; MASTOR</td>
</tr>
<tr>
<td>Ulchin</td>
<td>PWR; NPHMS</td>
</tr>
<tr>
<td>YoungkwangA</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NewKori</td>
<td>PWR; PWR</td>
</tr>
<tr>
<td>NewUlchin</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NewWolsong</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NC1</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>YoungkwangB</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>Kori_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>Wolsong_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>Ulchin_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>YoungkwangA_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NewKori_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NewUlchin_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NewWolsong_R</td>
<td>PWR; TNOVA</td>
</tr>
<tr>
<td>NC1_R</td>
<td>PWR; TNOVA</td>
</tr>
</tbody>
</table>

Run Model
- Create repository for final disposition
- Create AFR Interim Storage
- AFR Construction Complete: 2024-01-01
- Use off-shore reprocessing
- Overseas Reprocessing: 2015-01-01
- Use innovative SNF recycling
- Domestic Reprocessing
  - 2050-01-01
- Use Wolsong LILW Facility Complete
- Wolsong LILW Facility: 2015-04-01
- Use Interim HLW Storage
- Interim HLW Storage Facility Complete: 2020-01-01

Results Display
- SNF Storage Cost and Areas Chart
- Menu for SNF flow results
- Menu for Cost results

New Scenarios
National Research Program

- **The Latest Directives**
  - Three More Year Studies on SFR & Pyro
  - No Hot tests in Daejeon
  - MSIP, MOTIE, and National Assembly

- **Strong Movement from**
  - Nuclear Energy Sectors
  - Neighboring Society
  - Nationwide Action Groups

- **Uncertainty**
  - Energy Transition Policy
  - Action from National Assembly
Societal Movement

- **Active Movement**
  - No More Nuke
  - No More Pyro & SFR
  - Distrust

- **No Solid Background**
  - No Academic Support
  - No Solid Financial Support from the Civilized Society
  - No Foundation & Think Tanks

- **Information**
  - SNF Arising
  - Others
SUMMARY: Core Components to Build the National Policy

- The ERA of ENERGY TRANSITION
- New PSE
- Active Social Groups with No Solid Support
- Critical Year Coming!