Legal Aspects Issues for SMR Deployment in Indonesia

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• Introduction
• Regulatory framework
• Legal aspect issues
• Possible regulation development
• Activities
• Summary
INTRODUCTION

- Indonesia consists of around 17,500 big, medium and small islands, the big islands are: Java, Sumatra, Kalimantan, Sulawesi and Papua.
- Population is around 250 millions people with rate of 1.21% (2015)
- Total area of 1.9 million square miles including the ocean
- At the end of 2015, electrification ratio around 86.20% (not included non-PLN customer)
- High demand and supply of energy in the future
LONGTERM SOLUTION AND OBSTACLES

• Increase the electrification ratio through the 35,000 MW mega power plant project.
• Gas-based power plants were set to contribute 25 percent of the total capacity produced.
• State-owned electricity company (PT. PLN) has warned of a future gas supply deficit for the country, in the wake of rapidly increasing demand for the commodity following the growing number of gas-based power plants to be built in the national 35,000 megawatt (MW) project.
• In 2016 Java and Bali will experience a gas deficit of 118 billion British thermal units per day (Btu/d)
• Gas supply deficit is estimated to reach 281 Btu/d in 2017, and grow exponentially to 1,081 Btu/d in 2019. The deficit is then predicted to double and pass beyond 2,000 Btu/d in 2026

• Use 6 units marine vessel power-plant, owned by Turkish Karpowership
• Inauguration the use of first floating power plant (the Karadeniz Powership Zeynep Sultan) for the central and northern areas of Sulawesi was done in 8 dec 2016
• The Karadeniz Powership Zeynep Sultan has a capacity to produce 120 MWe

• BATAN promote the potency/advantages of SMR to overcome the problem of electricity in Indonesia
• Through an open-bidding, an experimental HTR-type SMR was selected in March 2015.
• Feasibility study and preparing conceptual design for Experimental Power Reactor of around 10 MWth in Serpong area. This reactor is planned to be operational in 2021.
• Licensing Progress:
  – BATAN already submit application to get site license
  – Licensing Directorate – BAPETEN in the process of Evaluating Management System Implementation Report
• BCR No. 1 Year 2015 on Management of Emergency Responses of BAPETEN.
• BCR No. 1 Year 2010 on Nuclear Emergency Responses and Preparedness
• BCR No. 14 Year 2007 on Emergency Response Unit
• BCR No. 3 Year 2014 on Composing Document of Analysis for Environmental Impact of Nuclear Energy Field
• BCR No. 7 Year 2013 on Dose Limit for Environmental Radioactivity
• BCR No. 6 Year 2013 on Working License for Operator of Installation and Nuclear Material
• BCR No. 6 Year 2010 on the Health Monitoring for Radiological Workers
• BCR No. 2 Year 2009 on the Making of Design Information List (DIQ)
• BCR No. 4 Year 2011 on the Safeguard System
• BCR No. 1 Year 2009 on the Physical Protection System Provision for Nuclear Installations and Materials
• BCR No. 9 Year 2006 on Additional Protocol to The System of Accountability and Control of Nuclear Material
• BCR No. 4 Year 2010 on the Management System of Nuclear Energy Facility and Utilization Activity
• BCR No. 4 Year 2009 on the Decommissioning of Nuclear Reactor
GOVERNMENT REGULATIONS No. 2/2014
LICENSING APPLICATIONS

Doc. for Site Evaluation Approval:
1. Site Evaluation Program
2. Site Evaluations Management System

Doc. Site Permit:
1. Site Evaluation Implementation Report
2. Management System Implementation Report
3. DIQ
4. Nuclear Reactor main Data

Doc. For Design Approval:
1. Detail Design Document
2. Safety Analysis Report

Doc. Construction License:
1. Safety Analysis Report
2. LCO Document
3. Management System Document
4. Radiation Protection and Safety Doc.
5. Safeguard System Doc.
8. Decommissioning Program
9. Emergency Preparedness Program
10. Construction Program
11. Environmental Impact License

Doc. Commissioning License:
1. Safety Analysis Report
2. LCO Document
3. Management System Document
4. Radiation Protection and Safety Doc.
5. Safeguard System Doc.
8. Decommissioning Program
9. Emergency Preparedness Program
10. Construction Activity Report
11. Environmental Impact License
12. Technical Specification of Reactor that had been built.

Doc. Operation License:
1. Safety Analysis Report
2. LCO Document
3. Maintenance Document
4. Radiation Protection and Safety Doc.
5. Safeguard System Doc.
7. Decommissioning Program
8. Emergency Preparedness Program
9. Management System Document
10. Environmental Impact License
Implications Report

Site Evaluation Approval Applications
Design Approval Applications
Site Permit Applications
Commissioning License Applications
Operations License Applications
Year
Construction Activity
Site Evaluation Approval
Design Approval
Construction License
Commissioning License
Operation License
Site License
Constructions License Applications
The key infrastructure issues for SMR deployment in Indonesia is gap of legal, regulation and institutional aspect to introduce various type of SMR.

Currently most of the regulation is just applicable for large light water reactor with the land site basis.

Government Regulation (GR) No.2/2014 on Licensing of Nuclear Installation & Nuclear Materials Utilization is for land base nuclear installation → article 1, site definition;

BAPETEN Chairman Regulation (BCR) No.3/2011 on Safety of Power Reactor Design
  – for land base Power Reactor and using light water cooling → article 3
  – No stipulate provision on graded approach
Issues related to floating NPP:
- Fabrication of the vessel
- replacement vessel after several years of operation
To identify infrastructure issues for the deployment of SMR in Indonesia, BAPETEN conduct gap analysis

1. Cooperation with Faculty of Engineering University of Gadjah Mada:

2. Cooperation with Faculty of Mathematics and Natural Sciences, Bandung Institute of Technology:
   • Assessment of Safety And Security Technology of the Molten Salt Reactor → June 2016 – November 2016

• Supervision from GRS - Germany in establishing new BCR on design safety provision for power reactor → Under cooperation with European Union.

• Safety Standards Series No. NS-R-1 has been revised by the IAEA became IAEA Safety Standards Series No. SSR-2/1 in 2012.

• A fundamental change in the SSR-2/1 is the related provisions of the basic design that includes a severe accident. These changes affect the sequence and contents of the requirements therein. → BCR No. 3/2011 requires major change
• Some requirements need to be adjusted
• Need additional emphasis on the safety aspects of some of these requirements, as in the following:
  – The management of safety during the design: all the requirements have been appropriate.
  – The main technical requirements need adjustments related to the development of safety features for design extension conditions.
  – Power reactors design in general: need some adjustments, particularly related to some terminologies in order to include HTR technology and some safety emphasis, such as the melting of the core and the design extension conditions.
  – Need a big change related to the shared use of safety system among the multi unit for the design extension conditions.
  – Power reactors system design in particular: need a few adjustment, particularly related to some terminologie in order to include HTR technology and some safety emphasis.
• In order to be able to anticipate HTR technological developments and safety requirements after the fukushima accident, the all things mentioned above should be concider in revising BCR no. 3 of 2011 on the design safety provision for power reactor
### ASSESSMENT OF BCR No 3/2011

<table>
<thead>
<tr>
<th>Req. No.</th>
<th>IAEA SSR-2/1 Requirement</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Postulated initiating events</td>
<td>Need to consider the specific terminology for HTR</td>
</tr>
<tr>
<td>19</td>
<td>Design basis accidents</td>
<td>Changing LOCA with DBA for HTR (e.g., depressurization, air / water ingress)</td>
</tr>
<tr>
<td>20</td>
<td>Design extension conditions</td>
<td>Consider specific DEC for HTR</td>
</tr>
<tr>
<td>40</td>
<td>Prevention of harmful interactions of systems important to safety</td>
<td>Part (5.70) which states &quot;fluid system&quot; for LWR needs to be replaced with more common &quot;fluid system&quot;</td>
</tr>
<tr>
<td>43</td>
<td>Performance of fuel elements and assemblies</td>
<td>Terminology fuel elements and assemblies need to be adjusted with HTR fuel</td>
</tr>
<tr>
<td>46</td>
<td>Reactor shutdown</td>
<td>HTR control system is a graphite sleeve contains boron. Liquid for Reactivity control (boric acid) cannot apply to HTR</td>
</tr>
</tbody>
</table>
ASSESSMENT OF SAFETY AND SECURITY TECHNOLOGY OF THE FLOATING NPP

• Scope of the assessment:
  – Technical design
  – Site selection
  – Safety
  – Impact on environmental
  – Nuclear safety
  – Legal aspects

• Institutions involved:
  – Surabaya Institute of Technology (ITS) and
  – PT. PAL (Indonesian Shipyard)
<table>
<thead>
<tr>
<th>No.</th>
<th>Technical provisions</th>
<th>Related Regulations</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>implementation of Site Evaluation</td>
<td>BCR No.3 Year 2008 on Dispersion of Radioactive Material in Air And Water and Consideration of Population Distribution in Site Evaluation For NPP (IAEA NS-G-3.2)</td>
<td>Can be fully applied for location near the coast (onshore).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCR No.4 Year 2008 on Geotechnical Aspect of Site Evaluation and Foundation for NPP (IAEA NS-G-3.6) → being revised</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCR No.8 Year 2013 on Seismic aspect of Site Evaluation for NI</td>
<td>Can be partially applied (for the location of the connecting facility on the mainland)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCR No.6 Year 2014 on Meteorological &amp; Hydrology aspect of Site Evaluation for NI</td>
<td>Can be partially applied (hazards from extreme weather conditions: wind, waves, and tsunamis)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BCR No.5 Year 2015 on Volcano aspect of Site Evaluation for NI</td>
<td>Can be partially applied (burst hazard, tsunami)</td>
</tr>
<tr>
<td></td>
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<td>BCR No.6 Year 2008 on External Human Induce Event in Site Evaluation for NPP (IAEA NS-G-3.1)</td>
<td>Need adjustments associated with hazard in the floating location.</td>
</tr>
<tr>
<td>2</td>
<td>Site Evaluation Management System</td>
<td>BCR No. 4 Year 2010 on the Management System of Nuclear Energy Facility and Utilization Activity</td>
<td>Can be fully applied</td>
</tr>
<tr>
<td>3</td>
<td>DIQ</td>
<td>BCR No. 2 Year 2009 on the Making of Design Information List (DIQ)</td>
<td>Can be fully applied</td>
</tr>
<tr>
<td>4</td>
<td>The main data of Nuclear Reactor</td>
<td>Not available</td>
<td></td>
</tr>
</tbody>
</table>
• Activities to enhance competence of BAPETEN staff:
  – Dispatch BAPETEN staff to study regulation and licensing process of HTGR to Japan, China, Germany, and South Africa (2016);
  – Dispatch BAPETEN staff to study HTGR safety analysis to Germany (2016);
  – Dispatch BAPETEN staff to study regulation, licensing and technology of floating NPP to Russia (in planning).
SUMMARY

• SMR technology suitable for archipelagic country
• Currently most of the regulation is just can be implement for large light water reactor with the land site basis.
• BAPETEN has conducted a gap analysis for regulations related to nuclear power plant.
• The implementation of gap analysis hopefully will make regulations on Safety of Power Reactor Design can be implemented on all types of nuclear power plants
Thank You

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