DEVELOPMENT OF A SUSTAINBLE REGULATORY FRAMEWORK FOR NUCLEAR SAFETY IN MALAYSIA

IAEA TM on the Development and Application of a Safety Goals Framework for Nuclear Installation,
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Azlina Mohammad Jais
Head, NPP Regulatory Coordination
Malaysia Nuclear Power Corporation
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• Current Regulatory Framework for Safety
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OBJECTIVE

SAFETY PRINCIPLES & OBJECTIVE

All persons who deal with atomic energy including nuclear-related activities in Malaysia shall be subjected to nuclear legislation, and **shall be directly responsible for the assurance of nuclear safety, security and safeguards, while managing regulated activities in a manner that protects public and workers health, property and the environment from radiological hazards.** Malaysia through AELB and other appropriate regulatory authorities shall assure that these responsibilities are properly discharged in accordance with the Atomic Energy Licensing Act, 1984 (Act 304) and **other relevant Acts, existing and in future.** AELB sets forth the following five principles to effectively regulate and encourage high-level of safety, security and safeguards implementations:

### Regulatory Principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>1.1 Effective Independence</strong></td>
<td>Regulatory Authority takes proper measures to ensure its independence, which is functionally separated by the other organizations and systems involved in the development and utilization of atomic energy including nuclear-related activities. The regulatory authority also acts on its own objectives, technical and professional judgment without any interference and influence from external sources.</td>
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<tr>
<td><strong>1.2 Reliability</strong></td>
<td>The regulatory authority endeavors to eliminate public distrust and fear of nuclear activities and obtain the public’s trust and support through fair legislation based on technical and professional judgments. Regulatory decisions must be made promptly, fairly and reliably with full integrity based on the best available knowledge, from regulatory assessment, verification, research and operational experience. The RA obtains up-to-date technical information on nuclear safety, security and safeguards and applies this information to regulatory activities. When regulatory requirements need to be either newly established or changed, the best option is adopted after the effectiveness of its implementation and technological difficulties resulting from any changes are sufficiently reviewed.</td>
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<td><strong>1.3 Transparency</strong></td>
<td>There should be a coherent relationship between the regulatory authority’s goals and objectives and the legislation. The regulatory authority’s position shall be documented to be readily understood and easily applied.</td>
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<td><strong>1.4 Openness</strong></td>
<td>RA maintains an open channel with the public for regulatory information so that the public is aware of, understand and rely on the regulatory process. Regulatory authority is also devoted to establish a firm social stand in the development and utilization of atomic energy and nuclear and its related activities by taking into account safety, security and safeguards aspects, which will be fulfilled by making an effort to inform the public appropriately and openly on the nuclear and its related activities.</td>
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<tr>
<td><strong>1.5 Efficiency</strong></td>
<td>The RA has the responsibility to provide the licensees and the public with the best possible management and administration of regulatory activities and infrastructures.</td>
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Ref: AELB Nuclear Regulatory Statement, 2010
Current Legal Framework for Safety

Atomic Energy Licensing Act, 1984

Regulations

Orders & Condition of License

Guidelines, Codes and Standard

- Atomic Energy Licensing Act, 1984
- Licensing Regulations 1986
- Basic Safety Radiation Protection 2010
- Radioactive Waste Management Regulations 2011
- Transport Regulations 1988
- Regulatory Requirements for Site Evaluation of Nuclear Power Plant 2011
- Standards for Modification of Research Reactors 2009
- Standards for Certification and Recertification of Research Reactor Operator 2007
- Guidelines for Decommissioning of Facilities Contaminated with Radioactive Materials 2008
- Guideline for Site Selection for Nuclear Power Plant 2011
- Guideline for Site Evaluation for Nuclear Power Plant 2011
- Exemption Orders: Lightning Arrestor, Leasing and Hire Purchase, Smoke Detectors, Small Amang Factory, Scanning Electron Microscope, Low activity radioactive materials
- EPR – RADPLAN, SOP & Emergency Response Centre

Malaysia Nuclear Power Corporation
KEY NUCLEAR SAFETY & ASSESSMENT COMPONENT

Safety Principles, Concept, principles, DID, function & role

DSA & PSA
- Assessment of Engineering factors important to safety
- Assessment of NPP site

Role of respective stakeholders in Safety Assessment

National Legislation and International safety requirements & guidance documents

Role and arrangement of TSO, E&T and R&D in Safety assessment

Human Resources and tools for safety assessment./safety analysis

Reactor types, design safety features & adaption to local conditions

Development of Key Documents relevant for safety assessment of NPP
Regulatory Framework Gap Analysis (On-going)

9 Elements Directly Related to Regulatory Framework

<table>
<thead>
<tr>
<th>Policy</th>
<th>Regulations</th>
<th>Financing</th>
<th>Technical Support/Project Development</th>
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</thead>
<tbody>
<tr>
<td>18. Industrial Involvement</td>
<td>13. Environmental Protection</td>
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<td>14. Emergency Planning</td>
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<td>15. Security &amp; Physical Protection</td>
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<td></td>
<td>17. Radioactive Waste</td>
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Including participation of nuclear Regulators & relevant non-nuclear Regulators

Recommendation  Verification  Identification & Selection  Adoption/Adaptation  Implementation

Malaysia Nuclear Power Corporation
Development of Regulatory Framework for Safety

New Comprehensive Nuclear Law (Atomic Energy Regulatory Bill..)

- Nuclear Installation Authorization
- Non-Proliferation (Safeguards)
- Authorization and Management of Spent Fuel and Radioactive Waste
- Security of Nuclear Material and Nuclear Facility
- Nuclear Liability Financial Security
- Community Benefit
- Requirements for Site Evaluations of Nuclear Power Plant
- Authorization of Radiation Sources Applications
- Financial Resources for facility operator, decommissioning & Radioactive waste management
- Nuclear Installation Licensing Fee
- Classification of Authorization and Authorization Fees

Regulations and Requirement (In progress)
• **Guidelines for SIA, EIA & RIA for NPP**
• **Guidelines for Preparation of SAR for NPP**
• **Guidelines for the Authorization and Oversight of NPP**
• **Guidelines for Application and Acceptance of Compliance Requirements for Design & Construction of NPP**
• **Guidelines for Site Evaluation of Nuclear Power Plant**
• **Guidelines for Public Participation on Major Regulatory Decision**
• **Guidelines for the Preparation of State System of Accounting For & Control of Nuclear Material (SSAC)**
• **Guidelines on Operational Radioactive Waste Management Strategy including Safety Case and Safety Assessment**
### Development of Regulatory Framework for Safety

#### 1. Authorization of Nuclear Installation

<table>
<thead>
<tr>
<th>Main Safety Elements</th>
<th>Reference Documents</th>
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<tr>
<td>Cover the process of authorization of the nuclear installations as defined in the Bill, in several stages: site licence, construction licence, permission for commissioning and for introducing nuclear material into the installation, operation licence, decommissioning licence and release from regulatory control. It provides the general conditions for obtaining an authorization, and the specific requirements for each authorization stage. In addition to Safety Requirements, it also provides requirements for safeguards and nuclear security (by cross-reference to relevant regulations), management systems, and applicable nuclear safety standards.</td>
<td>• IAEA Safety Glossary, 2007, 3. IAEA SSG-12, Licensing Process for Nuclear Installations, 2010</td>
</tr>
<tr>
<td>The options of the licensing process – multiple stages or combined licence – the Atomic Energy (Nuclear Installation Licensing) Regulations were substantially expanded and revised to reflect the lessons learned from countries with well-established nuclear programmes, and adjust those with the newest experience from newcomer countries.</td>
<td>• US Nuclear Regulatory Commission, Regulatory Guide RG 1.70, 1978; Regulation for Licensing of Nuclear Installation(s) in Pakistan (PAK/909), 2001, amended up to June 29, 2012</td>
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#### 2. Authorization and Management of Spent Fuel And Radioactive Waste

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<tr>
<td>It also provides requirements for the control of radioactive waste generation, its treatment, conditioning and packaging, storage and disposal, for the management of very low level waste, criteria for acceptance of the radioactive waste in storage or disposal, and the development of spent fuel and radioactive waste management facilities.</td>
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## Development of Regulatory Framework for Safety

### 3. Nuclear Non-Proliferation (Safeguards)

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<td>The Safeguards Regulations cover the safeguards regime for nuclear material, installations for the production, separation, reprocessing, storage or other use of nuclear material, nuclear fuel cycle-related research and development activities, nuclear related items and their manufacturing activities, control of which is appropriate to give effect to Malaysia’s obligations as a party to the Non-Proliferation Treaty, Safeguards Agreement and Additional Protocol.</td>
<td>- INFCIRC/182, IAEA Services Series 21, Handbook on Nuclear Law, IAEA, 2010, 1 INFCIRC/140, INFCIRC/153, INFCIRC/540 - Decree on safeguarding of nuclear materials, Official Gazette of the Republic of Slovenia, No. 34/2008. Commission Regulation (EURATOM) No. 302/2005 of 8 February 2005 on the application of Euratom safeguards</td>
</tr>
</tbody>
</table>

The Regulations provide the requirements for the authorization holders establishing a system of accounting for and control of nuclear material, and the requirements for reporting to the commission the relevant information for enabling the IAEA to verify and ascertain that there has been no diversion of nuclear material from peaceful uses to nuclear weapons or other nuclear explosive devices.

It includes requirements for transfers (export, import and internal), for nuclear material accountancy, provisions for safeguards inspections and Additional Protocol visits, specific provisions for ore and waste, the listing of nuclear related items and the necessary forms for reporting.

### 4 –Security of Nuclear Material and Nuclear Facilities

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<tr>
<td>The Security of Nuclear Material and Nuclear Facilities Regulations apply to all activities relating to the security of nuclear facilities and Category I, II and III nuclear material. They provide general requirements for Category I, II and III nuclear material, requirements for physical protection of and access into nuclear installations, for protection arrangements, contingency plans and security exercises and drills, for the security of nuclear material during transport, and of sensitive nuclear information and computers.</td>
<td>- IAEA Nuclear Security Series No. 13; Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5); IAEA Nuclear Security Series No. 14; Nuclear Security Recommendations on Radioactive Material and Associated Facilities; IAEA Nuclear Security Series No. 9; Security in the Transport of radioactive Material (if transport also included). - DECREE of the Nuclear Regulatory Authority of the Slovak Republic Laying Down Details of Requirements for Provision of Physical Protection; DECREE of the Nuclear Regulatory Authority of the Slovak Republic Laying Down Details of Requirements for the Transportation of Radioactive Materials; Bulgarian Regulation on Providing Physical Protection of Nuclear facilities, Nuclear Material and Radioactive Substances</td>
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## 5. Nuclear Liability Financial Security

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<tr>
<td>The Nuclear Liability Financial Security Regulations provide for all aspects of nuclear insurance, takaful and other financial security relating to nuclear liability which will be enforced under the proposed Bill. They include requirements for national and foreign operators of nuclear installations, for the case of the Government of Malaysia being the owner/operator of a nuclear facility, and the circumstances in which a government indemnity is either required, or when it might be allowed.</td>
<td>• 1997 Vienna Convention on Civil Liability on Nuclear Damage, IAEA 2003 Handbook Ch.11 Nuclear Liability. IAEA 2010 Handbook Ch. 11 Nuclear Liability • Malaysian Insurance Act 1996 (Act 553), Takaful Act 1994 (Act 312). Inputs were also provided by Nuclear Risk Insurers on insurance pools and premium rating considerations.</td>
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</table>

The Regulations apply to nuclear installations as defined by the 1997 Vienna Convention on Civil Liability for Nuclear Damage: nuclear reactors (both for electricity production and for research), any factory using nuclear fuel for the production of nuclear material, any factory for the processing of nuclear material, including any factory for the re-processing of irradiated nuclear fuel, any facility where nuclear material is stored, any other such installation in which there is nuclear fuel, radioactive products or waste.

## 6–Community Benefit

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The Regulations provide the principles of community benefit, e.g. direct relation to the proposed facility development or operation, necessary for the acceptability of the development by the community, fairly and reasonably related in scale and nature to the proposed development or operation. They also provide the criteria for the selection of communities entitled to benefits, and are construed on the principle of voluntary provision of community benefits by the facility developer/operator, but provide also the Government with the option to impose the contribution to a Community Benefit Fund in the case in which the voluntary approach does not function as expected. The Regulations provide also the rules for the use of the community benefit funds, whether voluntarily provided or otherwise, and requirements for community consultation and public involvement.
### Development of Regulatory Framework for Safety

#### 7. Authorization of Radiation Sources Applications

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<tr>
<td>These Regulations cover the authorization process and requirements for the activities and facilities related to radiation sources used in industry, research and medicine. They define notification and exemption criteria, the activities subject to registration, permission and licensing, and provide specific requirements for the licensing of supply and manufacture of radiation sources and consumer products, use, handling, transfer, import and export of radiation sources, licensing of facilities where radiation sources are manufactured or used, authorization of human-imaging activities for non-medical purposes, and authorization of activities involving naturally occurring radioactive materials. They also include provisions on the responsibilities of authorization holders.</td>
<td>Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, Interim Edition, IAEA GSR Part 3 (Interim), 2011; Radiological Protection for Medical Exposure to Ionising Radiation, IAEA Safety Guide No. RS-G-1.5, 2002; Regulatory Control of Radiation Sources, IAEA Safety Guide No. GS-G-1.5, 2004; Radiation Safety of Gamma, Electron and X Ray Irradiation Facilities, IAEA Specific Safety Guide No.SSG-8, 2010; Radiation Safety in Industrial Radiography, IAEA Specific Safety Guide No.SSG-11, 2011; Safety assessment plans for authorization and inspection of radiation sources, IAEA-TECDOC-1113, 1999; Inspection of Radiation Sources and Regulatory Enforcement, IAEA-TECDOC-1526, 2007; Draft Atomic Energy Regulatory Bill 201_; EC proposal DIRECTIVE laying down basic safety standards for protection against the dangers arising from exposure to ionizing radiation (as per May 2012) → ICRP recommendation from 2007; IAEA Safety Guide RS-G-1.0 “Categorization of Radioactive Sources”; IAEA Code of Conduct on the Safety and Security of Radioactive Sources, 2004; IAEA Guidance on the Import and Export of Radioactive Sources, 2012; Romanian Basic Radiological Safety Standards NSR-01, 2000; Romanian Radiological Safety Regulations on Authorization Procedures NSR-03, 2000</td>
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</tbody>
</table>
## Development of Regulatory Framework for Safety

### 8-Financial Resources for Facility Operator, Decommissioning and Radioactive Waste Management

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<tr>
<td>These regulations cover the <strong>requirements for the applicant for a licence and for the operator of a facility to ensure adequate financial resources for safe and secure operation</strong>, for financing decommissioning and radioactive waste management, as well as some administrative provisions for the establishment of a decommission fund and a radioactive waste management fund. The regulations apply to all holders of authorizations for facilities issued under the Bill.</td>
<td>Sections 45 - 68 of the UK Energy Act 2008; Conditions of licences, 10 CFR 50.54; Reporting and record keeping for decommissioning planning, 10 CFR 50.75; Decommissioning of Nuclear Power Reactors, RG 1.184; DECC Consultation Funded decommissioning Programmes, UK-DECC December 2011;</td>
</tr>
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</table>
### 9- Fees for Authorization of Nuclear Installations

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<tbody>
<tr>
<td>These Regulations establish the fees to be paid by the applicants for authorizations for nuclear installations. The Regulations provide for the RA to charge fees in relation to the authorization of nuclear installations and activities directly related to nuclear installations, in two stages: a fixed fee for the initial authorization (for each stage or related activity) and a monthly fee upon issuing the authorization to cover for the regulatory oversight activities related to fulfilment of licence conditions of a nuclear installation during its construction, commissioning, operation and decommissioning. The Regulations also provide a fixed fee for issuing an authorization for the selected management and operating personnel of a nuclear installation, as well as fees (fixed and monthly) for organizations performing specialized training activities. In addition, payment periods and due dates for payment of fees are defined.</td>
<td>Collection and study of practices on establishing and collecting regulatory fees in several countries in Europe, namely UK, Finland, Czech Republic, Slovakia, Romania and Bulgaria</td>
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### 10— Regulatory Requirements for Site Evaluation for Nuclear Power Plants

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<tbody>
<tr>
<td>These Regulatory Requirements address the site evaluation stage of siting process for nuclear power plants, as defined by the IAEA. They transpose the IAEA requirements for site evaluation, NS-R-3, and include a number of terminology updates in accordance with the newest IAEA guidance (2011-2012) on the various aspects of such as meteorological and hydrological hazards, volcanic hazards, etc.</td>
<td>IAEA Safety Glossary 2007; IAEA Site Evaluation for Nuclear Installations, Safety Requirements, NS-R-3, 2003; ICRP Protection from Potential Exposure - A Conceptual Framework, Publication 64, 1993; ICRP Nuclear Decay Data for Dosimetric Calculations, Publication 107, 2008; NRC (USA), Title 10 of Code of Federal Regulation: Reactor Site Criteria, 10 CFR 100; NRC, Determination of exclusion area, low population zone, and population center distance, 10 CFR 100.11; NRC (USA), Feasibility Study for a Risk-Informed and Performance-Based Regulatory Structure for Future Plant Licensing, NUREG-1860, 2007; HSE (UK), Safety Assessment Principles, 2006; CNSC (Canada), Site Evaluation for New Nuclear Power Plants, RD-346, 2008; CNSC (Canada), Design of New Nuclear Power Plants, RD-337, 2008; CNSC (Canada), Safety Analysis for Nuclear Power Plants, RD-310, 2008; NATIONAL COMMISSION FOR NUCLEAR ACTIVITIES CONTROL (Romania); Nuclear Safety Requirements on Siting of Nuclear Power Plants, 2010; STUK (Finland), Safety criteria for siting a nuclear power plant, Guide YVL</td>
</tr>
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Enhancement for a Sustainable Regulatory Framework

- Comprehensive coverage for implementation of the law
- Strengthen parts on safeguards (relating the Safeguards Convention and Additional Protocol); security and physical protection (relating CPPNM); and emergency preparedness and response plan;
- **Establishment independent Regulatory Authority** (Commission) as a single authority in regulating medical and non-medical activities that involve ionizing radiation;
- Provision of **authorization** strengthened, which include licence, permit and registration, can only be issued if there is no objection from other relevant authority added into the Bill;
- Provision on **financial security strengthened** in the Bill for recovery of remediying measures in case of accident and incident;
- Strengthen provision on **mining activities** containing uranium or thorium will be informed by holder of approved operational mining scheme under Mineral Development Act 1994 to the Commission;
- **Safety** is the prime responsibility of the licensee relating to Safety Fundamental Principle and Nuclear Safety Convention;
Enhancement for a Sustainable Regulatory Framework

- Strengthen part on **decommissioning requirements**;
- Establishment of **radioactive waste management fund** and payment of cess and other requirements relating to Joint Convention on Spent Fuel and Radioactive Waste Management;
- Strengthen part on **transport** added into the Bill;
- The **limit of liability strengthened** to 300 Million SDR relating 1997 Vienna Convention on Civil Nuclear Liability;
- Strengthen part on **offences on physical protection** relating to CPPNM;
- Strengthen provision on compoundable offenses;
- Strengthen provisions on public participation in major regulatory decision-making process (in light of current public issues in the country); and Others.
REGULATORY INDEPENDENCE PRINCIPLES

Objective: No pressure from interests conflicting with safety

8 PRINCIPLES OF INDEPENDENCE

- **POLITICAL**
  - no political pressure in taking safety decisions

- **FINANCIAL**
  - adequate staffing and budget not defined by promoters

- **INFORMATION TO PUBLIC**
  - right to communicate independently regulatory opinion to the public

- **STATUTORY & LEGAL AUTHORITY**
  - clearly defined power and authorities of the Commission
  - independent regulatory decision

- **LEGISLATIVE**
  - authority to develop legal requirements and enforcement

- **COMPETENCE**
  - independent technical expertise (staff, tech. support)

- **INTERNATIONAL**
  - right to cooperate with other regulators and inter. organizations

- **ORGANIZATIONAL**
  - independent from promoter and development of nuclear technology
  - sufficient man-power with technical skill and capabilities
Summary

Safety Principles and Objectives

- Protects public and workers' health, property, and the environment from radiological hazards

RA shall assure that these responsibilities are properly discharged in accordance with the Atomic Energy Licensing Act, 1984 (Act 304) and other relevant Acts, existing and in future.

- All persons who deal with atomic energy including nuclear-related activities shall be subjected to nuclear legislation, and shall be directly responsible for the assurance of nuclear safety, security, and safeguards.

Key important element on Nuclear Safety

- Including the implementation on International Legal Instruments related to Safety Aspect

Measures for continues Improvement & Increase Competence & Professional Human Resources in Nuclear Safety

International Cooperation

- Effective Independence Regulatory Authority with a Sustainable Regulatory Framework

Malaysia Nuclear Power Corporation
Thank You

Reference:

Azlina Mohammad Jais  
Head, Nuclear Power Regulatory Coordination,  
Malaysia Nuclear Power Corporation (MNPC),  
A-1-01, A-1-03 & A-1-05, SME Technopreneur Centre 2,  
2260 Jalan Usahawan 1,  
63000 Cyberjaya, Selangor Darul Ehsan,  
Malaysia  

Tel: ++60-(0)3-8319 4700  
Fax: ++60-(0)3-8319 4800  
Email: azlina@mnpc.org.m