



MISSION REPORT
ON
THE INTEGRATED NUCLEAR INFRASTRUCTURE REVIEW (INIR) – PHASE 1

Counterpart:

Nuclear Energy Programme Implementing Organization
of the Department of Energy
of the Republic of the Philippines

10–17 December 2018

Manila, Philippines

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EXECUTIVE SUMMARY

To ensure sustained GDP growth, the Government of the Republic of the Philippines issued its Philippine Development Plan 2017–2022 and AmBisyon Natin 2040. These plans aim to achieve 7–8% GDP growth, lower poverty and unemployment, raise human development and drive innovation. For this, the country will need a reliable, secure, sustainable and affordable electricity supply. The current electricity demand of the Philippines is 13.7 GW. The Government has adopted a technology-neutral approach to generation and is seeking to enhance the baseload stability of the country’s electricity supply by exploring nuclear energy and its inclusion in the existing energy mix.

In 2016, the Department of Energy created the Nuclear Energy Programme Implementing Organization (NEPIO) to produce a comprehensive study considering the 19 infrastructure issues described in the International Atomic Energy Agency (IAEA) publication entitled *Milestones in the Development of a National Infrastructure for Nuclear Power*, IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1). The NEPIO has carried out a number of studies including a pre-feasibility study and a self-evaluation of the status of the Philippines’ national infrastructure for nuclear power based on the International Atomic Energy Agency (IAEA) methodology described in *Evaluation of the Status of National Nuclear Infrastructure Development*, IAEA Nuclear Energy Series No. NG-T-3.2 (Rev. 1). The self-evaluation report and supporting documents were sent to the IAEA in July 2018. A Self-Evaluation Report Support Mission and a Pre-Integrated Nuclear Infrastructure Review (Pre-INIR) Mission were conducted in the Philippines from 2 to 4 October 2018, and a revised self-evaluation report and more than 130 supporting documents were submitted to the IAEA in November and December 2018.

The Phase 1 INIR Mission was conducted from 10 to 17 December 2018.

The Honourable Alfonso Cusi, Secretary of Energy, and Mr Dohee Hahn, Director of the Division of Nuclear Power within the IAEA’s Department of Nuclear Energy, provided opening remarks for the INIR mission. Mr Donato Marcos, Undersecretary of Energy and Chairman of the NEPIO also made remarks. On the Filipino side, the mission was coordinated by Mr Gerardo Erguiza, Jr., Assistant Secretary of Energy and Vice Chairman of the NEPIO. The INIR team was led by Mr Milko Kovachev, Section Head of the IAEA’s Nuclear Infrastructure Development Section, and consisted of staff from the IAEA Departments of Nuclear Energy and Safeguards and Office of Legal Affairs as well as international experts recruited by the IAEA.

The INIR mission and associated activities were funded through a combination of a cost-sharing contribution from the Government of the Republic of the Philippines, the IAEA Technical Cooperation Project PHI2012 entitled *Developing Nuclear Power Infrastructure in the Philippines – Phase II* and an extrabudgetary contribution from the United States of America through the IAEA Peaceful Uses Initiative (PUI).

The INIR team concluded that the Philippines is committed to a systematic approach to finalizing its nuclear power strategy and completing the associated infrastructure development. The NEPIO has completed several studies; draft legislation addressing nuclear safety, security, and safeguards and establishing an independent regulatory body is being considered in the Congress. The Philippines recognizes the importance of open and

transparent public communication and the need to include a broader range of stakeholders in preparations to introduce nuclear power.

In order to assist the Philippines in making further progress in its infrastructure development, the INIR team made 14 recommendations and 13 suggestions. The INIR team also identified three good practices that may benefit other countries considering the introduction of nuclear power.

Based on the recommendations and suggestions, the key areas for further action are summarized below:

- **The Philippines needs to involve a broader range of stakeholders in completing the work required to enable a national commitment to introduce nuclear power.**

The Department of Energy has initiated a number of studies related to the introduction of nuclear power, several of which have been completed. In order to make a compelling case for the safe and sustainable use of nuclear power in the Philippines that is accepted by key stakeholders including the public, further work is required. This includes analysing ownership and financing options, developing policies for industrial participation and radioactive waste management and finalizing studies that demonstrate the benefits of including nuclear power in the energy mix. All of this will require open and transparent public consultations, adequate resources and a structured coordinating mechanism involving relevant governmental stakeholders.

- **The Philippines needs to develop a legal and regulatory framework that ensures and demonstrates a commitment to safety, security and non-proliferation.**

Bills addressing nuclear safety, security, and safeguards and establishing an independent regulatory body are being considered in the Congress. The final law will need to adequately address all elements of a comprehensive nuclear law, including the responsibilities of the body of commissioners, decommissioning, nuclear security and radioactive waste. In addition, the Philippines needs to review other laws that may affect the nuclear power programme and complete the approval process for adherence to relevant international legal instruments.

Further, the Philippines needs to ensure the structure and staffing of the future regulatory body are adequate to meet the needs of the nuclear power programme and develop a plan for issuing appropriate regulations.

- **The Philippines needs to further develop its understanding of and enhance its approaches to several issues related to a future nuclear power project.**

Through energy planning studies and a pre-feasibility study, assessments of all aspects of nuclear power infrastructure have been conducted. The Philippines needs to enhance its plans for human resource and leadership development, including promoting a safety and security culture in the key organizations, and consider nuclear fuel cycle options and electrical grid impacts in more detail.

The Philippines needs to assess the existing frameworks for emergency preparedness and response and nuclear security in light of a future nuclear power project and adapt the respective coordination mechanisms as needed.

1. INTRODUCTION

In a letter dated 10 May 2017, the Government of the Republic of the Philippines requested the IAEA to carry out a Phase 1 Integrated Nuclear Infrastructure Review (INIR) mission. The Nuclear Energy Programme Implementing Organization (NEPIO) coordinated the preparation of a self-evaluation report based on the IAEA methodology contained in the IAEA publication entitled *Evaluation of the Status of National Nuclear Infrastructure Development*, IAEA Nuclear Energy Series No. NG-T-3.2 (Rev. 1). The self-evaluation report and supporting documents were sent to the IAEA in July 2018. A Self-Evaluation Report Support Mission and a Pre-INIR Mission were conducted in the Philippines from 2 to 4 October 2018, and a revised self-evaluation report and more than 130 supporting documents were submitted to the IAEA in November and December 2018. The Phase 1 INIR Mission was conducted from 10 to 17 December 2018.

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2. OBJECTIVES OF THE MISSION

The main objectives of the INIR mission were to:

- Evaluate the development status of the national infrastructure to support the nuclear power programme according to the IAEA publication *Milestones in the Development of a National Infrastructure for Nuclear Power*, IAEA Nuclear Energy Series No. (NG-G-3.1 (Rev. 1)) and the evaluation conditions described in the IAEA publication *Evaluation of the Status of National Nuclear Infrastructure Development*, IAEA Nuclear Energy Series No. (NG-T-3.2 (Rev. 1));
- Identify the areas needing further actions to reach Milestone 1: 'Ready to make a knowledgeable commitment to a nuclear power programme';
- Provide recommendations and suggestions which can be used by the Government of the Philippines and national institutions to prepare an action plan.

3. SCOPE OF THE MISSION

The INIR mission evaluated the status of the infrastructure in the Philippines covering all of the 19 infrastructure issues relative to the conditions identified for Phase 1 and indicated in the above mentioned IAEA publications.

4. WORK DONE

Prior to the mission, the INIR team reviewed the self-evaluation report and supporting documentation that included relevant national laws, regulations, studies and reports. The INIR team sought input from IAEA staff members with relevant expertise working with the Philippines. INIR team meetings were conducted prior to the mission in Vienna on 6 and 7 December and in Manila on 9 December 2018.

The INIR mission was conducted from 10 to 17 December 2018. The meetings were held at the Makati Shangri-La hotel in Manila. The main interviews were conducted over four days. The Philippines' side was well prepared for the mission and managed its participation in the review effectively. During the interviews, the Philippines counterparts provided an update on the current status of issues where progress had been made since the self-evaluation report was finalized, and provided additional supporting documentation requested by the INIR team.

The preliminary draft report was prepared by the INIR team and discussed with the counterparts. The main mission results were presented to representatives of the Government in an exit meeting on 17 December 2018. The preliminary draft report was delivered to the counterparts during the exit meeting.

The results of the mission are summarized in Section 5 and presented in tabular form in Section 6 for each of the 19 infrastructure issues in Phase 1. Appendix 1 provides the evaluation results for each condition.

5. MAIN CONCLUSIONS

The INIR mission was conducted in a cooperative and open atmosphere. The mission was coordinated on the Philippines' side by the NEPIO with participation from several organizations involved in the nuclear power programme and corresponding infrastructure development activities. The full list of participants can be found in Appendix 2.

The INIR team concluded that the Philippines is committed to a systematic approach to finalizing its nuclear power strategy and completing the associated infrastructure development. The NEPIO has completed several studies; draft legislation addressing nuclear safety, security, and safeguards and establishing an independent regulatory body is being considered in the Congress. The Philippines recognizes the importance of open and transparent public communication and the need to include a broader range of stakeholders in preparations to introduce nuclear power.

In order to assist the Philippines in making further progress in its infrastructure development, the INIR team made 14 recommendations and 13 suggestions. The INIR team also identified three good practices that may benefit other countries considering the introduction of nuclear power.

Based on the recommendations and suggestions, the key areas for further action are summarized below:

- **The Philippines needs to involve a broader range of stakeholders in completing the work required to enable a national commitment to introduce nuclear power.**

The Department of Energy has initiated a number of studies related to the introduction of nuclear power, several of which have been completed. In order to make a compelling case for the safe and sustainable use of nuclear power in the Philippines that is accepted by key stakeholders including the public, further work is required. This includes analysing ownership and financing options, developing policies for industrial participation and radioactive waste management and finalizing studies that demonstrate the benefits of including nuclear power in the energy mix. All of this will require open and transparent public consultations, adequate resources and a structured coordinating mechanism involving relevant governmental stakeholders.

- **The Philippines needs to develop a legal and regulatory framework that ensures and demonstrates a commitment to safety, security and non-proliferation.**

Bills addressing nuclear safety, security, and safeguards and establishing an independent regulatory body are being considered in the Congress. The final law will need to adequately address all elements of a comprehensive nuclear law, including the responsibilities of the body of commissioners, decommissioning, nuclear security and radioactive waste. In addition, the Philippines needs to review other laws that may affect the nuclear power programme and complete the approval process for adherence to relevant international legal instruments.

Further, the Philippines needs to ensure the structure and staffing of the future regulatory body are adequate to meet the needs of the nuclear power programme and develop a plan for issuing appropriate regulations.

- **The Philippines needs to further develop its understanding of and enhance its approaches to several issues related to a future nuclear power project.**

Through energy planning studies and a pre-feasibility study, assessments of all aspects of nuclear power infrastructure have been conducted. The Philippines needs to enhance its plans for human resource and leadership development, including promoting a safety and security culture in the key organizations, and consider nuclear fuel cycle options and electrical grid impacts in more detail.

The Philippines needs to assess the existing frameworks for emergency preparedness and response and nuclear security in light of a future nuclear power project and adapt the respective coordination mechanisms as needed.

Recommendations

R-1.2.1 The Government should implement the proposed expansion of the current NEPIO in order to enhance nuclear power programme coordination.

R-1.3.1 The NEPIO should implement the work proposed in the executive order to define a national strategy for the nuclear power programme.

R-4.2.1 The NEPIO should review the viability of various financing options for a nuclear power project in the Philippines and identify any need for changes in the current legal framework.

R-5.2.1 The Philippines should further review some aspects of the current bills and ensure that its legislative plans include all necessary provisions of a comprehensive national nuclear law.

R-5.3.1 The Philippines should complete an analysis of laws that may affect the nuclear power programme and plan for their enactment or amendment as appropriate.

R-7.1.1 The NEPIO should review the proposed structure and staffing requirements for the future regulatory body and ensure they are adequate to meet the needs of the nuclear power programme.

R-7.1.2 The NEPIO should develop a plan for the development of regulations that will be required for a nuclear power programme.

R-9.1.1 The NEPIO should ensure that a preliminary study of the grid system is conducted covering the reliability of the grid and its compatibility with the introduction of a nuclear power plant.

R-10.2.1 The NEPIO should develop outline plans for human resource development for each key organization to be integrated at the national level.

R-14.1.1 The NEPIO should assess existing EPR arrangements against the requirements for the nuclear power programme.

R-16.1.1 The NEPIO should further assess options for the nuclear fuel cycle, including the supply of nuclear fuel and the management of spent nuclear fuel.

R-17.1.1 The NEPIO should perform a preliminary evaluation of the amounts and types of radioactive waste generated by a nuclear power plant and consider options for their management.

R-17.2.1 The NEPIO should consider disposal options for radioactive waste arising from the operation and decommissioning of the nuclear power plant.

R-18.1.1 The NEPIO should seek further information from local industries and technology providers and develop a national policy for industrial involvement in the nuclear power programme.

Suggestions

S-1.1.1 The Government is encouraged to finalize the consultations on the proposed executive order to achieve consensus on the way forward.

S-2.1.1 The NEPIO is encouraged to continue developing its own and all relevant stakeholders' understanding of nuclear safety.

S-3.1.1 The NEPIO is encouraged to implement a leadership development programme to ensure that future leaders in the key organizations gain the experience needed for a successful nuclear power programme.

S-3.1.2 The NEPIO is encouraged to gain awareness of approaches to promote a safety and security culture in the key organizations of the nuclear power programme and to plan relevant activities at the appropriate time.

S-4.1.1 The NEPIO is encouraged to develop a multi-year assessment of the costs of nuclear power infrastructure development activities.

S-4.1.1 The Philippines is encouraged to further consider arrangements to ensure the availability of adequate funds for radioactive waste management and decommissioning.

S-5.1.1 The Philippines is encouraged to complete the legislative approval process of the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management as well as the Amendment to the Convention on the Physical Protection of Nuclear Material.

S-5.1.2 The Philippines is encouraged to carry out an analysis and develop a plan to pursue legislative approval of the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, the Convention on Supplementary Compensation and the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention.

S-7.1.1 The Philippine Nuclear Research Institute (PNRI) is encouraged to identify regulators and organizations that can provide external support to PNRI or the future Philippine Nuclear Regulatory Commission (PNRC) and pursue opportunities for cooperation.

S-8.1.1 The NEPIO is encouraged to continue assessing and planning for enhancements to radiation protection programmes with regard to the needs of the nuclear power programme.

S-11.1.1 The NEPIO and other key organizations are encouraged to further develop outreach activities and materials specific to nuclear power in the Philippines for engaging all relevant stakeholders.

S-14.1.1 The Philippines is encouraged to ensure consistency between the comprehensive nuclear law and the National Radiological Emergency Preparedness and Response Plan (RADPLAN) with regard to the responsibility for maintaining the RADPLAN.

S-15.1.1 The Philippines is encouraged to review and adapt the national coordination mechanisms for nuclear security to meet the needs of the nuclear power programme.

Good Practices

GP-5.2.1 Involving parliamentarians in briefings and workshops raised their awareness and understanding of the scope and content of a comprehensive nuclear law early in the legislative approval process.

GP-11.1.1 Routinely providing spokespersons training to both technical and communication staff, according to an annual schedule, supports clear and consistent messaging about the nuclear power programme.

GP-12.1.1 Organizing a workshop with a broad range of stakeholders and implementing a structured process led to the development of a comprehensive set of criteria for identifying candidate sites for a nuclear power plant.

6. EVALUATION RESULTS FOR PHASE 1

For the purposes of the INIR mission results, the following definitions are used:

Significant* actions needed:

The review observations indicate that important work still needs to be initiated or completed to meet the condition.

Minor* actions needed:

The review observations indicate that some additional work or steps are needed to meet the condition or that plans for the next phase need to be enhanced.

No actions needed:

The available evidence indicates that all the work to meet the condition has been completed.

*The judgement whether the actions are significant or minor is based on the importance of the work to the overall programme and/or the resources needed to complete it. The classification is done through a consensus of the INIR team, and is not based solely upon the judgement of any individual team member.

Recommendations:

Recommendations are proposed when the expectations of the condition have not been met. A recommendation should:

- Emphasize ‘what’ needs to be done, not ‘how’;
- Be based on the IAEA Milestones Approach/Evaluation Methodology;
- Be succinct, self-explanatory and achievable;
- Be supported by the Review Observation text — a ‘gap’ must be identified; already planned work can still be a recommendation if it is required to reach the milestone.

Suggestions:

Suggestions propose the consideration of new or different approaches to develop infrastructure and enhance performance, or to point out better alternatives to current work. A suggestion:

- Should be clear and self-explanatory;
- Should be supported by the Review Observation text;
- May relate to work already under consideration for the next phase.

Good practices:

A good practice is identified in recognition of an outstanding practice or arrangement, superior to those generally observed elsewhere. It is more than fulfilment of the conditions or expectation, and worthy of the attention of other countries involved in the development of nuclear infrastructure as a model in the drive for excellence.

1. National position	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
1.1. Long term commitment made and importance of safety, security and non-proliferation recognized		X	
1.2. The Nuclear Energy Programme Implementing Organization (NEPIO) established	X		
1.3. National strategy defined	X		
2. Nuclear safety	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
2.1. Key requirements of nuclear safety understood		X	
2.2. Support through international cooperation initiated			X
3. Management	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
3.1. Need for appropriate leadership and management systems recognized		X	
4. Funding and financing	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
4.1. Strategies for funding established		X	
4.2. Potential strategies for financing identified	X		

5. Legal framework	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
5.1. Adherence to all relevant international legal instruments planned		X	
5.2. Plans in place for development of comprehensive national nuclear law	X		
5.3. Plans in place to enact and/or amend other legislation affecting the nuclear power programme	X		
6. Safeguards	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
6.1. Terms of international safeguards agreement in place			X
6.2. Strengthening of the State System of Accounting for and Control of nuclear material (SSAC) planned			X
6.3. Recommendations from any previous reviews or audits being addressed			X
7. Regulatory framework	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
7.1. Development of an adequate regulatory framework planned	X	X	
8. Radiation protection	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
8.1. Enhancements to radiation protection programmes planned		X	
9. Electrical grid	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
9.1. Electrical grid requirements considered	X		

10. Human resource development	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
10.1. Necessary knowledge and skills identified, and gaps in current capability assessed			X
10.2. Development of human resources planned	X		
11. Stakeholder involvement	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
11.1. Open and transparent stakeholder involvement programme initiated		X	
12. Site and supporting facilities	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
12.1. General survey of potential sites conducted and candidate sites identified			X
13. Environmental protection	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
13.1. Environmental requirements considered			X
13.2. Framework for environment protection reviewed			X
14. Emergency planning	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
14.1. Requirements of, and resources for, developing an emergency response capability recognized	X	X	
14.2. Recommendations from any previous reviews or audits being addressed			X

15. Nuclear security	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
15.1. Nuclear security requirements recognized and the actions of all relevant organizations coordinated		X	
15.2. Recommendations from any previous reviews or audits being addressed			X
16. Nuclear fuel cycle	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
16.1. Options for nuclear fuel cycle (front-end and back-end) considered	X		
17. Radioactive waste management	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
17.1. The requirements for management of radioactive waste from NPP recognized	X		
17.2. Options for disposal of all radioactive waste categories understood	X		
18. Industrial involvement	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
18.1. National policy developed with respect to industrial involvement	X		
19. Procurement	Phase 1		
Condition	Actions Needed		
	SIGNIFICANT	MINOR	NO
19.1. Requirements for purchasing NPP services recognized			X

APPENDIX 1: REVIEW OBSERVATIONS, RECOMMENDATIONS AND SUGGESTIONS FOR PHASE 1

1. National Position		Phase 1
Condition 1.1: Long term commitment made and importance of safety, security and non-proliferation recognized		
Summary of the condition to be demonstrated	A clear statement adopted by the government of its intent to develop a nuclear power programme and of its commitment to safety, security and non-proliferation, with evidence that their importance is embedded in the ongoing work programme.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. A clearly stated government commitment; 2. Evidence of clear responsibilities for each issue, with government coordination of activities. 	
Observations		
<p>The Department of Energy (DOE) submitted a draft executive order to the Office of the President of the Republic of Philippines on 16 April 2018. This draft document was based on the main findings of the pre-feasibility study (PFS) conducted by the NEPIO. DOE recommended:</p> <ul style="list-style-type: none"> — The long-term inclusion of nuclear power in the energy mix; — The expansion of the NEPIO and the assignment of key responsibilities; and — That the President certify as urgent the existing bills providing for the legal and regulatory framework or cause the filing of a new one, if needed. <p>The proposed executive order includes a provision stating the commitment of the Government to adhere to international standards and guidance for safety, security and safeguards and the peaceful development of nuclear energy. The Philippines has signed or ratified several relevant treaties, conventions and agreements (see infrastructure Issue No. 5, Legal Framework). The PFS outlines steps for developing a national framework for nuclear safety, security and safeguards.</p> <p>The process of inter-governmental agency consultations for the adoption of the executive order has been initiated by the Office of the President. The cabinet secretaries are expected to recommend next steps in January 2019.</p>		
Areas for further action	Significant	No
	Minor	Finalizing the National Position
RECOMMENDATIONS		
None		
SUGGESTIONS		
S-1.1.1 The Government is encouraged to finalize the consultations on the proposed executive order to achieve consensus on the way forward.		
GOOD PRACTICES		
None		

1. National Position		Phase 1
Condition 1.2: The NEPIO established		
Summary of the condition to be demonstrated	<p>The NEPIO:</p> <ol style="list-style-type: none"> a) Has clear terms of reference that call for a comprehensive review of all the issues relevant to making a decision to proceed with a nuclear power programme; b) Is recognized by all relevant ministries as having that role; c) Reports to a senior minister or directly to the head of government; d) Has appropriate human and financial resources; e) Involves all relevant stakeholders, including the country's major utilities, the regulatory body for security and radiation safety, other relevant government agencies, legislative representatives and other decision makers. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. The charter establishing the NEPIO and to whom it reports; 2. Evidence that the roles and responsibilities of the NEPIO are known by all its members and by other government ministries; 3. A document defining objectives and timescales and an adequate scope of investigations; 4. A clear description of how the NEPIO operates in terms of funding, planning, reporting, scope of studies and use of consultants; 5. Evidence that the NEPIO has adequate skills to address all issues either directly or through commissioning specialist studies; 6. Evidence of relevant interactions between the head of NEPIO and appropriate ministries, such as those responsible for energy and the environment. 	
Observations		
<p>The Nuclear Energy Programme Implementing Organization (NEPIO) was created by Order No. DO2016-10-0013 issued by the Secretary of Energy on 13 October 2016.</p> <p>The NEPIO was assigned the responsibility to coordinate organizations involved in the implementation of activities related to the assessment and evaluation of the 19 infrastructure issues. The NEPIO is chaired by a DOE Undersecretary and is comprised of directors and senior level representatives from DOE. Funds for the NEPIO to carry out its mandate are sourced from the annual General Appropriations Act (GAA) of the Government.</p> <p>The NEPIO's main accomplishments to date were the preparation of the PFS and the self-evaluation of the status of national nuclear infrastructure development. A self-evaluation report was compiled by the NEPIO's Technical Working Groups (TWGs) in coordination with the country's current nuclear regulatory body, the Philippine Nuclear Research Institute (PNRI), the National Power Corporation (NPC) which is the designated caretaker of the Bataan Nuclear Power Plant (BNPP), other relevant Government Agencies such as the Departments of Trade and Industry (DTI), Environment and Natural Resources (DENR) and Science and Technology (DOST), and the lawmakers from the 17th Congress.</p> <p>If approved, the executive order would create an expanded NEPIO (eNEPIO) chaired by DOE, reporting to the Office of the President and including members from DOST, DENR, Department of the Interior and Local Government (DILG), Department of Finance (DOF), Department of Foreign Affairs (DFA), National Economic and Development Authority (NEDA), NPC, National Transmission Corporation (TRANSCO), PNRI and Philippine Institute of Volcanology and</p>		

Seismology (PHIVOLCS). The eNEPIO would create subcommittees including other relevant agencies covering the infrastructure issues.

The eNEPIO would have the following tasks:

- Prepare a national strategy to include a roadmap and timeline addressing the future phases of the programme;
- Review and assess the 19 nuclear infrastructure issues and make the necessary recommendations; and
- Recommend a national decision to the President.

The eNEPIO would have the authority to hire the services of consultants with nuclear power experience.

The work of the eNEPIO would include a review of the existing legal and regulatory framework, including the creation of an independent regulatory body. It would also conduct the necessary consultation of all stakeholders including relevant government agencies and the public.

The DOE will continue to allocate funds through the annual General Appropriations Act (GAA) in accordance with an approved work and financial plan. The eNEPIO would also be authorized to secure supplemental funds from other government agencies.

Areas for further action	Significant	Enhanced NEPIO coordination
	Minor	No

RECOMMENDATIONS

R-1.2.1 The Government should implement the proposed expansion of the current NEPIO in order to enhance nuclear power programme coordination.

SUGGESTIONS

None

GOOD PRACTICES

None

1. National Position

Condition 1.3: National strategy defined

Phase 1

Summary of the condition to be demonstrated

A comprehensive report, defining and justifying the national strategy for nuclear power, including:

- a) An analysis of energy demand and energy alternatives;
- b) An evaluation of the impacts of nuclear power on the national economy, for example gross domestic product and employment;
- c) A preliminary technology assessment to identify technologies that are consistent with national expectations;
- d) Consideration of siting possibilities and grid capacity;
- e) Consideration of financing options, ownership options and operator responsibilities;
- f) Consideration of long term costs and obligations relating to spent fuel, radioactive waste and decommissioning;

	<p>g) Consideration of the human resource needs and external support needs of the regulatory body and the owner/operator;</p> <p>h) Recognition that there remains a non-zero possibility of a severe accident and the need to deal with the consequences of such an accident will need to be addressed;</p> <p>i) Consideration of the demands of each of the infrastructure issues and a plan for how they will be met in the next phase of development.</p> <p><i>Note: Any prefeasibility study conducted during Phase 1 can provide significant input to the comprehensive report, although it is important that the report fully address all 19 infrastructure issues.</i></p>
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Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. List of the studies that are feeding into the report(s); 2. Current status and conclusions; 3. Contents list for the report(s); 4. Executive summary of the report(s); 5. Evidence of ministerial review of the report(s).
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Observations

The NEPIO issued a Pre-Feasibility Study (PFS) in December 2017 covering the 19 infrastructure issues of nuclear power development. The main findings of the PFS were summarized and attached to the draft executive order submitted to the President. The document identifies further work needed prior to making the National Decision, including to:

- Consider the Government’s role and participation in a nuclear power project, e.g. financing operations, waste and spent fuel management;
- Review the legal framework;
- Study the impact of nuclear power on the electrical grid;
- Consult with all stakeholders including relevant government agencies and the public; and
- Confirm candidate sites for a nuclear power plant.

DOE conducted energy planning studies (EPS) reported in a document entitled *Assessment of Energy Supply Options for the Philippines*. It analyses the impact of introducing nuclear power as one of the options. However, the INIR team was informed that the EPS needs to be expanded in order to provide a more detailed analysis before introducing nuclear power in the national energy plan.

Areas for further action	Significant	Defining the national strategy
	Minor	No

RECOMMENDATIONS

R-1.3.1 The NEPIO should implement the work proposed in the executive order to define a national strategy for the nuclear power programme.

SUGGESTIONS

None

GOOD PRACTICES

None

2. Nuclear Safety		Phase 1
Condition 2.1: Key elements of nuclear safety understood		
Summary of the condition to be demonstrated	The key requirements for nuclear safety, specified in the IAEA safety standards, are understood by the NEPIO and other relevant stakeholders, and their implications are recognized.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Evidence that the NEPIO has an understanding of, and commitment to, nuclear safety and the principles described in IAEA Safety Standards Series No. SF-1, Fundamental Safety Principles, and is aware of how nuclear safety requirements are taken into account in various designs of nuclear power plants (NPPs); 2. Evidence that the responsibility for nuclear safety is recognized, for example in consideration of leadership, funding and expertise; 3. Evidence that the need to develop adequate capability and skills in nuclear safety is recognized; 4. Evidence of familiarity with IAEA safety standards and other States' practices, and recognition of the need for, and commitment to, the development of national safety standards. 	
Observations		
<p>Senate Bill 1352 and the House of Representatives Substitute Bill recognize the prime responsibility of the licensee for nuclear safety. PNRI sets national standards for nuclear safety and formulates regulations consistent with IAEA standards.</p> <p>The INIR team was informed that PNRI conducts training courses on nuclear safety, which are attended by NEPIO members other stakeholders. NEPIO members have participated in several nuclear safety-related training courses and meetings of the IAEA. In the aftermath of the Fukushima-Daiichi Nuclear Power Plant (NPP) accident, NEPIO staff attended training through the Asian Nuclear Safety Network (ANSN) to learn about the EU stress tests resulting from lessons learned from the Fukushima-Daiichi NPP accident and the improved safety features that are included in the latest NPP designs.</p> <p>The draft executive order proposes an expanded NEPIO with more organizations involved. All relevant stakeholders need to be aware of the key requirements for nuclear safety, as specified in the IAEA safety standards, as well as their implications.</p>		
Areas for further action	Significant	No
	Minor	NEPIO understanding of nuclear safety
RECOMMENDATIONS		
None		
SUGGESTIONS		
S-2.1.1 The NEPIO is encouraged to continue developing its own and all relevant stakeholders' understanding of nuclear safety.		
GOOD PRACTICES		

None		
2. Nuclear Safety		Phase 1
Condition 2.2: Support through international cooperation initiated		
Summary of the condition to be demonstrated	The need for international cooperation and open exchange of information related to nuclear safety as an essential element is recognized and demonstrated.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Evidence of review of options for bilateral or regional cooperation and specific actions for selected cooperation started, especially with countries with an established nuclear power programme; 2. Implementation of a national technical cooperation programme with the IAEA and evidence of government financial support including nuclear safety aspects. 	
<p>Observations</p> <p>The Philippines has signed a five-year Country Programme Framework (CPF) with the IAEA covering, among other actions, nuclear power infrastructure development in the country.</p> <p>The Philippines, through the PNRI, implemented a project with the European Union entitled, ‘Technical Assistance for Improving the Legal Framework for Nuclear Safety and Strengthening the Capabilities of the Regulatory Authority of the Philippines and its TSO (PNRI)’.</p> <p>The Philippines participates in the Asian Nuclear Safety Network (ANSN) and is a member of the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM). The network aims to enhance cooperation on nuclear safety, security and safeguards and complement the work among ASEAN countries at the national, regional, and international levels.</p> <p>The Philippines has signed memoranda of cooperation/understanding with:</p> <ul style="list-style-type: none"> — State Atomic Energy Corporation (ROSATOM) of the Russian Federation, Memorandum of Cooperation which aims to foster cooperation on various areas of nuclear energy development and to support the country in crafting a nuclear energy policy that may lead to a nuclear energy programme; — Korea Atomic Energy Research Institute (KAERI), Memorandum of Understanding to undertake complementary research and development activities and a healthy exchange of technical information; — State Atomic Energy Corporation (ROSATOM) of the Russian Federation, Intergovernmental Agreement on the Use of Nuclear Energy for Peaceful Purposes; and — Korea Hydro & Nuclear Power Co., Ltd (KHNP), Memorandum of Understanding on Cooperation to outline and explore cooperation areas between DOE and KHNP with focus on the development of human resource, legal and regulatory framework, activities to promote social acceptability and the conduct of feasibility study and related activities for the construction of small modular reactors. 		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		

None
SUGGESTIONS
None
GOOD PRACTICES
None

3. Management		Phase 1
Condition 3.1: Need for appropriate leadership and management systems recognized		
Summary of the condition to be demonstrated	There is a commitment to leadership and management systems that will ensure success and promote a safety and security culture as well as the peaceful use of nuclear technologies. There are plans to ensure the knowledge gained by the NEPIO is transferred to the future regulatory body and the owner/operator of the programme.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Plans to ensure appointment of leaders with the appropriate training and experience to plan, procure, construct and operate an NPP as well as to ensure the leadership and management of nuclear safety, security and safeguards; 2. Evidence that the importance of nuclear safety and security culture in each of the organizations to be established is recognized; 3. Evidence that the importance of ensuring the peaceful use of nuclear technology is recognized; 4. Evidence of a clear understanding of management system requirements; 5. A plan to implement management systems in future key organizations is consistent with the appropriate standards and guidance. 	
Observations		
<p>DOE, PNRI and NPC have received training related to management in a nuclear power programme through workshops, conferences and training courses and through scientific visits in countries with nuclear power facilities.</p> <p>As part of ASEAN cooperation, more than 20 Filipinos have participated in 1- to 2-week training programmes for prospective managers provided by countries with experience in nuclear power. There is a requirement for leaders in all governmental organizations in the Philippines to undergo general leadership training. The human resource development plan for the nuclear power programme includes ongoing training for NEPIO staff and nuclear training for executives of the future owner/operator, but there are no specific plans at present for the development of future leaders.</p> <p>The NEPIO recognizes the need for the key organizations in the nuclear power programme to implement management systems consistent with the appropriate standards and guidance. The NEPIO believes that these management systems should integrate all requirements, including safety, health, security, quality, economics and environment into a complete framework to enable the organizations to work cohesively towards unified goals and objectives and ensure that safety and security are given high priority in decision-making. The INIR team was informed that the NEPIO will present its vision for management systems and expects each key organization to develop its management system accordingly.</p> <p>At the national level, Executive Order No. 605 was issued in 2007 to institutionalize the structure, mechanisms and standards to implement the Government Quality Management Program in all executive branch departments and agencies. DOE entered into a Memorandum of Agreement with the Development Academy of the Philippines (DAP) in 2017 to provide guidance, training and support in the development of a quality management system certifiable to ISO 9001:2015 standard. The INIR team was informed that DOE was recently audited and would be ISO 9001:2015 certified before the end of 2018. The work of the NEPIO is being carried out under this quality management system.</p> <p>Other agencies that are involved in the current activities of NEPIO such as PNRI and NPC are</p>		

already certified to ISO 9001:2015. As the nuclear power programme develops, the NEPIO recognizes that aspects of its management system will need to evolve (e.g. development of new processes) and that there will be a need to ensure the smooth transmission of information and knowledge through all the phases of the programme.

There will be several requirements for the management system of the future owner/operator pursuant to existing laws and their implementing regulations. For example, under the Electric Power Industry Reform Act (Republic Act (RA) No. 9136), there is a requirement that before a new generation company operates, it shall submit to the Energy Regulatory Commission a certificate of compliance pursuant to the standard set forth in the Act to include health, safety and environmental clearances. Republic Act (RA) No. 11058 establishes management system requirements covering occupational health and safety, and the Philippine Clean Air Act of 1999 (RA No. 8749) establishes management system requirements related to the environment. The INIR team was informed that the proposed PNRC will establish regulatory requirements on management systems for licensees.

The INIR team was informed that PNRC will also develop its own management system. The Nuclear Regulatory Division of PNRI would be transferred to the proposed PNRC organization, thus, existing knowledge and experience on leadership and management systems would be transferred to PNRC.

The INIR team was informed that the management systems in the key organizations will seek to promote a safety and security culture through process definition, leadership requirements, a plan-do-check-act approach, training and a commitment to continuous improvement. At this stage, the NEPIO has not planned any specific activities (e.g. workshops) to develop a safety and security culture in the key organizations.

Areas for further action	Significant	No
	Minor	Leadership development Promoting a safety and security culture

RECOMMENDATIONS

None

SUGGESTIONS

S-3.1.1 The NEPIO is encouraged to implement a leadership development programme to ensure that future leaders in the key organizations gain the experience needed for a successful nuclear power programme.

S-3.1.2 The NEPIO is encouraged to gain awareness of approaches to promote a safety and security culture in the key organizations of the nuclear power programme and to plan relevant activities at the appropriate time.

GOOD PRACTICES

None

4. Funding and Financing		Phase 1
Condition 4.1: Strategies for funding established		
Summary of the condition to be demonstrated	<p>Mechanisms have been defined for funding a range of key activities that are specific to a nuclear power programme but may not be the fiscal responsibility of the owner/operator. The activities include:</p> <ul style="list-style-type: none"> a) Establishing the legal framework; b) Activities of the regulatory body for safety, security and safeguards; c) The government’s stakeholder involvement programme; d) Siting and environmental protection activities that are the responsibility of the government; e) Emergency preparedness and response (EPR); f) Education, training and research; g) Any required improvements to the electrical grid, if such improvements are the government’s responsibility; h) Any proposed incentives and direct government support to promote localization; i) Storage and disposal of radioactive waste, including spent fuel; j) Decommissioning of the NPP. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Clear statements of how the above areas will be funded, based on a consideration of options; 2. Evidence that the scale of the costs of each of these activities has been recognized. 	
Observations		
<p>The NEPIO’s work to date has been funded from the DOE Regular Budget. The budgeting process is based on an annual cycle.</p> <p>The proposal for the expanded NEPIO states that the DOE will continue to allocate funds through the annual General Appropriations Act (GAA) for the activities of NEPIO in accordance with an approved work and financial plan. The expanded NEPIO will also be authorized to secure supplemental funding from other government agencies.</p> <p>The INIR team was informed that the NEPIO had identified a number of activities that will require funding in the next steps of the programme, and these include studies on siting and environmental impact, grid, industrial involvement, stakeholder involvement, financing models, human resource development, fuel cycle and radioactive waste management as well as a review of the legal framework.</p> <p>The NEPIO also recognized that there may be a need for additional studies coming from the recommendations of the INIR mission. Detailed cost estimates for these studies had not been completed, but the NEPIO is confident that the budget for 2019 is adequate to meet the needs. Where work is required by other governmental agencies, the expanded NEPIO will review the overall work programme with the intent of ensuring that the costs of the work are included in the relevant agency’s budget.</p> <p>The INIR team noted that it may provide added security to, and justification of, the funding of the ongoing activities if a multi-year assessment of the cost for each activity was developed.</p> <p>Senate Bill No. 1352 provides that the budget of the PNRC, based on an annual appropriation from Congress, shall ensure that the PNRC has the financial and human resources necessary to fulfil its assigned responsibilities under this Act. The PNRC would also be authorized to charge and collect</p>		

reasonable fees in the performance of its regulatory functions.

The NEPIO has estimated an overall budget for establishing the new regulatory body, including the hiring of additional staff. Once established, there is a need to reassess the future costs, particularly with regard to developing the competence required to regulate the nuclear power programme (see Infrastructure Issue No. 7, Regulatory Framework). There is already a process in place to assess licensing fees for non-nuclear power activities and there is previous experience related to charging licensing fees for the BNPP.

The House of Representatives Substitute Bill contains a provision for the establishment of a nuclear Waste Management Fund to be held in escrow that can only be utilized for the safe disposal of the nuclear waste, including siting research, transport and final geological disposal. The fund will come from a portion of the payment for the electricity generated from a nuclear power plant.

The INIR team was informed that the Philippines recognizes the need to address decommissioning costs in a similar way (see Infrastructure Issue No. 5, Legal Framework). The INIR team was also informed that NEPIO has not yet considered the roles and responsibilities associated with providing a secure fund that will meet the future costs of radioactive waste management and decommissioning.

Areas for further action	Significant	No
	Minor	Funding of future activities

RECOMMENDATIONS

None

SUGGESTIONS

S-4.1.1 The NEPIO is encouraged to develop a multi-year assessment of the costs of nuclear power infrastructure development activities.

S-4.1.1 The Philippines is encouraged to further consider arrangements to ensure the availability of adequate funds for radioactive waste management and decommissioning.

GOOD PRACTICES

None

4. Funding and Financing

Condition 4.2: Potential strategies for financing identified

Phase 1

Summary of the condition to be demonstrated

Potential options have been identified with financial and risk management strategies, which together:

- a) Create sufficient confidence for lenders and investors to support an NPP project;
- b) Ensure the long term viability of the owner/operator to fulfil all its responsibilities.

Note: A large part of the government's role in nuclear power financing, if the government is not directly a sponsor of the project, relates to financial risk reduction.

Examples of how the condition may be demonstrated	A review of financing options and risk management strategies, considering the long term economics and risks associated with the NPP and including the extent of government funding, equity partners and borrowing, among other things.
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Observations

The PFS Report provides an initial estimate of the initial investment cost of a nuclear power plant of unit size 1000 megawatt (MW), noting that further studies should be conducted to reflect the impact of factors which include siting, localization rate and fluctuations in foreign exchange rates.

The PFS Report outlines approaches for financing nuclear power projects that have been considered in other countries as well as potential sources of finance for the nuclear power project including the Government, commercial financial institutions, equity investors, export credit agencies and multilateral financial institutions.

In the Philippines, the Foreign Investments Act of 1991 (RA No. 7042) limits the equity investment by foreign organizations in a nuclear power project to 40%.

Republic Act No. 7718, the Philippines' Build-Operate-Transfer (BOT) Law, identifies that the project proponent may obtain financing from foreign and/or domestic sources, provided that the operating organization is registered with the Securities and Exchange Commission and at least sixty percent (60%) of the capital stock is owned by Filipino citizens.

It also states that for projects that would have difficulty in sourcing funds, they may be financed up to 50% from direct government's appropriations and/or from the Official Development Assistance (ODA) of foreign governments or institutions, provided the Government of the Philippines participates in the financing of the project.

The NEPIO recognizes the need to conduct further studies and assess whether the legal framework is adequate for the identified options for nuclear power plant financing. The studies will need to address potential financing mechanisms including sovereign guarantees, power purchase agreements and owner/operator structures and their impact on the viability of a nuclear power project.

There is an Investment Coordinating Committee (ICC) in the Philippines. This high level committee composed of cabinet members approves major capital investment projects, which would include financing proposals for a NPP.

The INIR team was informed that Executive Order No. 30, Energy Projects of National Significance (EPNS), provides an enabling policy environment for energy projects including nuclear power plants. Its aim is to ensure that the approvals required by local and national government agencies are given appropriate priority.

Areas for further action	Significant	Financing options
	Minor	No

RECOMMENDATIONS

R-4.2.1 The NEPIO should review the viability of various financing options for a nuclear power project in the Philippines and identify any need for changes in the current legal framework.

SUGGESTIONS

None

GOOD PRACTICES
None

5. Legal Framework		Phase 1
Condition 5.1: Adherence to all relevant international legal instruments planned		
Summary of the condition to be demonstrated	<p>There is an understanding of the requirements of the relevant international legal instruments, their implications and a commitment to adhere to them. The following instruments are covered:</p> <ol style="list-style-type: none"> a) Convention on Early Notification of a Nuclear Accident (INFCIRC/335); b) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (INFCIRC/336); c) Convention on Nuclear Safety (INFCIRC/449); d) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the ‘Joint Convention’) (INFCIRC/546); e) Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev.1) and Amendment thereto (INFCIRC/274/Rev.1/Mod.1); f) Vienna Convention on Civil Liability for Nuclear Damage (INFCIRC/500); g) Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (INFCIRC/566); h) Convention on Supplementary Compensation for Nuclear Damage (INFCIRC/567); i) Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (INFCIRC/402); j) Comprehensive safeguards agreement — based on The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/153 (Corrected)); k) Additional protocol — following the provisions of Model Protocol Additional to the Agreement(s) Between States(s) and the International Atomic Energy Agency for the Application of Safeguards (INFCIRC/540 (Corrected)); l) Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Plans for when each of the instruments will be adhered to; 2. Identification of the actions that will need to be undertaken and the required timescales; 3. Evidence that the resources required are understood and have been defined. 	
Observations		
<p>The Philippines is party to the following international legal instruments:</p> <ul style="list-style-type: none"> — The Convention on Early Notification of a Nuclear Accident; — The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; — The Convention on the Physical Protection of Nuclear Material (CPPNM); and — The Vienna Convention on Civil Liability for Nuclear Damage. <p>The Philippines has a Comprehensive Safeguards Agreement and an Additional Protocol to the Comprehensive Safeguards Agreement with the IAEA in connection with the Treaty on the Non-</p>		

Proliferation of Nuclear Weapons.

The Philippines is a signatory but not yet a party to the following international legal instruments:

- The Convention on Nuclear Safety (CNS);
- The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention);
- The Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage;
- The Convention on Supplementary Compensation for Nuclear Damage (CSC); and
- The Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention.

The Philippines is not a party to the Amendment to the CPPNM.

The Philippines has initiated the legislative approval process for:

- The Amendment to the CPPNM;
- The CNS; and
- The Joint Convention.

PNRI initiated through the Department of Foreign Affairs the concurrence hearings by the Philippines Senate concerning the CPPNM Amendment. The ratification of the CPPNM Amendment was submitted for consideration during the 16th Congress of the Republic of the Philippines; however, the INIR team was informed that the Senate prioritized other international agreements and therefore was not able to ratify the Amendment to the CPPNM. Further, the INIR team was informed that currently the CNS and the Joint Convention are still with the Department of Foreign Affairs. The INIR team was informed that these three Conventions may be ratified during the 18th Congress of the Republic of the Philippines (July 2019–June 2022).

The INIR team was informed that the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, the CSC and the Joint Protocol will be addressed at a latter stage. There is currently no formal plan for the ratification of these international instruments.

Areas for further action	Significant	No
	Minor	Ratifying international instruments

RECOMMENDATIONS

None

SUGGESTIONS

S-5.1.1 The Philippines is encouraged to complete the legislative approval process of the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management as well as the Amendment to the Convention on the Physical Protection of Nuclear Material.

S-5.1.2 The Philippines is encouraged to carry out an analysis and develop a plan to pursue legislative approval of the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, the Convention on Supplementary Compensation and the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention.

GOOD PRACTICES

None

5. Legal Framework

Condition 5.2: Plan in place for development of a comprehensive national nuclear law

Phase 1

Summary of the condition to be demonstrated

There is an understanding of the requirements of the comprehensive national nuclear law that needs to be enacted, a plan with the actions and timescales for development and enactment, together with a commitment from the government to achieve the stated plan. The plan includes the need for the law to:

- a) Establish an independent nuclear regulatory body with adequate human and financial resources, and a clear and comprehensive set of functions;
- b) Identify responsibilities for safety, security and safeguards;
- c) Formulate safety principles and rules (radiation protection, nuclear installations, radioactive waste and spent fuel management, decommissioning, mining and milling, EPR and the transport of radioactive material);
- d) Formulate nuclear security principles;
- e) Give appropriate legal authority to, and define the responsibilities of, the regulatory body and all competent authorities establishing a regulatory control system (authorization, inspection and enforcement, review and assessment, and development of regulations and guides);
- f) Implement IAEA safeguards, including a State system of accounting for and control of nuclear material (SSAC);
- g) Implement import and export control measures for nuclear and radioactive material and items;
- h) Establish compensation mechanisms for nuclear damage.

Examples of how the condition may be demonstrated

1. A plan on how the law will be developed and approved;
2. A summary of how each of the areas listed above will be addressed within the law;
3. Interactions with the IAEA and the other relevant organizations.

Observations

The Philippines has two bills in the legislative process. The House of Representatives Substitute Bill, 'An Act Providing for a Comprehensive Nuclear Regulatory Framework, creating for the Purpose, the Philippine Nuclear Regulatory Commission, and Appropriating Funds Therefor' was approved by the Joint Committee on Government Reorganization and Science and Technology on 21 November 2017, and by the Appropriations Committee on 28 August 2018. Senate Bill No. 1532, 'An Act Providing for a Comprehensive Nuclear Regulation, Creating for the Purpose, the Philippine Nuclear Regulatory Commission, and Appropriating Funds Therefor', is going through the legislative process in the Committee on Science and Technology.

The INIR team was informed that, at the end of the legislative approval process, a single bill will be enacted in accordance with the procedure in place in the Philippines.

The two bills were identical when submitted to each house of Congress but have undergone separate revisions during the legislative process. Both bills include provisions on radiation protection, emergency preparedness and response, transport of radioactive material, import and export of nuclear and other radioactive material, management of spent fuel and radioactive waste, safeguards, physical protection and security, civil liability for nuclear damage. Both bills also provide for the creation of a

regulatory body, the Philippine Nuclear Regulatory Commission (PNRC), which will take over the regulatory functions currently assigned to the Philippines Nuclear Research Institute (PNRI) and to the Centre for Device Regulation, Radiation, Health and Research under the Department of Health.

However, some differences have been introduced, for example: the reporting lines of PNRC are clearly established in the Senate Bill which states “the PNRC is an attached agency of the Department of Science and Technology (Sec. 6)”, while the House of Representatives Substitute Bill is silent on this matter. The INIR team was informed that by default, in the House of Representatives Bill, the PNRC, as an independent commission, will be under the Office of the President for administrative and budgetary purposes.

Further, in both bills, key provisions are missing, and some aspects of a comprehensive nuclear law are only partially addressed. The two bills do not provide for the roles and responsibilities of the body of PNRC Commissioners. They also do not make adequate provisions for the main steps of the licensing process of nuclear installations. These would ensure legal certainty and provide essential guidance for the development of regulations by the regulatory body. Some elements of the CPPNM and its Amendment are not addressed, in particular, those pertaining to the establishment of a physical protection regime and to the criminalization of offenses. The bills do not reflect the general principles of radioactive waste management as embodied in the Joint Convention. The decommissioning of facilities, including its financial aspects, is not addressed in either bill, although an interpretation is given in the “definitions” section. The INIR team was informed that it may be possible to address the issues highlighted above, prior to the enactment of the law.

Areas for further action	Significant	Development of a comprehensive nuclear law
	Minor	No

RECOMMENDATIONS

R-5.2.1 The Philippines should further review some aspects of the current bills and ensure that its legislative plans include all necessary provisions of a comprehensive national nuclear law.

SUGGESTIONS

None

GOOD PRACTICES

GP-5.2.1 Involving parliamentarians in briefings and workshops raised their awareness and understanding of the scope and content of a comprehensive nuclear law early in the legislative approval process.

5. Legal Framework

Condition 5.3: Plans in place to enact and/or amend other legislation affecting the nuclear power programme

Phase 1

Summary of the condition to be demonstrated

There is an understanding of which legislation that affects the nuclear power programme needs to be enacted and/or amended, the timescales for its development and approval, together with a commitment from the government to achieve the stated plan. The legislation to be considered includes that on:

- a) Environmental protection;

	<ul style="list-style-type: none"> b) EPR; c) Occupational health and safety of workers; d) Protection of intellectual property; e) Local land use controls; f) Foreign investment; g) Taxation, fees, electricity tariffs and incentives; h) Roles of national and local governments; i) Stakeholders and public involvement; j) International trade and customs; k) Financial guarantees and any other required financial legislation; l) R&D. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. A plan on how the legislation will be developed and approved; 2. A summary of how each of the areas listed above will be addressed within the proposed legislation; 3. Interactions with the IAEA and the other relevant organization. 	
Observations		
<p>The NEPIO provided a list of national laws that may be affected by the provisions of the House of Representatives Substitute Bill but has not yet completed an analysis of laws that may affect the nuclear power programme and that need to be enacted or amended as appropriate. The INIR team was informed that this activity will be conducted in the near future and the NEPIO's technical working group on legal framework will lead this review process.</p>		
Areas for further action	Significant	Review of legislation that may affect the nuclear power programme
	Minor	No
RECOMMENDATIONS		
R-5.3.1 The Philippines should complete an analysis of laws that may affect the nuclear power programme and plan for their enactment or amendment as appropriate.		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

6. Safeguards		Phase 1
Condition 6.1: Terms of international safeguards agreement in place		
Summary of the condition to be demonstrated	<p>The Member State has a comprehensive safeguards agreement with associated subsidiary arrangements in force with the IAEA.</p> <p>If the Member State currently has concluded a small quantities protocol to its comprehensive safeguards agreement, a plan needs to be developed setting out the necessary steps to rescind the small quantities protocol in a timely manner.</p> <p>The Member State is aware of the requirements of the additional protocol; if the Member State has made the decision to ratify the additional protocol but has not already done so, a plan is in place for the timely ratification.</p>	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> Plans for rescinding the small quantities protocol and/or for ratification of the additional protocol, including the actions that need to be taken, clear assignment of responsibilities and understanding of the resources and the required timescales; Evidence that the need for outreach activities is recognized to ensure that all existing and future entities having to report to the State authority for safeguards are aware of their roles and obligations. 	
Observations		
<p>The Philippines has a comprehensive safeguards agreement with the IAEA which has been in force since 16 October 1974 and an additional protocol which has been in force since 26 February 2010.</p> <p>In its Safeguards Statement for 2012 and in each annual safeguards statement since, the IAEA drew the conclusion that, for the Philippines, all nuclear material remained in peaceful activities.</p> <p>In its Safeguards Statement for 2017, the IAEA noted that integrated safeguards — which can only be implemented in States where there is increased assurance of the absence of undeclared nuclear material and activities for the State as a whole — were implemented during 2017 for the Philippines.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

6. Safeguards		Phase 1
Condition 6.2: Strengthening of the SSAC planned		
Summary of the condition to be demonstrated	The Member State has a plan describing how the existing SSAC will be strengthened or adjusted to deal with the increase of activities and resources, as well as the need for enhancement of capabilities.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Evidence that the NEPIO includes a representative knowledgeable in the requirements of the comprehensive safeguards agreement; 2. A plan produced by the NEPIO covering the enforcement of national legislation, policies and procedures relevant to safeguards; the development of the legislation itself is covered under Infrastructure Issue No. 5, Legal Framework; 3. Evidence that approaches undertaken by one or more States with existing nuclear power programmes have been reviewed and the information gained has been adapted for the national context. 	
Observations		
<p>PNRI provides safeguards expertise to the NEPIO. The Philippines sends trainees from PNRI, DOE and NPC to SSAC courses offered by the IAEA. The NEPIO recognizes there would be a need for additional human resources and training in safeguards, including for the regulatory body and the future NPP owner/operator, for a nuclear power programme.</p> <p>The NEPIO believes that existing mechanisms for cooperation with the IAEA, the Asia Pacific Safeguards Network (APSN) and the United States' International Nuclear Safeguards Engagement Programme (INSEP) are sufficient to meet its needs for training and outreach for the Additional Protocol. PNRI plans to establish a Nuclear Safeguards and Security Laboratory which could be used for training new SSAC staff to support the implementation of procedures and practices necessary to facilitate information gathering, timely reporting and in-field verification.</p> <p>The Philippines has good knowledge of the requirements of its comprehensive safeguards agreement and additional protocol. PNRI has identified the need for a new regulation related to safeguards implementation and is drafting a new regulation.</p> <p>PNRI informed the INIR team that it plans to increase the number of its safeguards staff from 4 to 10 if the nuclear power programme proceeds. In addition, staff are getting exposure to safeguards practices relevant to a nuclear power programme through SSAC courses and cooperation with ASEANTOM. One PNRI staff member is currently in Japan to gain experience in safeguards implementation. In early 2019, PNRI plans to conduct domestic safeguards training on nuclear material control and accounting and reporting, and it plans to invite participants from DOE and NPC.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		

None		
GOOD PRACTICES		
None		
6. Safeguards		Phase 1
Condition 6.3: Recommendations from any previous reviews or audits being addressed		
Summary of the condition to be demonstrated	If any reviews or audits have been conducted on the existing safeguards provisions, there is evidence that the actions resulting from it are progressing.	
Examples of how the condition may be demonstrated	Action plans resulting from a review or audit with progress identified indicating the required timescales, responsibilities and resources required.	
<p>Observations</p> <p>The INIR team was informed that the Philippines' SSAC was reviewed in the framework of a safeguards cooperation with INSEP and the Australian Safeguards and Non-Proliferation Office (ASNO). The review recommended that the Philippines use software offered by the IAEA and US-DOE for preparing nuclear material accounting reports and additional protocol declarations. PNRI's Nuclear Safeguards and Security Section (NSSS) now uses a secure communications system installed by the IAEA to submit directly its nuclear material accounting reports. All required nuclear material accounting reports and additional protocol declarations are transmitted on time to the IAEA using the recommended software.</p> <p>The INIR team was informed that the Philippines may consider requesting an ISSAS mission in the medium to long term, particularly if the country strengthens its SSAC to deal with an increase of activities as part of a nuclear power programme.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

7. Regulatory Framework Condition 7.1: Development of an adequate regulatory framework planned		Phase 1
Summary of the condition to be demonstrated	<p>The prospective senior managers of the regulatory body have been identified. There are plans to develop a regulatory framework for nuclear safety, nuclear security and safeguards that matches the overall plan for the NPP, and includes:</p> <ol style="list-style-type: none"> a) Designation of an effectively independent competent regulatory body with clear authority, adequate human and financial resources, and strong government support; b) Assignment of core safety, security and safeguards regulatory functions for developing regulations, review and assessment, authorization, inspection, enforcement and public information; c) Authority and resources to obtain technical support as needed; d) A clear definition of the relationship of the regulatory body to other organizations (e.g. technical support organizations and environmental agency); e) Clearly defined responsibilities of licensees; f) Authority to implement international obligations, including IAEA safeguards; g) Authority to engage in international cooperation; h) Provisions to protect proprietary, confidential and sensitive information; i) Provisions for stakeholder involvement and communication with the public. <p>There are agreed terms of reference for each regulator and a clear definition of roles of, and interfaces with, other regulators. There is recognition of the need for integrating existing security and radiation safety regulations with new regulations for NPPs.</p> <p><i>Note: Plans to develop competence are addressed under Infrastructure Issue No. 10, Human Resource Development.</i></p>	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Evidence of what has been done, or is planned, to develop the experience of the senior regulators; 2. Proposals on the overall approach to assessment, licensing, inspection and enforcement, among other things; 3. Plans to develop the regulatory body for safety, security and safeguards 4. Plans to develop the required regulations; 5. Evidence of interaction and cooperation with established regulatory organizations; 6. Plans to enhance or develop appropriate technical support organizations (see also infrastructure issue No. 10, human resource development) to support the regulatory body; 7. Plans to secure support from international regulatory organizations. 	
Observations <p>In January 1987, Executive Order No. 128, Sec. 21, established the Philippine Nuclear Research Institute (PNRI) and assigned it the functions to, inter alia, license and regulate activities related to the production, transfer, and utilization of nuclear and radioactive substances. Republic Act No. 9711 (2009) assigned the responsibility for the regulation of devices generating ionizing radiation to the</p>		

Centre for Device Regulation, Radiation, Health and Research (CDRRHR) of the Department of Health.

The House and Senate Bills both contain provisions to establish a new regulatory body, the Philippine Nuclear Regulatory Commission (PNRC). The INIR Team was informed that PNRC is intended to be an independent regulatory commission by virtue of:

- Reporting directly to the Office of the President;
- Being funded through regular government appropriations and fees from licensees;
- Its commissioners serving for five-year fixed terms (and being able to be removed only for just cause); and
- Its rulings being able to be challenged only on jurisdictional issues or alleged violation of law.

Both bills describe PNRC’s functions and basic organization, including the assignment of core safety, security and safeguards regulatory functions for developing regulations, review and assessment, authorization, inspection, enforcement and public information. However, the roles and responsibilities of the body of PNRC commissioners are not specified in the bills. The INIR team was informed that these will be specified in implementing regulations.

The INIR team was informed that the selection and appointment of senior managers of the future PNRC will be done through standard procedures for government organizations: qualification requirements are specified and published and applications are reviewed by a committee which recommends which candidates should be appointed.

The legislation intends to establish a single regulator (the PNRC) for all activities and practices involving ionizing radiation, including nuclear and other radioactive materials, facilities and radiation generating equipment. The bills provide for the transfer to the PNRC the regulatory functions of PNRI as well as the regulatory functions of CDRRHR. All powers, functions and duties, budget, records, files, staff and assets of these organizational units would be transferred to the PNRC. Regulations issued by PNRI and CDRRHR would remain in force unless superseded, amended or revised by the PNRC.

A proposal for organizational structure, staffing levels and sources of operating income for the PNRC was provided to the House Appropriations Committee during its consideration of the House of Representatives Substitute Bill. This proposal supplemented the organizational provisions included in the Bill. The NEPIO recognized that further work would need to be done in defining the competences required for regulating nuclear power and planning the organizational development accordingly.

PNRI has developed a draft regulation on Site Evaluation for Nuclear Installations (CPR Part 5) and a draft regulation on Licensing of Atomic Energy Facilities (CPR Part 7) which have already been reviewed by statutory stakeholders; however, there are no specific plans to develop all the regulations and guides required for a nuclear power programme.

Currently, the Philippines has cooperation arrangements with the IAEA and the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM). The INIR team was informed that PNRI recognizes the importance of securing support from foreign regulatory organizations and associations but does not have specific plans to do so.

Areas for further action	Significant	Plans for structuring and staffing the future regulatory body Plans for developing regulations
	Minor	Regulatory cooperation

RECOMMENDATIONS

R-7.1.1 The NEPIO should review the proposed structure and staffing requirements for the future regulatory body and ensure they are adequate to meet the needs of the nuclear power programme.

R-7.1.2 The NEPIO should develop a plan for the development of regulations that will be required for a nuclear power programme.

SUGGESTIONS

S-7.1.1 PNRI is encouraged to identify regulators and organizations that can provide external support to PNRI or the future PNRC and pursue opportunities for cooperation.

GOOD PRACTICES

None

8. Radiation Protection Condition 8.1: Enhancements to radiation protection programmes planned		Phase 1
Summary of the condition to be demonstrated	<p>The needed enhancements to the existing radiation protection programme to address NPP operation have been identified, including consideration of transport of radioactive materials and radioactive waste management. They consider both the increase in scale and the need to cover new technical issues.</p> <p><i>Note: This issue is closely linked to Infrastructure Issue No. 7, Regulatory Framework. In particular, the development of regulations and whether the existing regulatory body will expand its role or whether the infrastructure issues will be addressed by a separate organization.</i></p>	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Evidence of discussions with specialists from other countries; 2. Identification of the main areas requiring enhancement; 3. Recognition that additional competences will be required to review proposed designs against the requirement to control contamination and to reduce exposures to as low as reasonably achievable, also known as ALARA; 4. Recognition that the programme for dose assessment will need to be significantly expanded; 5. Plans for who will be responsible for the main elements of a radiation protection programme. 	
<p>Observations</p> <p>The national radiation protection infrastructure is being strengthened. Some of the planned enhancements are relevant to the nuclear power programme.</p> <p>Regulations for radiation protection were adopted under the Code of PNRI Regulations (CPR). CPR Part 25 on ‘Licenses for Commercial Providers of Nuclear Techniques Services’ issued by PNRI in 2013 prescribes the requirements to be met by commercial providers.</p> <p>PNRI has developed capabilities to monitor radiation levels and personal exposures. The services currently provided cover personal dosimetry, calibration of radiation instruments in its secondary standards dosimetry laboratory (SSDL), radioactivity measurements, workplace monitoring and dose assessment, including through bio-dosimetry. PNRI provides radiation protection training through its Nuclear Training Centre.</p> <p>The INIR team was informed that presently, technical services are provided by PNRI, the DOH, two private companies and one company with in-house capacity. The companies are accredited either by PNRI or DOH, depending on the service provided or the device involved; however, PNRI and DOH plan to harmonize their accreditation processes. In the future, once the nuclear law is in force, PNRC will accredit all service providers, including PNRI and the DOH. The NEPIO recognizes that the accreditation programme will need to be expanded.</p> <p>The NEPIO recognizes the need to expand existing services to include: calibration to cover low and high energy photons, neutron and beta, whole body counting and extremity monitoring and neutron dosimetry. Radioactivity analysis services for internal uptake monitoring, airborne concentration monitoring and methods for leak testing of sealed sources also need to be developed. In 2017, PNRI launched the construction of the Radiation Protection Services Facility to house the upgraded laboratories and accommodate the increasing number of samples and instruments.</p> <p>The current estimated personnel under occupational exposure is about 30,000, and there will be more</p>		

if the nuclear power programme proceeds.

The expanded NEPIO would address the needed enhancements to radiation protection programmes, with regard to the nuclear power plant operation.

Areas for further action	Significant	No
	Minor	Enhancements to radiation protection programmes

RECOMMENDATIONS

None

SUGGESTIONS

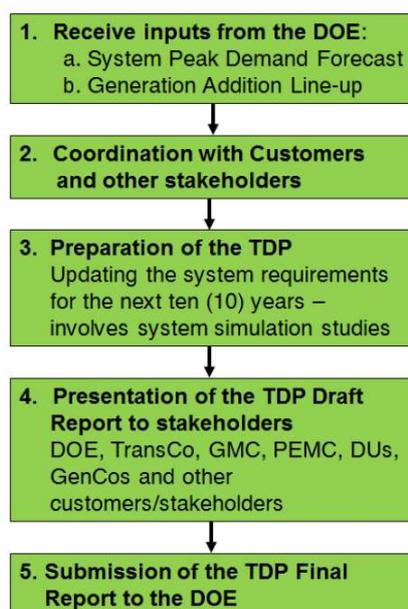
S-8.1.1 The NEPIO is encouraged to continue assessing and planning for enhancements to radiation protection programmes with regard to the needs of the nuclear power programme.

GOOD PRACTICES

None

9. Electrical Grid		Phase 1
Condition 9.1: Electrical grid requirements considered		
Summary of the condition to be demonstrated	<p>A preliminary study of the grid system has been conducted covering:</p> <ol style="list-style-type: none"> a) Capability and reliability to take the output from the NPP; b) Ability to withstand loss of the output; c) Reliability to minimize the risk of loss of power to the NPP from the grid. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. An analysis of the grid covering: <ol style="list-style-type: none"> a) The expected grid capacity; b) The historical stability and reliability of the electrical grid; c) The historical and projected variation in energy demand. 2. Evidence of consideration of: <ol style="list-style-type: none"> a) Available NPP designs to identify those with output consistent with required grid performance and reliability ('grid code'), with due consideration taken for safety aspects; b) Potential NPP sites and their impact on grid operation; c) The anticipated growth of grid capacity; d) The potential for local or regional interconnectors to improve grid characteristics. 3. Preliminary plans to enhance the grid to meet NPP requirements. 	
Observations		
<p>The National Transmission Corporation (TRANSCO), a governmental agency, is the owner of the country's transmission grid and substation assets. The transmission system comprises three grids namely the Luzon, Visayas and Mindanao grids:</p> <ul style="list-style-type: none"> — The Luzon grid is a network of 500 kV, 230 kV and 115 kV lines; — The Visayas and Mindanao grids are networks of 230 kV, 138 kV and 69 kV lines. <p>The INIR team was informed that a single 350 kV DC bi-directional line located at the Northeast part of Visayas serves as interconnection between the Visayas and Luzon Grids. Currently, the Visayas and Mindanao grids are not interconnected. A Visayas-Mindanao grid interconnection is scheduled to be completed by December 2020.</p> <p>In 2015, the total installed capacity was 18.7 GW (Luzon: 13.7 GW, Visayas: 2.7 GW and Mindanao: 2.4 GW). Peak electricity demand is expected to increase from 12.2 GW in 2015 to 49.2 GW by 2040 (under a high GDP growth scenario).</p> <p>The INIR team was informed that after the privatization of the electricity sector, the National Grid Corporation of the Philippines (NGCP) was granted a private concession, valid for 25 years, to maintain, operate, expand and improve the high voltage backbone transmission system and facilities throughout the Philippines. As the system operator of the grid, NGCP operates and maintains metering facilities and provides technical services, particularly system studies. TRANSCO provides oversight of NGCP.</p> <p>The Transmission Development Plan (TDP) prepared by NGCP outlines the planned projects which are required to address the system needs. The most recent version of the TDP covers the period 2016 to 2025.</p>		

The below figure is a flowchart of the process for the preparation of the TDP.



The current version of the TDP takes into account the expansion of thermal (fossil-fuelled) and renewable (hydro, wind, solar, biomass, geothermal) power generating capacity up to 2025. The introduction of nuclear power plants is not included. System impact studies with respect to the incorporation of a NPP have not yet been undertaken.

The INIR team was informed that once candidate sites for the NPP have been identified, DOE will request NGCP to undertake preliminary studies of the impact of connecting a NPP to the grid.

Areas for further action	Significant	Preliminary electrical grid studies
	Minor	No

RECOMMENDATIONS

R-9.1.1 The NEPIO should ensure that a preliminary study of the grid system is conducted covering the reliability of the grid and its compatibility with the introduction of a nuclear power plant.

SUGGESTIONS

None

GOOD PRACTICES

None

10. Human Resources Development Condition 10.1: Necessary knowledge and skills identified, and gaps in current capability assessed		Phase 1
Summary of the condition to be demonstrated	<p>A broad assessment of the typical staffing needs of each of the key organizations and their technical support has been completed together with an assessment of improvements required in the current capability of the country to meet the projected need. The assessment covers the full range of scientific, technical, managerial and administrative disciplines and considers:</p> <ol style="list-style-type: none"> a) Current human resource competences and capabilities; b) Estimated required competence and capability; c) Availability of domestic and foreign capacity for education and training; d) Additional education, recruitment, training and experience that will be required (gap analysis), including specialist training in nuclear safety, nuclear security, safeguards, radiation protection, spent fuel and radioactive waste management, management systems and EPR; e) Which facilities and programmes need to be established for education, training and experience building; f) Which research capability needs to be developed; g) A senior leaders development programme. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. An analysis identifying the competences and number of staff needed, covering all the future organizations. The analysis needs to include: <ol style="list-style-type: none"> a) Bulk workforce needs per phase; b) A breakdown by knowledge, skills and discipline per phase; c) The flow of workforce to other projects (e.g. future NPPs). 2. An analysis of existing human resource capabilities and the ability to attract experienced staff from other countries. 3. An assessment of the capability of existing education and training facilities. 	
<p>Observations</p> <p>The NEPIO has considered three potential scenarios (a new NPP, the rehabilitation of BNPP, and SMRs) and has estimated overall manpower needs for each scenario, including for each of the key organizations. The INIR team was informed that the Philippines used examples from other countries as well as IAEA publications in estimating the human resource needs for the nuclear power programme. An estimate of training needs for the NEPIO, the regulatory body and the owner/operator has been made in terms of the field of training, number of staff to be trained and duration of training.</p> <p>The INIR team was informed that the NEPIO's Technical Working Group on Human Resource Development is composed of DOE employees who are human resource practitioners and that the group's main function is to prepare a Human Resource Development Plan for the nuclear power programme.</p> <p>The Philippines generates a sufficient pipeline of engineering, science and non-technical graduates. However, the following needs were identified:</p> <ul style="list-style-type: none"> — To introduce nuclear topics as electives in the existing curricula of the engineering and natural sciences programmes; — To establish master's and doctoral programmes in nuclear engineering and related courses; and 		

<p>— To develop programmes in the vocational/technical schools to produce skilled technicians in relevant disciplines.</p> <p>The NEPIO has also concluded that there is a need to reintroduce nuclear-related courses, topics and materials into curricula at primary and secondary levels and to conduct outreach activities to engage students. While there may be an opportunity to make use of the experience of professionals who worked on the Bataan nuclear power project, many have retired, or their qualifications have lapsed.</p> <p>The NEPIO is collecting information about Filipino companies and professionals who could potentially support the nuclear power programme.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		
10. Human Resources Development		Phase 1
Condition 10.2: Development of human resources planned		
Summary of the condition to be demonstrated	<p>Outline plans have been agreed to:</p> <ol style="list-style-type: none"> a) Enhance national education and training; b) Develop a detailed human resource development plan for each key organization; c) Integrate the plans to develop a national strategy including the development of an initial core leadership group. 	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Plans to develop human resources required including: <ol style="list-style-type: none"> a) Identification of national organizations that could support human resource development; b) Enhancement of education and training infrastructure; c) Development of national competences (through schools, universities, institutes and industry); d) Non-national human resources that are needed to augment national resources and how they will be secured; e) International cooperation and vendor support; f) Leadership development. 2. Strategies for the recruitment and retention of staff. 3. Recognition of the need for qualification and certification programmes for personnel. 4. Evidence that key stakeholder organizations have participated in the 	

Observations

The Philippine HRD Roadmap for the Nuclear Power Programme intends to integrate plans for short-, mid- and long-term activities and serve as a guide for various groups and stakeholders.

The NEPIO intends to promote a systematic approach to training (SAT) in the nuclear power programme to ensure that the industry-required knowledge, skills and attitudes are developed by the training programmes.

The INIR team was informed that a human resource development plan related to the needs of the NEPIO has been developed.

The following activities already have been implemented:

- Training by PNRI including at its Nuclear Training Centre;
- Meetings with universities to develop nuclear engineering courses at BS, MS and PhD levels;
- Training on legislative framework;
- MoAs between PNRI and different government departments on education and training; and
- An IAEA TC project design for 2020–21 on establishing a graduate programme in nuclear science, engineering and management.

The Philippines is considering the option to engage foreign experts through a variety of mechanisms, e.g. hiring foreign consultants, engaging consulting firms, hosting international conferences, sending students to foreign academic institutions, etc.

Regarding the legacy from BNPP, the following is being considered:

- The vendor could also play a significant role, as was the case with Bataan NPP;
- Retired Bataan NPP experts could share their experience; and
- The Bataan NPP could be converted into a training facility.

Consideration for the development of an initial core leadership group is covered under Infrastructure Issue No. 3, Management.

Areas for further action	Significant	Plans for each key organization
	Minor	No

RECOMMENDATIONS

R-10.2.1 The NEPIO should develop outline plans for human resource development for each key organization to be integrated at the national level.

SUGGESTIONS

None

GOOD PRACTICES

None

11. Stakeholder Involvement		Phase 1
Condition 11.1: Open and transparent stakeholder involvement programme initiated		
Summary of the condition to be demonstrated	Stakeholder involvement strategy and plan, with the required resources and competence, implemented by the NEPIO based on transparency and openness. The public, and other relevant interested parties, receive information about the benefits and risks of nuclear power, including the non-zero potential for severe accidents.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. A clear mandate for the NEPIO to engage with stakeholders; 2. Actions to disseminate information in the context of the national energy outlook, policy and needs, and pros and cons of all sources of energy, using a range of effective tools; 3. Evidence of a professional communication team available to the NEPIO, with appropriate financial resources; 4. Results of surveys to determine the public's knowledge and receptiveness to nuclear power; 5. Approaches to address public concerns, including waste management and severe accidents; 6. Evidence of activities at the local, regional and national level; 7. A plan for ongoing interaction with the public, in particular, opinion leaders, media, local and national governmental officials and neighbouring countries; 8. Plans for regular opinion polls managed by specialist companies; 9. A training programme to enable identified spokespersons to interact with stakeholders. 	
Observations		
<p>The NEPIO is aware of the importance of communicating with the public and other stakeholders about both the benefits and the risks of nuclear power. DOE and PNRI carry out stakeholder involvement activities including:</p> <ul style="list-style-type: none"> — Perception surveys; — Seminars on nuclear technology in the Philippines; — Promotion of nuclear science and technology to science teachers and students; — Annual celebration of Atomic Energy Week; — Interactive exhibits on nuclear energy displayed at national and local science and technology events; — Establishment of the Philippine Young Generation in Nuclear (PYGN) network; and — Participation in ANSN's Communication Topical Group (CTG) as coordinator. <p>An interim communication plan was drafted by the Public Information and Communication Team (PICT) in 2012. The INIR team was informed that the plan will be revised in the second quarter of 2019 to become the National Communication/Stakeholder Engagement Plan. The revision will take into account the results of a national survey to be conducted in early 2019. The INIR team was informed that the survey will cover 17 regions in the Philippines and will be conducted in English and local dialects. An evaluation and monitoring mechanism will be included in the revised plan.</p> <p>The INIR team was informed that the NEPIO TWG on stakeholder involvement is led by DOE with members from NPC and PNRI. Members are from the public relations departments of their respective agencies and have technical knowledge in energy and nuclear energy. There are designated spokespersons from technical staff, and a training programme for spokespersons is planned for 2019.</p>		

Membership in the TWG will be broadened to include representatives from other agencies in the expanded NEPIO.

PNRI has produced a significant amount of public communication materials, although most focus on non-power topics: basics of radiation, radiation protection, emergency preparedness and response and nuclear applications. Additional efforts are needed to communicate about nuclear power in the Philippines. The INIR team was informed that questions about nuclear power are often raised in press conferences and other stakeholder involvement events.

The NEPIO plans to develop and modernize public communication materials, broaden the use of social media channels and strengthen media relations to support the objective of communicating about the benefits and risks of the nuclear power programme in the Philippines. The TWG recognizes the importance of commitment from leadership for open and transparent stakeholder involvement.

Areas for further action	Significant	No
	Minor	Outreach and information on nuclear power

RECOMMENDATIONS

None

SUGGESTIONS

S-11.1.1 The NEPIO and other key organizations are encouraged to further develop outreach activities and materials specific to nuclear power in the Philippines for engaging all relevant stakeholders.

GOOD PRACTICES

GP-11.1.1 Routinely providing spokespersons training to both technical and communication staff, according to an annual schedule, supports clear and consistent messaging about the nuclear power programme.

12. Site and supporting facilities		Phase 1
Condition 12.1: General survey of potential sites conducted and candidate sites identified		
Summary of the condition to be demonstrated	Exclusion and avoidance criteria (covering safety, security, cost, socioeconomic issues, engineering and the environment) have been identified and regional analysis to identify candidate sites has been conducted. The analysis includes the impact of external hazards on security and emergency response capability. Consultations with stakeholders have been part of the process.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. A report covering: <ol style="list-style-type: none"> a) Safety and security criteria for initial NPP site selection; b) National criteria (e.g. socioeconomic and environmental); c) Engineering and cost criteria. 2. An assessment report issued and approved identifying: <ol style="list-style-type: none"> a) Regional analysis and identification of potential sites; b) Screening of potential sites and selection of candidate sites. 3. Evidence that the resources that were used for NPP site selection are competent and have experience with NPP site selection; 4. Plans for the work that will be required in Phase 2 to select and justify the site; 5. Evidence that safety and security related activities conducted (e.g. site evaluation and environmental impact studies) are included within the framework of an effective management system. 	
Observations		
<p>Siting investigations were conducted in the 1970s for the Philippines' first nuclear power plant. The criteria for the site survey included basic rock formation, population distribution, proximity to load, land and water use and seismology. Five candidate sites in Luzon were identified. Further consideration of external natural hazards (e.g. geology, geotechnical, seismology, volcanology, terrestrial, meteorology, ecology, hydrography and oceanography) and non-safety related parameters (e.g. accessibility, water supply and connections to the transmission system) led to the selection of Napot Point, Morong, Bataan, for the NPP, which was constructed between 1976 and 1985.</p> <p>In the 1990s, the Philippine Government again considered introducing nuclear power, and through Executive Order No. 243 established a Nuclear Power Steering Committee which, inter alia, conducted site investigations. The site investigation team was led by the National Power Corporation, and included the Department of Environment and Natural Resources, Department of Energy, Department of Science and Technology, Office of the President and the Philippine Nuclear Research Institute. Based on a range of criteria, 10 potential sites were identified. A more detailed evaluation was conducted on the sites in three of the sub-regions: Cagayan (on Luzon), Negros and Palawan.</p> <p>In 2018, the NEPIO Technical Working Group (TWG) on Site and Supporting Facilities conducted a Strategic Planning and Technical Workshop on Siting with the involvement of other governmental agencies with relevant expertise, such as the Mines and Geosciences Bureau in the Department of Environment and Natural Resources, the Philippine Institute of Volcanology and Seismology, Philippine Atmospheric, the Geophysical and Astronomical Services Administration and the Philippine Nuclear Research Institute in the Department of Science and Technology. The purpose of the workshop was to identify and agree on criteria that would be applied to validate the previously</p>		

identified potential sites and/or to identify new potential sites for a NPP.

The TWG on Site and Supporting Facilities compiled a set of criteria related to safety and non-safety parameters. The criteria addressed geology, seismology, volcanology, geotechnical, hydrogeology, hydrology, meteorological events, coastal flooding, population distribution data, land use, human induced external hazards, environment, socio-cultural, military and security, economic, transmission grid, accessibility, site development and political considerations. The INIR team was informed that these criteria were also categorized into exclusionary, discretionary and suitability criteria. Security, physical protection and emergency considerations were taken into account in developing this set of criteria.

The INIR team was informed that a workplan for early 2019 has been developed to validate the previously identified potential sites. This will involve both desktop studies and site visits. Information to support this validation activity would be obtained from partner organizations. The INIR team was also informed that a range of stakeholders including regional development authorities, local government, local NGOs, local industrial sector, local academia, health institutions, religious organizations, armed forces, police, coast guard, fire protection and local media have been identified.

A quality assurance framework was not applied during the site surveys and site selection activities in the 1970s and 1990s. The INIR team was informed that the quality of the current and future activities of the NEPIO TWG on Site and Supporting Facilities is being assured by virtue of the application of the DOE quality management system.

Areas for further action	Significant	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

GP-12.1.1 Organizing a workshop with a broad range of stakeholders and implementing a structured process led to the development of a comprehensive set of criteria for identifying candidate sites for a nuclear power plant.

13. Environmental Protection		Phase 1
Condition 13.1: Environmental requirements considered		
Summary of the condition to be demonstrated	The NEPIO has considered the main environmental requirements related to the siting of an NPP, including land use, water use, water quality and the impacts of low level radioactive effluents.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Identification of key requirements for siting and during construction; 2. Evidence of discussions by specialists with States operating nuclear power; 3. Evidence that the non-radiological environmental issues, such as water use, transport of materials, disposal of hazardous waste, additional environmental monitoring requirements and construction impact, have been considered and taken into account by the NEPIO. 	
Observations		
<p>The Revised Procedural Manual of the Philippine Environmental Impact Statement System (PEISS), DAO 03-30, dated August 2007, is designed to guide project proponents on how to fulfil the country's environmental assessment requirements. Nuclear power plants are identified in the PEISS as Environmentally Critical Projects that require a full environmental impact assessment.</p> <p>The NEPIO, through the Technical Working Group (TWG) on Site and Supporting Facilities, has considered a range of environmental criteria for the nuclear power project including natural parks and wildlife reserves, historically and aesthetically sensitive areas, touristic areas, air quality, water quality, the use of land and water, and the dispersion of radioactive effluents. The INIR team was informed that the Department of Environment and Natural Resources and other Agencies have been involved in this work.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		
13. Environmental Protection		Phase 1
Condition 13.2: Framework for environmental protection reviewed		

Summary of the condition to be demonstrated	The NEPIO has reviewed the suitability of the State's existing framework for environmental protection and for meeting its international obligations.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Procedures developed for the elaboration, reporting and assessment of environmental studies for nuclear and other related facilities; 2. Evidence of interactions by specialists with States operating nuclear power. 	
<p>Observations</p> <p>Presidential Decree No. 1152 of 1977, 'Philippine Environmental Code', establishes specific environment management policies and provides for environment quality standards for air, water, land use, and energy development. Section 11 on Radioactive Emissions states that the release and emission of radioactivity into the environment arising from the establishment or possession of nuclear energy facilities and radioactive materials, handling, transport, production, storage, use and disposal of radioactive materials shall be regulated by the Philippine Atomic Energy Commission (now PNRI) in coordination with other appropriate government agencies. Section 38 on Safety Measures on Energy Development states that all nuclear power plants, whether owned or controlled by private or government entities, shall observe internationally accepted standards of safety and provide safety devices to ensure the health and welfare of their personnel as well as the surrounding community.</p> <p>DENR Administrative Order No. 30 'Revised Procedural Manual of the Philippine Environmental Impact Statement System (PEISS)' dated August 2007, outlines the country's environmental assessment procedures and requirements. The PEISS stipulates that nuclear power projects are categorized as environmentally critical projects (ECPs) and require an environmental compliance certificate issued by the Department of Environment and Natural Resources.</p> <p>The INIR team was informed that the PEISS provides for a Review Committee, comprised of DENR representatives, external experts and experts from other agencies, to review EIA reports submitted by project proponents. PNRI provides the expertise for the review of any radiological impact assessments.</p> <p>The INIR team was informed that the NEPIO considers the existing Philippine framework adequate for environmental protection related to the nuclear power programme.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

14. Emergency Planning		Phase 1
Condition 14.1: Requirements of, and resources for, developing an emergency response capability recognized		
Summary of the condition to be demonstrated	<ol style="list-style-type: none"> 1. The NEPIO is aware of the EPR arrangements and capabilities that will be required for the nuclear power programme. It has evaluated existing EPR arrangements and capabilities in the country and is aware of the major gaps that will need to be addressed. 2. The NEPIO has identified the main organizations and resources that will need to be involved in the establishment of adequate national EPR capabilities. 3. The lead for the execution of the action plan and the action plan coordination framework has been identified. <p><i>Notes: (1) The process of developing adequate EPR will be initiated in Phase 2 and will be largely carried out in Phase 3;</i> <i>(2) The requirements of the conventions on early notification and assistance are covered under Infrastructure Issue No. 5, Legal Framework.</i></p>	
Examples of how the condition may be demonstrated	Report summarizing existing EPR arrangements and capabilities and identifying those to be enhanced and/or developed as well as identifying the main organizations and resources that will need to be involved in the establishment of adequate national EPR capabilities.	
Observations		
<p>The national framework for emergency preparedness and response (EPR) is governed by the Act Strengthening the Philippines Disaster Risk Reduction and Management System, which forms the basis for the development of the National Disaster Risk Reduction and Management Plan (NDRRMP). The National Disaster Risk Reduction and Management Council (NDRRMC), formerly the National Disaster Coordination Council (NDCC), is empowered with policy-making, coordination, integration, supervision, monitoring and evaluation functions. The Office of Civil Defense (OCD) of the Department of National Defense implements the NDRRMP.</p> <p>In 2000, the Philippines developed the National Radiological Emergency Preparedness and Response Plan (RADPLAN) with the objective to establish a national and coordinated emergency response capability for nuclear and radiological emergencies. The RADPLAN was prepared by PNRI and approved by the OCD and the NDCC.</p> <p>The RADPLAN established the Committee on Radiological Emergencies (CORE) as the coordinating body for radiological emergencies, under the supervision of the NDCC. The CORE has the responsibility to develop and coordinate the RADPLAN and to provide assistance to NDCC (now NDRRMC), OCD and local governments to support preparedness activities. The CORE, chaired by the Civil Defence Administrator, includes the Director of PNRI and representatives of relevant stakeholders. The RADPLAN provides for a detailed description of roles and responsibilities of participating agencies and requires them to develop and maintain their own plans, in coordination with OCD and PNRI.</p> <p>The RADPLAN designates PNRI to coordinate the nuclear response and OCD to coordinate the non-nuclear response and foresees the installation of a Nuclear Response Centre (RSC) in PNRI premises to support the nuclear response activities.</p> <p>In addition, the House of Representatives Substitute Bill includes provisions that mandate PNRC to develop and maintain a national emergency plan for responding to nuclear and radiological</p>		

emergencies. The Bill also mandates PNRC to coordinate radiological emergency response in the framework of the NDRRMC and to provide for the activities of an emergency response centre and for the international information exchange.

Currently, the RADPLAN is being revised to meet the requirements of IAEA GSR Part 7 and needs to be tested in a national exercise. The INIR team was informed that this revision is being undertaken by PNRI, which will coordinate with the NDRRMC for approval. The INIR team noted that it was not clear how the CORE is involved in this process. Given the importance of CORE's role in emergency planning for nuclear and radiological emergencies, there is a need to ensure consistency between the Bill and the RADPLAN.

The RADPLAN was activated during the Fukushima-Daiichi NPP accident in 2011. This experience indicated the need for an on-line network of real time environment radioactivity monitoring stations. The Philippine Government, in cooperation with the IAEA, is establishing 14 stations throughout the country.

The INIR team was informed that once PNRC takes the lead on nuclear emergency response activities, PNRI could continue providing technical support to response activities, given its technical capabilities.

The NEPIO has not yet conducted an assessment of EPR arrangements with regard to a nuclear power programme. This work will be conducted by the extended NEPIO.

Areas for further action	Significant	EPR arrangements for the nuclear power programme
	Minor	Consistency between the comprehensive nuclear law and the RADPLAN

RECOMMENDATIONS

R-14.1.1 The NEPIO should assess existing EPR arrangements against the requirements for the nuclear power programme.

SUGGESTIONS

S-14.1.1 The Philippines is encouraged to ensure consistency between the comprehensive nuclear law and the RADPLAN with regard to the responsibility for maintaining the RADPLAN.

GOOD PRACTICES

None

14. Emergency Planning

Condition 14.2: Recommendations from any previous reviews or audits being addressed

Phase 1

Summary of the condition to be demonstrated

If any reviews or audits have been undertaken of the existing framework, there is evidence that the actions resulting from it are progressing.

Examples of how the condition may be

Presentation of any action plans resulting from a review or audit with progress identified.

demonstrated		
Observations		
An EPREV Mission was conducted in 2010. The INIR team was informed that some of the recommendations and suggestions have been completed and some are being addressed.		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

15. Nuclear Security Condition 15.1: Nuclear security requirements recognized and the actions of all relevant organizations coordinated		Phase 1
Summary of the condition to be demonstrated	<p>The NEPIO recognizes the importance of nuclear security, based on a national threat assessment and principles of prevention, detection and response. All competent authorities that are involved in nuclear security have been identified and there is a coordinating body or mechanism established that brings together all of the organizations that have responsibility for nuclear security.</p> <p><i>Note: The need to establish legislation and a regulatory framework is addressed under Infrastructure Issues Nos. 5 and 7, Legal Framework and Regulatory Framework, respectively.</i></p>	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Evidence of familiarity with IAEA Nuclear Security Series publications and other States' practices; 2. Clear identification of all organizations that have roles and responsibilities for nuclear security and of the work that will need to be carried out in the subsequent phases; 3. Evidence that nuclear security considerations for siting have been defined and have been considered as part of the siting assessment (see infrastructure issue No. 12, site and supporting facilities); 4. Evidence that international cooperation and assistance is being used; 5. Evidence that the need to address the interface with safety and safeguards is recognized. 	
<p>Observations</p> <p>The Philippines' national security framework is governed by various legal, institutional, strategic and operational arrangements. This includes, inter alia:</p> <ul style="list-style-type: none"> — The Strategic Trade Management Act, preventing the proliferation of weapons of mass destruction; — The National Security Council, which coordinates and integrates national security policies and plans; — The 2018 National Security Strategy, which integrates security policies, goals, responsibilities and actions; and — The National Disaster Response Plan for Consequence Management of Terrorism-Related Incidents, which constitutes a 'multi-hazard' response plan to facilitate a coordinated response at the national and local levels. <p>In 2010, PNRI in conjunction with relevant national agencies developed a Nuclear Security Plan. These agencies include the Anti-Terrorism Council, the National Security Council, the National Police, the National Bureau of Investigation, the Bureau of Customs, the Armed Forces, the National Intelligence Coordinating Agency, the Office of the Special Envoy on Transnational Crime and the Office of National Defence. The INIR team was informed that PNRI provides technical support to the National Security Council.</p> <p>The IAEA supports PNRI and the relevant national agencies through the Integrated Nuclear Security Support Plan.</p> <p>Several national agencies have responsibilities with regard to nuclear security, for example: Customs operates radiation portal monitors (RPMs); the National Police have detection and response</p>		

functions; the Office of Transportation Security develops and implements the National Security Program for Land Transportation, Rail System and Infrastructure; and the Armed Forces have chemical-, biological-, radiological- and nuclear-related detection and response equipment.

At the regulatory level, CPR Part 26 on the 'Security of Radioactive Sources', issued in February 2014, provides the requirements to ensure the security of radioactive sources, and CPR Part 27 on the 'Security Requirements in the Transport of Radioactive Material' issued in 2013 addresses the security of the transport of radioactive materials. CPR Part 9 addresses the physical protection of nuclear power plants and materials.

The House of Representatives Substitute Bill foresees that PNRC will issue regulations and requirements to prevent, detect and respond to unauthorized acts involving nuclear or radioactive materials, coordinate with relevant governmental agencies and seek international cooperation.

Regarding the nuclear power programme, the INIR team was informed that DOE will initiate discussions with the National Security Council to raise its awareness about the future nuclear power programme, which may require specific nuclear security provisions and arrangements.

A Technical Working Group (TWG) for nuclear security was established under the NEPIO and is supported by staff from DOE and from PNRI. Its members participated in various capacity building activities, through training courses and seminars, including training at the Korea Institute of Non-Proliferation and Control (KINAC) and training through the Nuclear Security Support Centre hosted by PNRI. Some of these training courses covered security considerations relevant to a nuclear power programme. The INIR team was also informed that DOE foresees that under the expanded NEPIO, this TWG will include representatives of other national agencies having nuclear security responsibilities.

Areas for further action	Significant	No
	Minor	Coordination mechanisms for nuclear security

RECOMMENDATIONS

None

SUGGESTIONS

S-15.1.1 The Philippines is encouraged to review and adapt the national coordination mechanisms for nuclear security to meet the needs of the nuclear power programme.

GOOD PRACTICES

None

15. Nuclear Security

Condition 15.2: Recommendations from any previous reviews or audits being addressed

Phase 1

Summary of the condition to be demonstrated

If any reviews or audits have been undertaken of the existing framework, there is evidence that the actions resulting from it are progressing.

Examples of how the condition may be demonstrated	Presentation of any action plans resulting from a review or audit with progress identified.	
Observations An International Physical Protection Advisory Service (IPPAS) mission was conducted in 2003, and an International Nuclear Security Advisory Service (INSServ) mission was conducted in 2008. The INIR team was informed that all recommendations and suggestions from these missions have been addressed.		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

16. Nuclear Fuel Cycle		Phase 1
Condition 16.1: Options for nuclear fuel cycle (front end and back end) considered		
Summary of the condition to be demonstrated	At a strategic level, options have been considered for the front end and back end of the fuel cycle. For the front end, options for uranium sourcing and fuel manufacture and supply have been addressed. For the back end of the fuel cycle, spent fuel storage needs and capacities (on-site and off-site) and possible reprocessing have been considered.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. A document: <ol style="list-style-type: none"> a) Identifying available national natural resources and capacities for individual steps in the nuclear fuel cycle; b) Identifying potential sources of supply and services; c) Assessing available options for a national fuel cycle strategy, taking into account non-proliferation issues. 2. A document clearly demonstrating that the NEPIO understands the long term commitments related to the back end of the nuclear fuel cycle and has considered the options and their implications. The document needs to address the need for adequate capacity for spent fuel storage at the reactor site, the possibility of interim storage of spent fuel at a dedicated facility and any plans for reprocessing; 3. Clear allocation of responsibilities for development of the fuel cycle policy and strategy (front end and back end) to be undertaken during Phase 2. 	
Observations		
<p>The Philippines does not have commercially extractable uranium resources or facilities to fabricate nuclear fuel. The INIR team was informed that the only option under consideration is to source nuclear fuel from an external supplier. Within that option, sub-options related to separate sourcing of different steps of the front-end (e.g. uranium, enrichment, fabrication) have not yet been studied.</p> <p>Regarding the back-end of the fuel cycle, the INIR team was informed that the country may consider long term on-site storage and return of spent fuel to the supplier. The current radioactive waste and spent fuel management capabilities will not be sufficient for the nuclear power programme. Further details on the options in terms of length of storage and the implications for national waste disposal as part of a take back option have not been considered.</p> <p>The Pre-Feasibility Study (PFS) concluded that the Philippines needs to have a national policy and strategy on radioactive waste management including storage, potential reprocessing and disposal. Currently there is no defined nuclear fuel cycle policy in the country. The INIR team was informed that the NEPIO will be responsible for developing the policy to be reflected, as appropriate, in legislation or rules and regulations.</p>		
Areas for further action	Significant	Assessment of nuclear fuel cycle options
	Minor	No
RECOMMENDATIONS		
R-16.1.1 The NEPIO should further assess options for the nuclear fuel cycle, including the supply of nuclear fuel and the management of spent nuclear fuel.		

SUGGESTIONS
None
GOOD PRACTICES
None

17. Radioactive Waste Management		Phase 1
Condition 17.1: The requirements for management of radioactive waste from NPPs recognized		
Summary of the condition to be demonstrated	The NEPIO understands the significantly increased requirements for the processing, storage and disposal of high, intermediate and low level radioactive waste from a nuclear power programme, and has developed options for the management of radioactive waste, taking into account existing arrangements.	
Examples of how the condition may be demonstrated	A document addressing possible approaches to the management of radioactive waste arising from NPP operation and decommissioning, the capabilities and resources needed, and the options and technologies for its processing, handling, storage and disposal. If reprocessing is being considered, this needs to include the management of high level waste. Regulatory framework and financing schemes are addressed under Infrastructure Issues Nos. 7 and 4, Regulatory Framework, and Funding and Financing, respectively.	
Observations		
<p>The Philippines has radioactive waste which comes from medical, research and industrial activities. PNRI has issued regulations to govern safe and secure management of this type of radioactive waste. PNRI also operates an Interim Centralized Radioactive Waste Management Facility.</p> <p>The Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 prohibits the entry of hazardous and nuclear waste into Philippine territorial limits. The House of Representatives Bill No. 142 on Hazardous and Radioactive Wastes Management has been under discussion for several years.</p> <p>The NEPIO is aware that a nuclear power plant generates greater quantities of low, intermediate- and high-level waste than currently generated in the Philippines and recognizes that the existing capabilities are limited to the management of disused sealed radioactive sources and institutional radioactive waste.</p> <p>The INIR team was informed that the quantities of low, intermediate and high level radioactive waste arising from the operation and decommissioning of a nuclear power plant and possible approaches for managing this radioactive waste have not yet been considered.</p>		
Areas for further action	Significant	Requirements for NPP radioactive waste management
	Minor	No
RECOMMENDATIONS		
R-17.1.1 The NEPIO should perform a preliminary evaluation of the amounts and types of radioactive waste generated by a nuclear power plant and consider options for their management.		
SUGGESTIONS		
None		

GOOD PRACTICES		
None		
17. Radioactive Waste Management		Phase 1
Condition 17.2: Options for disposal of all radioactive waste categories understood		
Summary of the condition to be demonstrated	The NEPIO understands the options for disposal of each of the different waste categories. Although the specific routes for disposal of the different waste categories (including spent fuel if considered as waste) can be decided later, the need to select and plan for adequate options is recognized.	
Examples of how the condition may be demonstrated	A document indicating that the NEPIO understands options for disposal of different radioactive waste categories and options for funding these activities.	
Observations		
<p>The NEPIO recognizes the need to develop a national policy and strategy for the management of radioactive waste and spent fuel, including a process for deciding on the eventual disposal of radioactive waste.</p> <p>The INIR team was informed that the disposal options for radioactive waste arising from the operation and decommissioning of the NPP have not yet been considered.</p>		
Areas for further action	Significant	Assessment of disposal options
	Minor	No
RECOMMENDATIONS		
R-17.2.1 The NEPIO should consider disposal options for radioactive waste arising from the operation and decommissioning of the nuclear power plant.		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

18. Industrial Involvement		Phase 1
Condition 18.1: National policy with respect to industrial involvement developed		
Summary of the condition to be demonstrated	A policy for national involvement in the nuclear power programme has been developed, taking into account current industrial capacity and technical services, current and required quality standards, and potential investment requirements. The policy may include short term and longer term targets for industrial involvement.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. A survey of companies with the potential to participate in the nuclear power programme for construction, equipment provision or support services, with a review of their ability to satisfy the requirements of a nuclear power programme; 2. Meetings with, or training of, potential suppliers to explain standards and qualifications required, review feasibility of involvement, and identify required actions and funding requirements. 	
Observations		
<p>The NEPIO conducted an Information, Education and Communication (IEC) campaign in 2018 for local industries on the three major islands of the Philippines. The objective of the IEC campaign was to raise awareness of potential investment opportunities the nuclear power programme may create and the role industry could play. The INIR team was informed that the DOE worked with the DTI and its Board of Investments (BOI).</p> <p>The INIR team was informed that as part of the IEC campaign, a preliminary survey was conducted to assess the capacity and interest of local industry to support the nuclear power programme and identify what additional information industry would need. The preliminary survey indicated limited interest and that local industry lacks sufficient information. Consequently, another IEC campaign is scheduled for early 2019. The INIR team was informed that local agencies of DTI have agreed to help to reach out to industry in the next information campaign and survey. The INIR team was informed that the expanded NEPIO will conduct a more comprehensive national survey in late 2019 or early 2020.</p> <p>The expanded NEPIO will develop a policy and strategy for industrial involvement in the nuclear power programme based on an analysis of the national survey results. The INIR team was informed that this policy would be developed within the context of the national policy on industrialization, the Manufacturing Resurgence Programme. Transfer of some nuclear power-related technology could be a long-term objective of the policy.</p> <p>The Philippines has national standards and quality control system for manufacturing in accordance with international standards.</p> <p>The INIR team was informed that the NEPIO may utilize the current or future nuclear cooperation agreements to gain information that could support the establishment of a national policy for industrial involvement in the nuclear power programme.</p>		
Areas for further action	Significant	National policy for industrial involvement
	Minor	No
RECOMMENDATIONS		
R-18.1.1 The NEPIO should seek further information from local industries and technology providers		

and develop a national policy for industrial involvement in the nuclear power programme.

SUGGESTIONS

None

GOOD PRACTICES

None

19. Procurement		Phase 1
Condition 19.1: Requirements for purchasing NPP services recognized		
Summary of the condition to be demonstrated	Recognition of the requirements associated with purchasing services.	
Examples of how the condition may be demonstrated	<ol style="list-style-type: none"> 1. Appropriate procurement of consulting services in Phase 1; 2. Evidence that the issues related to services for Phase 2 activities are recognized, allowing for both national and foreign suppliers. 	
Observations		
<p>The Government’s procurement policy and procedures are provided under Republic Act No. 9184, ‘An Act Providing for the Modernization, Standardization and Regulation of the Procurement Activities of the Government and for Other Purposes’. This policy applies to the procurement of infrastructure projects, goods, and consulting services, by all government departments, offices and agencies, including government-owned and/or -controlled corporations. The procurement of goods and services under this law is done through competitive bidding.</p> <p>For consulting services, the bidders are evaluated and ranked using pre-determined evaluation criteria, which include factors such as experience, performance, quality of personnel, price and methodology, and are ranked from highest to lowest in terms of their calculated ratings. The bidder with the highest rated bid is invited for negotiation and clarification and then evaluated to determine whether the bidder is compliant with all the requirements and conditions set in the bidding documents.</p> <p>DOE has a procurement unit and a bid and awards committee that implements the procurement procedures. DOE develops an annual procurement plan based on inputs from the different sections. Technical and procurement experts then develop terms of reference for each proposed study. The INIR team was informed that two significant studies related to the nuclear power programme had been procured to date and that no issues were identified with the procurement process.</p>		
Areas for further action	Significant	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

APPENDIX 2: LISTS OF THE INIR TEAM MEMBERS AND COUNTERPARTS

INIR MISSION REVIEW TEAM	
Milko KOVACHEV	Team Leader, IAEA
Sean DUNLOP	Mission Coordinator, IAEA
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Lisa BERTHELOT	IAEA
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Anthony STOTT	IAEA
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Stephen MORTIN	International Expert
Itimad SOUFI	International Expert
Camille SCOTTO DE CESAR	IAEA Observer

PHILIPPINE COUNTERPARTS OF THE INIR MISSION	
Donato D. MARCOS, Undersecretary & NEPIO Chair Gerardo D. ERGUIZA, JR., Assistant Secretary & NEPIO Vice Chair	Mission Counterparts, DOE
Marietta M. QUEJADA	Mission Coordinator, DOE

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1	National Position	Donato D. MARCOS, Undesecretary-DOE Gerardo D. ERGUIZA, JR., Asst. Secretary-DOE Carmencita A. BARISO, Asst. Director-DOE Herminio A. ARIOLA, Director-DOE Melita V. OBILLO, Director-DOE Arthus T. TENAZAS, Director-DOE Amelia M. DE GUZMAN, Director-DOE Mario C. MARASIGAN, Director-DOE Angelina V. MANGA, Director-DOE Marietta M. QUEJADA, Director-DOE Alumanda DELA ROSA, Consultant-DOE Carlo A. ARCILLA, Director-PNRI Manuel Luis. B. PLOFINO, NPC	DOE PNRI Cabinet Secretary Office of the President NPC

PARTICIPANTS FROM THE PHILIPPINES

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3	Management	Gerardo D. ERGUIZA Jr., Asst. Sec.-DOE Carmencita A. BARISO, Asst. Dir.-DOE Danilo V. VIVAR, DOE Editha S. ABANGAN, DOE Carlo A. ARCILLA, Director-PNRI	DOE PNRI
4	Funding and Financing	Carmencita A. BARISO, Assit. Dir.-DOE Alumanda DELA ROSA, Consultant-DOE Marietta M. QUEJADA, DOE Elisa B. MORALES, DOE	DOE NPC
5	Legal Framework	Gerardo D. ERGUIZA Jr., Asst. Sec-DOE Alumanda DELA ROSA, Consultant-DOE Arthus T. TENAZAS, Director-DOE Julietta E. SEGUIS, PNRI Teresita G. DE JESUS, PNRI	DOE PNRI

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7	Regulatory Framework	Gerardo D. ERGUIZA Jr., Asst. Sec.-DOE Arthus T. TENAZAS, Director-DOE Ben Julius G. GAGNI, DOE Alumanda DELA ROSA, Consultant -DOE Vangeline K. PARAMI, PNRI Alfonso A. SINGAYAN, PNRI	DOE PNRI
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9	Electrical Grid	Mario C. MARASIGAN, Dir.-DOE Mark Christian P. MAROLLANO, DOE Mary Grace V. GABIS, DOE Marietta M. QUEJADA, DOE	DOE

PARTICIPANTS FROM THE PHILIPPINES

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11	Stakeholder Involvement	Carmencita A. BARISO, Asst. Dir.-DOE Alumanda DELA ROSA, Consultant-DOE Ma. Victoria B. CAPITO, DOE Rowena T. VILLANUEVA, DOE Rhodora R. LEONIN, PNRI Grace M. CARLOS, PNRI	DOE PNRI
12	Site and Supporting Facilities	Nenito C. JARIEL, JR., DOE Jason Jude P. VILLEGAS, DOE Edmundo P. VARGAS, PNRI Rick Rodel C. LUIS, DOE Carlo A. ARCILLA, Dir.-PNRI	DOE PNRI MAB-DENR PHIVOLCS NPC

PARTICIPANTS FROM THE PHILIPPINES

No.	INFRASTRUCTURE ISSUE	REPRESENTATIVE	RESPONSIBLE ORGANIZATION(S)
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14	Emergency Planning	Gerardo D. ERGUIZA Jr., Asst. Sec.-DOE Guillermo H. ANSAY, DOE Janish S. GUTIERREZ, DOE Kristine Lorraine F. SOMINTAC, DOE Justine A. NUAY, DOE Alumanda DELA ROSA, Consultant-DOE Carlo A. ARCILLA, Dir.-PNRI Cecilia M. DE VERA, PNRI Manuel Luis. B. PLOFINO, NPC	DOE PNRI NPC
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PARTICIPANTS FROM THE PHILIPPINES

No.	INFRASTRUCTURE ISSUE	REPRESENTATIVE	RESPONSIBLE ORGANIZATION(S)
16	Nuclear Fuel Cycle	Amelia M. DE GUZMAN, Dir.- DOE Editha S. ABANGAN, DOE Alumanda DELA ROSA, Consultant -DOE Carlo A. ARCILLA, Dir.-PNRI Edmundo P. Vargas, PNRI	DOE PNRI NPC
17	Radioactive Waste Management	Amelia M. DE GUZMAN, Dir.-DOE Angela P. REVILLA, DOE Carlo A. ARCILLA, PNRI Ronald E. PIQUERO, PNRI	DOE PNRI NPC
18	Industrial Involvement	Carmencita A. BARISO, Asst. Dir.-DOE Alumanda DELA ROSA, DOE-Consultant Lana Rose A. MANALIGOD, DOE Lililbeth T. MORALES, DOE Renato T. BAÑAGA, PNRI	DOE PNRI DTI
19	Procurement	Amelia M. DE GUZMAN, Dir.-DOE Nenito C. JARIEL, JR., DOE Andres O. PANGILINAN, JR., DOE Earl Jan R. NERA, DOE	DOE

APPENDIX 3: REFERENCES

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APPENDIX 4: ABBREVIATIONS

ANSN	Asian Nuclear Safety Network
APSN	Asia Pacific Safeguards Network
ASEANTOM	Association of Southeast Asian Nations (ASEAN) Network of Regulatory Bodies on Atomic Energy
ASNO	Australian Nuclear Safeguards and Non-Proliferation Office
BNPP	Bataan Nuclear Power Plant
BoI	Board of Investments
CDRRHR	Centre for Device Regulation, Radiation, Health and Research
CNS	Convention on Nuclear Safety
CORE	Committee on Radiological Emergencies
CPF	Country Programme Framework
CPPNM	Convention on the Physical Protection of Nuclear Material and Nuclear Facilities
CPR	Code of Philippine Nuclear Research Institute (PNRI) Regulations
CSC	Convention on Supplementary Compensation for Nuclear Damage
CTG	Communication Topical Group
DAP	Development Academy of the Philippines
DENR	Department of Environment and Natural Resources
DFA	Department of Foreign Affairs
DILG	Department of the Interior and Local Government
DOE	Department of Energy
DOF	Department of Finance
DOH	Department of Health
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
eNEPIO	Expanded Nuclear Energy Programme Implementing Organization (NEPIO)

EPR	Emergency Preparedness and Response
EPREV	Emergency Preparedness Review
EPS	Energy Planning Studies
GAA	General Appropriations Act
IEC	Information, Education and Communication
INSEP	International Nuclear Safeguards Engagement Programme
INSServ	International Nuclear Security Advisory Service
IPPAS	International Physical Protection Advisory Service
KAERI	Korea Atomic Energy Research Institute
KHNP	Korea Hydro and Nuclear Power Co., Ltd.
KINAC	Korea Institute of Non-Proliferation and Control
MoA	Memorandum of Agreement
NDCC	National Disaster Coordination Council
NDRRMC	National Disaster Risk Reduction and Management Council
NDRRMP	National Disaster Risk Reduction and Management Plan
NEDA	National Economic and Development Authority
NEPIO	Nuclear Energy Programme Implementing Organization
NPC	National Power Corporation
NSSS	Nuclear Safeguards and Security Section
OCD	Office of Civil Defense
PFS	Pre-Feasibility Study
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PNRI	Philippine Nuclear Research Institute
PYGN	Philippine Young Generation Nuclear Network
RADPLAN	National Radiological Emergency Preparedness and Response Plan
ROSATOM	State Atomic Energy Corporation of the Russian Federation
RA	Republic Act

RPM	Radiation Portal Monitor
RSC	Nuclear Response Centre
SAT	Systematic Approach to Training
SSDL	Secondary Standards Dosimetry Laboratory
TC	Technical Cooperation
TRANSCO	National Transmission Corporation
TSO	Technical Support Organization
TWG	Technical Working Group