MISSION REPORT

ON

THE INTEGRATED NUCLEAR INFRASTRUCTURE REVIEW (INIR) - PHASE 1

Counterpart:

Sri Lanka Atomic Energy Board
on behalf of the
Ministry of Power of the
Democratic Socialist Republic of Sri Lanka

4 – 11 April 2022

Colombo, Sri Lanka

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EXECUTIVE SUMMARY

The Democratic Socialist Republic of Sri Lanka (Sri Lanka) has a population of 21.9 million people (2020). The total installed power generating capacity is approximately 4560 MW(e) (2020). With the increasing electricity demand of 4–5% annually and expected future developments in the country, it is envisaged that Sri Lanka needs more energy sources in the longer term. Sri Lanka's current energy policy is to increase the percentage of renewables in the electricity mix to 70% by 2030, not to construct more coal fired plants and to achieve carbon neutrality of the electricity sector by 2050. Nuclear power is recognized in the Ceylon Electricity Board's (CEB) Long-Term Generation and Expansion Plan 2022–2041 in one of the scenarios to help achieve carbon neutrality.

In 2010, the Cabinet's approval was granted for the initiation of a pre-feasibility study based on the International Atomic Energy Agency's (IAEA's) Milestones Approach. In 2019, Sri Lanka established a Nuclear Energy Programme Implementing Organization (NEPIO) under the Ministry of Power. It is comprised of a Steering Committee, the Project Management Unit (PMU) and nine working groups led by representatives from the Ceylon Electricity Board (CEB), Sri Lanka Atomic Energy Board (SLAEB) and Sri Lanka Atomic Energy Regulatory Council (SLAERC).

In a letter dated 13 January 2020, the Director General of SLAEB, Mr T.M.R. Tennakoon, on behalf of the Ministry of Power, requested the IAEA to carry out a Phase 1 Integrated Nuclear Infrastructure Review (INIR) mission. The INIR mission was conducted from 4 to 11 April 2022 having been postponed twice due to the COVID-19 pandemic.

The INIR mission was conducted in a cooperative and open atmosphere.

The INIR team concluded that Sri Lanka has engaged the appropriate stakeholders in considering the introduction of nuclear power and initiated studies to enable the Government to make a future decision on the nuclear power programme.

In order to assist Sri Lanka in making further progress in its infrastructure development, the INIR team made 26 Recommendations and 6 Suggestions. The INIR team also identified 2 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:

- **Sri Lanka needs to further develop several areas of the pre-feasibility study.**

The NEPIO has collected significant information about the current situation in Sri Lanka, but the future needs of nuclear power infrastructure should be studied further and applied to the Sri Lankan context. The Government's decision to commit to a nuclear power programme is not necessary to complete this work, rather the work is required to inform the decision.

The Government needs to provide the human and financial resources for this work, and the NEPIO needs to analyse and develop viable options for key areas including financing of the nuclear power plant project, siting, the nuclear fuel cycle, the management of radioactive waste, industrial involvement and a national human resources strategy for the programme. An analysis

of a range of realistic options in the Sri Lankan context will also help the Government prepare for discussions with nuclear power plant suppliers and other potential partners.

- **Sri Lanka needs to complete the analysis of the legal framework and regulatory framework required for nuclear power and develop plans for their expansion.**

Sri Lanka is already party to some relevant international legal instruments. It needs to carry out an analysis of the international legal instruments to which it is not yet a party, and establish a plan to adhere to these instruments, taking account of the need for the necessary implementing legislation.

Sri Lanka needs to review the Atomic Energy Act No. 40 of 2014 and develop a plan to ensure that the national legal framework contains the necessary provisions of a comprehensive national nuclear law. It also needs to identify other laws that may impact the strategy for developing the nuclear power programme and establish a corresponding plan to address any identified issues.

Sri Lanka also needs to prepare a plan for the development of the regulatory framework needed for the nuclear power programme that covers safety, security, and safeguards. This needs to include the establishment of an independent and competent regulatory body with adequate human and financial resources, and a plan for the development of the regulations for the initial stages of the programme.

- **Sri Lanka needs to develop programmes and plans for competency development and stakeholder involvement.**

Sri Lanka needs to perform an assessment comparing the available human resources and competences in the country with those required for the key organizations in a nuclear power programme. Based on this analysis, Sri Lanka needs to develop a strategy to address the human resource and competence needs to support the nuclear power programme, including a plan to enhance its national educational programmes.

Sri Lanka also needs to develop a programme to increase its understanding of the nuclear safety aspects and management systems required for a nuclear power programme. It also needs to identify the key competences required for the senior leaders and develop corresponding plans for their recruitment and development.

Sri Lanka has several ongoing activities related to stakeholder involvement, including programmes with educational institutes and universities, but the NEPIO needs to develop a strategy and plan to inform and guide the current and future work in this area.

- **The NEPIO needs to prepare recommendations to enable the Government to make an informed decision on the nuclear power programme.**

The comprehensive report prepared by the NEPIO needs to define a strategy for the nuclear power programme based on the conclusions of the studies performed. The report should include: the rationale for developing nuclear power based on the national energy policy; a description of the benefits of nuclear power (environmental, energy security, macroeconomics); a roadmap that provides a timeline for implementation of key steps of the programme; the identification of technologies that are consistent with national circumstances regarding

financing and grid capability; plans and funding requirements for the next phase of the programme; and a summary of the key conclusions and recommendations.

To support the decision making process, the oversight roles of the PMU and the Steering Committee within the NEPIO need to be strengthened to ensure that comprehensive studies are completed with clear and consistent conclusions that are shared with all key stakeholders.

1. INTRODUCTION

The Democratic Socialist Republic of Sri Lanka (Sri Lanka) has a population of 21.9 million people (2020). The total installed power generating capacity is approximately 4560 MWe (2020). The electricity consumption is predominantly for households, followed by industrial customers and the commercial sector. Sri Lanka reached 100% electrification of households in 2017. With the increasing electricity demand of 4–5% annually and expected future developments in the country, it is envisaged that Sri Lanka needs more energy sources in the longer term.

Sri Lanka has almost reached saturation of its hydro resources and the dependence on imported fossil fuel for electricity generation has reached almost 50% of the electricity production in the country. The country's current energy policy is to increase the percentage of renewables in the electricity mix to 70% by 2030, not to construct more coal fired plants and to achieve carbon neutrality of the electricity sector by 2050. Nuclear power is recognized in the Ceylon Electricity Board's (CEB) Long-Term Generation and Expansion Plan 2022–2041 in one of the scenarios to help achieve carbon neutrality.

The Government of Sri Lanka approved the initiation of the Study on Nuclear Power in September 2010 based on the Development Policy Framework prepared by the National Planning Department. This was supplemented in May 2018 by the Cabinet approval of the Joint Cabinet Memorandum submitted by the Minister of Power and the Minister of Special Assignments on "Deciding of the Composition of Electricity Generation of Sri Lanka".

In 2010, the Cabinet's approval was granted for the initiation of a pre-feasibility study based on the International Atomic Energy Agency's (IAEA's) Milestones Approach. In 2019, Sri Lanka established a Nuclear Energy Programme Implementing Organization (NEPIO) under the Ministry of Power, Energy and Business Development. It is comprised of a Steering Committee, the Project Management Unit (PMU) and nine working groups led by representatives from the Ceylon Electricity Board (CEB), Sri Lanka Atomic Energy Board (SLAEB) and Sri Lanka Atomic Energy Regulatory Council (SLAERC).

In a letter dated 13 January 2020, the Director General of SLAEB, Mr T.M.R. Tennakoon, on behalf of the Ministry of Power, requested the IAEA to carry out a Phase 1 Integrated Nuclear Infrastructure Review (INIR) mission. SLAEB coordinated the preparation of a preliminary self-evaluation report (SER) based on the IAEA methodology contained in the IAEA Nuclear Energy Series technical report "Evaluation of the Status of National Nuclear Infrastructure Development" No. NG-T-3.2 (Rev. 1). This report and supporting documents were sent to the Agency in May 2020. A joint SER Support mission/Pre-INIR mission was conducted in September 2020. The INIR mission was conducted from 4 to 11 April 2022 having been

postponed twice due to the COVID-19 pandemic. A revised SER was submitted to the IAEA in March 2022.

The INIR mission was opened by: Hon. Hermantha Samarakoon, State Secretary, State Ministry of Solar, Wind and Hydro Generation; Professor S.R.D. Rosa, Chairman, Sri Lanka Atomic Energy Board; Mr. Sydney Gajanayake, Chairman, Board of Sri Lanka Atomic Energy Regulatory Council; Mr. T.M.R. Tennakoon, Director General, Sri Lanka Atomic Energy Board; Mr. Anil Ranjith, Director General, Sri Lanka Atomic Energy Regulatory Council; and Ms Aline Des Cloizeaux, Director of the IAEA Division of Nuclear Power in the Department of Nuclear Energy.

On the Sri Lankan side, the mission was coordinated by Mr. Malinda Ranaweera, Head of PMU. The INIR mission team was led by Mr José Bastos of the IAEA Nuclear Infrastructure Development Section and consisted of staff from the IAEA Departments of Nuclear Energy, Nuclear Safety and Security and Safeguards as well as international experts recruited by the IAEA. The INIR mission and associated activities were funded through IAEA regular budget and extrabudgetary contributions from Japan and the United States.

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 NE Series guide *Milestones in the Development of a National Infrastructure for Nuclear Power* (NG-G-3.1 (Rev. 1)) and the evaluation conditions described in NE Series technical report *Evaluation of the Status of National Infrastructure Development* (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 Sri Lanka and national institutions to prepare an action plan.

3. SCOPE OF THE MISSION

The INIR mission evaluated the status of the infrastructure in Sri Lanka covering all the 19 infrastructure issues relative to the conditions identified in the above publications for Phase 1.

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. INIR team meetings were conducted in Colombo from 31 March to 2 April 2022.

The INIR mission was conducted from 4 to 11 April 2022. The meetings were held at the Movenpick Hotel, Colombo. The main interviews were conducted over four days. During the interviews, the Sri Lankan counterparts provided an update on the current status of issues where progress had been made since the self-evaluation report was updated, 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 the exit meeting on 11 April 2022. 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. Attachment 1 provides the evaluation results for each issue.

5. MAIN CONCLUSIONS

The INIR mission was conducted in a cooperative and open atmosphere.

The INIR team concluded that Sri Lanka has engaged the appropriate stakeholders in considering the introduction of nuclear power and initiated studies to enable the Government to make a future decision on the nuclear power programme.

In order to assist Sri Lanka in making further progress in its infrastructure development, the INIR team made 26 Recommendations and 6 Suggestions. The INIR team also identified 2 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:

- **Sri Lanka needs to further develop several areas of the pre-feasibility study.**

The NEPIO has collected significant information about the current situation in Sri Lanka, but the future needs of nuclear power infrastructure should be studied further and applied to the Sri Lankan context. The Government's decision to commit to a nuclear power programme is not necessary to complete this work, rather the work is required to inform the decision.

The Government needs to provide the human and financial resources for this work, and the NEPIO needs to analyse and develop viable options for key areas including financing of the nuclear power plant project, siting, the nuclear fuel cycle, the management of radioactive waste, industrial involvement and a national human resources strategy for the programme. An analysis

of a range of realistic options in the Sri Lankan context will also help the Government prepare for discussions with nuclear power plant suppliers and other potential partners.

- **Sri Lanka needs to complete the analysis of the legal framework and regulatory framework required for nuclear power and develop plans for their expansion.**

Sri Lanka is already party to some relevant international legal instruments. It needs to carry out an analysis of the international legal instruments to which it is not yet a party, and establish a plan to adhere to these instruments, taking account of the need for the necessary implementing legislation.

Sri Lanka needs to review the Atomic Energy Act No. 40 of 2014 and develop a plan to ensure that the national legal framework contains the necessary provisions of a comprehensive national nuclear law. It also needs to identify other laws that may impact the strategy for developing the nuclear power programme and establish a corresponding plan to address any identified issues.

Sri Lanka also needs to prepare a plan for the development of the regulatory framework needed for the nuclear power programme that covers safety, security, and safeguards. This needs to include the establishment of an independent and competent regulatory body with adequate human and financial resources, and a plan for the development of the regulations for the initial stages of the programme.

- **Sri Lanka needs to develop programmes and plans for competency development and stakeholder involvement.**

Sri Lanka needs to perform an assessment comparing the available human resources and competences in the country with those required for the key organizations in a nuclear power programme. Based on this analysis, Sri Lanka needs to develop a strategy to address the human resource and competence needs to support the nuclear power programme, including a plan to enhance its national educational programmes.

Sri Lanka also needs to develop a programme to increase its understanding of the nuclear safety aspects and management systems required for a nuclear power programme. It also needs to identify the key competences required for the senior leaders and develop corresponding plans for their recruitment and development.

Sri Lanka has several ongoing activities related to stakeholder involvement, including programmes with educational institutes and universities, but the NEPIO needs to develop a strategy and plan to inform and guide the current and future work in this area.

- **The NEPIO needs to prepare recommendations to enable the Government to make an informed decision on the nuclear power programme.**

The comprehensive report prepared by the NEPIO needs to define a strategy for the nuclear power programme based on the conclusions of the studies performed. The report should include: the rationale for developing nuclear power based on the national energy policy; a description of the benefits of nuclear power (environmental, energy security, macroeconomics); a roadmap that provides a timeline for implementation of key steps of the programme; the identification of technologies that are consistent with national circumstances regarding financing and grid capability; plans and funding requirements for the next phase of the programme; and a summary of the key conclusions and recommendations.

To support the decision making process, the oversight roles of the PMU and the Steering Committee within the NEPIO need to be strengthened to ensure that comprehensive studies are completed with clear and consistent conclusions that are shared with all key stakeholders.

RECOMMENDATIONS:

R-1.2.1 The Steering Committee and PMU should strengthen their oversight of the work performed by the working groups.

R-1.3.1 The NEPIO should finalize the pre-feasibility study and summarize the results in the comprehensive report with clear recommendations to support the national decision-making process.

R-2.1.1 The NEPIO should develop a programme to increase awareness on the nuclear safety aspects of a nuclear power programme among all stakeholders.

R-3.1.1 The NEPIO should identify the key competences required for senior leaders of a nuclear power programme and develop plans for their recruitment and development.

R-3.1.2 The NEPIO should further develop its understanding of the main elements of management systems that will be required for each of the key organizations to ensure the success of the programme.

R-4.1.1 The NEPIO should estimate the funding that will be required for the main activities in the future phases of the nuclear power programme.

R-4.2.1 The NEPIO should complete an analysis of the options for financing a nuclear power plant project and develop conclusions and recommendations for the government.

R-5.1.1 Sri Lanka should carry out an analysis of the conventions to which it is not yet a party and establish a plan with timelines to adhere to these instruments, taking account of the need for necessary implementing legislation.

R-5.2.1 Sri Lanka should review the 2014 Atomic Energy Act and develop plans that include all necessary provisions of a comprehensive national nuclear law to support its nuclear power programme.

R-5.3.1 Sri Lanka should carry out an analysis of laws that may affect the nuclear power programme and plan for their enactment or amendment as appropriate.

R-6.1.1 Sri Lanka should conclude the Subsidiary Arrangements to its comprehensive safeguards agreement.

R-6.2.1 Sri Lanka should analyse the safeguards requirements associated with a new nuclear power programme and develop a plan to strengthen its SSAC.

R-7.1.1 The NEPIO should provide clear recommendations to the government to enable it to establish and develop an independent regulatory body with a defined organizational structure, functions and responsibilities.

R-7.1.2 The NEPIO should prepare a plan for the development of regulations and guides in line with the needs of the nuclear power programme.

R-9.1.1 CEB should analyse the capability of the grid system to support the integration of a nuclear power plant and identify the scale of grid enhancement required.

R-10.1.1 Sri Lanka should perform an assessment comparing the current human resources and competences with those required for the key organizations in the nuclear power programme.

R-10.2.1 The NEPIO should develop a strategy to address the human resource and competence needs that will be required for the key organizations for the nuclear power programme, including a plan to enhance its national education and training infrastructure.

R-11.1.1 The NEPIO should develop a stakeholder involvement strategy and plan, with dedicated staff and resources, to inform and guide its ongoing activities in this area.

R-12.1.1 The NEPIO should continue its work to identify candidate sites based on criteria covering safety, security, cost, socioeconomic issues, engineering and the environment.

R-13.2.1 The NEPIO should review the existing framework for environmental protection and identify gaps to ensure environmental protection in a nuclear power programme.

R-14.1.1 The NEPIO should conduct a gap analysis of existing emergency preparedness and response (EPR) arrangements and capabilities with the objective of identifying the additional resources and arrangements that need to be developed for a nuclear power programme.

R-15.1.1 Sri Lanka should develop the national coordination mechanism for nuclear security.

R-16.1.1 The NEPIO should develop a document addressing suitable options for the nuclear fuel cycle in Sri Lanka, including their implications for the nuclear programme.

R-17.1.1 Sri Lanka should develop a document addressing possible approaches to the management of radioactive waste arising from NPP operation and their implications.

R-17.2.1 The NEPIO should develop a document addressing disposal options for all types of radioactive waste with initial estimates of the resources and time needed for their implementation to enable informed decision making.

R-18.1.1 The NEPIO should continue to engage national industries to raise awareness and gauge interest, and develop recommendations for the Government regarding a national policy for industrial involvement in the nuclear power programme.

SUGGESTIONS:

S-1.3.1 The NEPIO is encouraged to develop a roadmap for the nuclear power programme to be updated on a regular basis to inform and guide the key stakeholders.

S-1.3.2 The NEPIO is encouraged to consider the macroeconomic benefits of the nuclear power programme in finalizing the comprehensive report.

S-2.2.1 SLAERC is encouraged to pursue mechanisms for cooperation in nuclear safety with regulatory bodies in countries operating nuclear power plants.

S-5.1.1 Sri Lanka is encouraged to finalize the legislative approval process for concluding its Additional Protocol.

S-8.1.1 The NEPIO is encouraged to continue planning the expansion of its radiation protection programme to meet the need of the nuclear power programme.

S-15.1.1 Sri Lanka is encouraged to consider the country's plans for nuclear power during the next review and update of the Integrated Nuclear Security Support Plan (INSSP).

GOOD PRACTICES:

GP-10.1.1 The University of Moratuwa and the University of Colombo offer a nuclear power engineering module as part of various BSc and MSc programmes that introduces students to the principles of nuclear power, including the main considerations related to introducing nuclear power in Sri Lanka. This provides a pool of graduates that have a basic understanding of nuclear power that can be recruited by the key organizations.

GP-11.1.1 SLAEB cooperated with the Ministry of Education to develop educational curricula and training programmes on nuclear science and technology for teachers in secondary schools. This initiative will help raise awareness about the potential role for nuclear power in Sri Lanka.

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 judgment 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 judgment 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.

It should be noted that the results summarized in the following tables neither validate the country actions and programmes, nor certify the quality and completeness of the work done by a country.

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**	**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**	**x**	
5.2. Plans in place for development of a 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**		
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**		
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 NPPs 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 **Condition 1.1: Long term commitment made and importance of safety, security and non-proliferation recognized**	**Phase 1**
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	(1) A clearly stated government commitment; (2) Evidence of clear responsibilities for each issue, with government coordination of activities.

Observations

The Government of Sri Lanka has recognized the importance of considering nuclear energy as an option for the country's energy mix. In 2010, the Cabinet approved the initiation of a pre-feasibility study for this purpose under the supervision of a Steering Committee. The Cabinet Memorandum recognized that "the development and implementation of an appropriate infrastructure to support the successful introduction of nuclear power and its safe, secure, peaceful and efficient application is an issue of major concern."

Ceylon Electricity Board (CEB), Sri Lanka Atomic Energy Board (SLAEB) and Sri Lanka Atomic Energy Regulatory Council (SLAERC) were the main contributors to the pre-feasibility study which was conducted under the purview of the Ministry of Power to develop a technological, financial, environmental and social understanding for policy makers to take a decision on the development of a nuclear power programme.

On 9 May 2018, the Minister of Power and Energy and the Minister of Special Assignments issued a joint cabinet memorandum on the composition of the electricity generation mix in Sri Lanka. This memorandum recommended that the Government "accepts in principle the necessity of strategically developing all practically developable energy sources and exploiting the non-conventional alternative renewable energy sources such as solar power, wind power, biomass, geothermal, wave and solid waste and high efficient coal power technologies, liquefied natural gas, indigenously available natural gas and nuclear power in timely and appropriate manner." The Government that assumed power in 2019 maintained this policy.

CEB in its least-cost long-term generation expansion plan (LTGEP) 2022–2041 considered nuclear power as one of the potential energy sources of its future energy mix. CEB also concluded that integrating a large nuclear plant to the system is a "challenge during this planning horizon. However, developments in small modular reactors (SMRs) in commercial scale in the future and the advancements of grid enhancement technologies will provide future prospects for Sri Lankan system to integrate a nuclear power unit which will be considered in future planning cycles."

Areas for further action	**Significant**	
	Minor	
RECOMMENDATIONS		
R-1.1.1		
SUGGESTIONS		
S-1.1.1		
GOOD PRACTICES		
GP-1.1.1		

1. National Position **Condition 1.2: The NEPIO established**	**Phase 1**
Summary of the condition to be demonstrated	The NEPIO: (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	(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

The Cabinet approved the terms of reference for the pre-feasibility study on 8 September 2010. The Steering Committee, the Programme Management Unit (PMU) in the Ministry of Power and nine working groups function as the Nuclear Energy Programme Implementing Organization (NEPIO).

The role of the Steering Committee is to guide and monitor the project through the pre-feasibility study and to make recommendations to the Government. The Secretary to the Ministry of Power leads the Steering Committee which consists of senior officials in ministries and government organizations.

An official from the Sri Lanka Atomic Energy Board was appointed as the team leader for the Programme Management Unit. The PMU's task is to implement the pre-feasibility study and make recommendations to the Steering Committee.

To conduct the pre-feasibility study, nine working groups were created. The leaders of the working groups were appointed from CEB, SLAEB, SLAERC and the Public Utilities Commission of Sri Lanka (PUCSL).

The figure below shows the structure established:

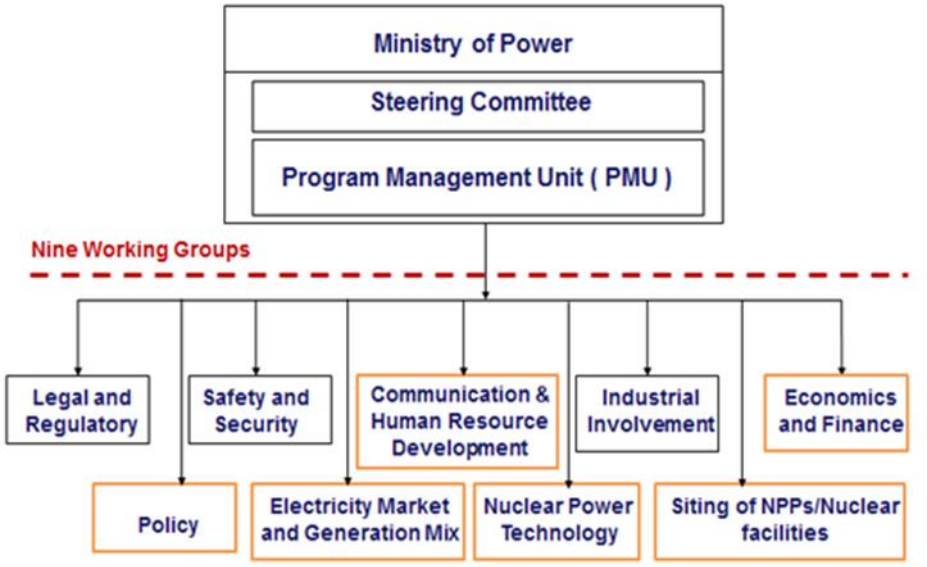

FIG. 2 Structure of the NEPIO (Source: Self-Evaluation Report)

Several ministries participate in the working groups, such as the Ministry of Power, the Ministry of National Policy and Economic Affairs, the Ministry of Finance, the Ministry of Foreign Affairs, the Ministry of Mahaweli Development and Environment, the Ministry of Disaster Management, the Ministry of Petroleum Resources Development, the Ministry of Law and Order and Prisons Reform, the Ministry of Technology, Technical Education and Employment, the Ministry of Higher Education and Highways, the Ministry of Defence and the Ministry of Lands and Parliamentary Reforms.

The Steering Committee was briefed on the reports of the working groups in July 2019. The INIR team noted that the role of the PMU in ensuring consistency among the studies performed by the working groups was not clear. The INIR team noted that the Steering Committee could play a more active role in reviewing and accepting the conclusions of the studies performed by the working groups.

The INIR team was informed that the NEPIO has identified additional competencies needed to complete the pre-feasibility study.		
Areas for further action	**Significant**	
	Minor	NEPIO Terms of Reference
RECOMMENDATIONS		
R-1.2.1 The Steering Committee and PMU should strengthen their oversight of the work performed by the working groups.		
SUGGESTIONS		
S-1.2.1		
GOOD PRACTICES		
GP-1.2.1		

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; (g) Consideration of the human resource needs and external support needs of the regulatory body and the owner/operator; (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; (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. *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.*

Examples of how the condition may be demonstrated	(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)

Observations

The reports prepared by the nine working groups supported the preparation of a comprehensive report entitled *Nuclear Power Study and Planning Programme of Sri Lanka*. In 2020, Sri Lanka requested the IAEA to review the comprehensive report, and suggestions were provided to improve it. An action plan was developed to address them. The INIR team noted that some of the suggestions were implemented, others are still pending.

A revised draft was produced in March 2021. The NEPIO has noted several aspects of the pre-feasibility study that still need to be completed. The INIR team noted that there is limited information on the macroeconomic benefits of the nuclear power programme.

The INIR team was informed that a roadmap, with tentative dates, for the nuclear power programme has not been developed.

The current draft of the comprehensive report does not provide conclusions and recommendations or a clear strategy for the future nuclear power programme and requires further development.

The INIR team was informed that the comprehensive report will be revised and submitted to the Steering Committee following the INIR Phase 1 Mission.

Areas for further action	**Significant**	Finalization of the comprehensive report
	Minor	— Development of a roadmap for the nuclear power programme — Macroeconomic benefits of nuclear power

RECOMMENDATIONS

R-1.3.1 The NEPIO should finalize the pre-feasibility study and summarize the results in the comprehensive report with clear recommendations to support the national decision-making process.

SUGGESTIONS

S-1.3.1 The NEPIO is encouraged to develop a roadmap for the nuclear power programme to be updated on a regular basis to inform and guide the key stakeholders.

S-1.3.2 The NEPIO is encouraged to consider the macroeconomic benefits of the nuclear power programme in finalizing the comprehensive report.

GOOD PRACTICES
GP-1.3.1

2. Nuclear Safety **Condition 2.1: Key elements of nuclear safety understood**		**Phase 1**
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	(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

The IAEA Safety Standards will constitute the key documents for the development of nuclear safety infrastructure in Sri Lanka. The Nuclear Power Technical Report 2020 identifies important safety elements to be considered in the NPP technology assessment.

The Nuclear Safety and Security Working Group report 2020 addresses mainly radiation safety and nuclear security. For nuclear safety, it is mentioned that nuclear safety courses will be developed at university and technical college levels subject to decision of the Government on the nuclear power programme.

Sri Lanka is party to the Convention on Nuclear Safety since November 1999. The Supporting Document on Nuclear Energy Policy states that the NEPIO recognizes that the development of a policy and process is important to inform the public and other stakeholders about the risks and benefits of nuclear power, development of understanding and commitment to nuclear safety, capability and skills required in nuclear safety as well as familiarization with IAEA safety standards and other practices to serve as basis for the development of national safety standards. However, the INIR team noted that not all stakeholders are aware of the specific nuclear safety considerations needed for a nuclear power programme.

Areas for further action	**Significant**	Nuclear safety awareness
	Minor	

RECOMMENDATIONS

R-2.1.1 The NEPIO should develop a programme to increase awareness on the nuclear safety aspects of a nuclear power programme among all stakeholders.

SUGGESTIONS		
S-2.1.1		
GOOD PRACTICES		
GP-2.1.1		
2. Nuclear Safety **Condition 2.2: Support through international cooperation initiated**		**Phase 1**
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	(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.	

Observations

The Government has and is considering concluding bilateral nuclear cooperation agreements with several countries. Since 2013, the Sri Lankan Government has held many discussions with the Russian Federation with the objective of establishing cooperation between the two nations on the peaceful use of nuclear technology. Representatives of the Ministry of Power and Renewable Energy, the Ministry of Foreign Affairs, the Ceylon Electricity Board, the Sri Lanka Atomic Energy Board and the Sri Lanka Atomic Energy Regulatory Council participated in these discussions. The focus is cooperation on the use of nuclear power for electricity generation.

In February 2015, the Government signed a nuclear cooperation agreement with India for capacity building and training in peaceful application of nuclear energy, especially the use of radioisotopes, nuclear safety, radioactive waste management, radiation safety and nuclear security. In April 2015, the Government also signed a nuclear cooperation memorandum of understanding (MoU) with Pakistan regarding non-destructive testing, nuclear applications for agriculture and marine pollution.

Sri Lanka is also implementing technical cooperation programmes with the IAEA under various national, regional and international projects.

The INIR team was informed that currently there is no cooperation in nuclear safety with regulatory bodies in countries operating nuclear power plants.

Areas for further action	**Significant**	
	Minor	Regulatory cooperation

RECOMMENDATIONS
R-2.2.1
SUGGESTIONS
S-2.2.1 SLAERC is encouraged to pursue mechanisms for cooperation in nuclear safety with regulatory bodies in countries operating nuclear power plants.
GOOD PRACTICES
GP-2.2.1

3. Management Condition 3.1: Need for appropriate leadership and management systems recognized	Phase 1
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	(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

Sri Lanka recognises the importance of leadership and management systems for a successful nuclear power programme. Participants from Sri Lanka have attended IAEA Training Courses on Leadership and Management for Safety. In addition, SLAEB and SLAERC, together with the IAEA, held a national training course in 2018 that covered legal, regulatory and governmental aspects of nuclear power.

CEB has experience in managing non-nuclear power generation projects and some of its staff have attended a nuclear power leadership training course in Russia.

The INIR team was informed that Sri Lanka has not yet identified or documented the specific leadership competencies needed for the senior managers of the future key organizations.

While Sri Lanka recognises the need to implement management systems in the organizations involved in the nuclear power programme, there are currently no studies related to the scope nor plans for their implementation. SLAERC, however, has initiated work to develop a management system. The INIR team noted that it would be beneficial to consider how any existing management system in CEB would need to be adapted to suit the development of a nuclear power programme.

No decision has been taken on the establishment of an owner/operator organisation, however, the INIR team was informed that a new organization would likely be created under the Ministry of Power, following a similar practice to other countries in the region.

Current studies by the NEPIO working groups are reported in documents that are readily available. The INIR team noted that as Sri Lanka moves forward and develops more detailed studies, it will be

<table>
<tr><td colspan="3">important to have a management system in place to ensure the quality of the work and its long-term availability within a document management system.</td></tr>
<tr><td rowspan="2">Areas for further action</td><td>Significant</td><td>— Leadership competences
— Management systems</td></tr>
<tr><td>Minor</td><td></td></tr>
<tr><td colspan="3">RECOMMENDATIONS</td></tr>
<tr><td colspan="3">R-3.1.1 NEPIO should identify the key competences required for senior leaders of a nuclear power programme and develop plans for their recruitment and development.

R-3.1.2 NEPIO should further develop its understanding of the main elements of management systems that will be required for each of the key organizations to ensure the success of the programme.</td></tr>
<tr><td colspan="3">SUGGESTIONS</td></tr>
<tr><td colspan="3">S-3.1.1</td></tr>
<tr><td colspan="3">GOOD PRACTICES</td></tr>
<tr><td colspan="3">GP-3.1.1</td></tr>
</table>

4. Funding and Financing Condition 4.1: Strategies for funding established	Phase 1
Summary of the condition to be demonstrated	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: (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	(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

The funding for the work that was carried out by the NEPIO was provided by SLAEB and CEB. SLAEB obtains its funding through the government budget allocations, and CEB obtains its funding through electricity sales.

The NEPIO has not yet estimated the funding that will be required for all the activities in the future phases of the programme. However, it recognises that budget allocations will be necessary to obtain the support of technical support organizations (TSOs) and specialized consultants for a number of areas including, siting studies, grid studies, and regulatory support. The INIR team was informed that while some of this funding may come from the government, Sri Lanka will also look for support from potential vendor countries.

The INIR team was informed that the current focus was to seek support for siting studies and development of an education and training centre. In addition, SLAEB has submitted a proposal to its Board to staff a Nuclear Power Planning and Study Section.

CEB is the sole transmission licensee in the country and prepared the Long-Term Transmission Development Plan (LTTDP). The LTTDP includes the investment and timing required to ensure an adequate capacity and a reliable network to cope with the load growth and future generation additions.

CEB is currently focused on developing programmes to meet the Government's target of producing 70% of its electricity from renewable sources. It has estimated that the necessary costs of grid improvements to meet this target are US $2 billion. The majority of the funding will come from the

Asian Development Bank. The INIR team was informed that if the Government takes a decision to develop nuclear power, CEB would carry out the necessary studies to identify the grid improvements required. Given the current focus on renewable energy, CEB is no longer allocating any resources to the development of an operator for the nuclear power plant.

SLAERC currently has responsibility for regulatory functions in the areas of safety, security and safeguards. Section 75 of the Sri Lanka Atomic Energy Act states that SLAERC has its own funds allocated by vote of the Parliament as well as fees and sums obtained in carrying out its functions. It is expected that the regulatory body for the nuclear power programme would be funded in a similar way. No work was conducted to estimate the future budget needs of the regulatory body.

The INIR team was informed that if the government approves a nuclear power programme, it will establish a committee that would identify the funds required and manage their allocation appropriately.

The INIR team was informed that the NEPIO has not yet considered the legal and financial mechanisms for funding long-term waste management and decommissioning costs.

Areas for further action	**Significant**	Funding requirements for future phases
	Minor	

RECOMMENDATIONS

R-4.1.1 The NEPIO should estimate the funding that will be required for the main activities in the future phases of the nuclear power programme.

SUGGESTIONS

S-4.1.1

GOOD PRACTICES

GP-4.1.1

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.

Observations

Different methods of financing for NPPs were studied and are described in the comprehensive report. They include:

- Government financing;
- Corporate financing;
- Vendor finance;
- Power user investment (Mankala model);
- Concession arrangements;
- Project financing.

The INIR team was informed that Sri Lanka hosted a workshop in 2019 that increased the NEPIO's understanding the main issues related to the different approaches. However, no further work has been carried out to evaluate the viable options for Sri Lanka or to look at the approaches to manage the financial risks associated with developing nuclear power. The current thinking of the NEPIO is that a BOO(T) model might be appropriate due to the financial issues in the country at present. The INIR team was informed that Sri Lanka is also discussing vendor financing options. The INIR team was informed that that the current law relating to power generation requires the government to have a majority shareholding for a large NPP.

For non-nuclear power projects in Sri Lanka, the general approach is to agree a power purchase agreement (PPA) with power developers with a guaranteed price for a number of years based on identified costs. Work to understand mechanisms for PPAs for a nuclear power plant has not yet been carried out. The INIR team was informed that some modelling has been carried out by CEB that suggests a NPP could provide electricity at a price compatible with other power sources.

Areas for further action	**Significant**	Conclusions on financing an NPP
	Minor	

RECOMMENDATIONS

R-4.2.1 The NEPIO should complete an analysis of the options for financing a nuclear power plant project and develop conclusions and recommendations for the government.

SUGGESTIONS

S-4.2.1

GOOD PRACTICES

GP-4.2.1

5. Legal Framework **Condition 5.1: Adherence to all relevant international legal instruments planned**	**Phase 1**
Summary of the condition to be demonstrated	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: (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	(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

Sri Lanka is party to several international legal instruments adopted under the IAEA auspices, in particular:

- The Convention on Early Notification of a Nuclear Accident;
- The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; and
- The Convention on Nuclear Safety.

Sri Lanka has also concluded:

- An Agreement with the IAEA for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons; and
- The Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA.

However, Sri Lanka is not a party to:

- The Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment;
- The Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management (Joint Convention);
- The Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention);
- The 1997 Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (1997 Vienna Convention);
- The Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention; and
- The Convention on Supplementary Compensation for Nuclear Damage (CSC).

Sri Lanka is considering signing the Agreement on the Privileges and Immunities of the International Atomic Energy Agency and joining the 1997 Vienna Convention and the CSC further to an initiative of SLAEB with the Ministry of Foreign Affairs. In this context, a Cabinet Memorandum was prepared and submitted for approval.

The Government has expressed its commitment to conclude an Additional Protocol (AP). The acceptance by Sri Lanka of the draft Additional Protocol was communicated in a letter to the Director General of the IAEA, dated 23 July 2018. The draft Additional Protocol was approved by the IAEA Board of Governors on 12 September 2018. The INIR team was informed that Sri Lanka has not taken further steps to finalize the legislative approval process of the AP and that this process will be reactivated through contact with the UN Division within the Ministry of Foreign Affairs.

Concerning the Joint Convention and the CPPNM, and its 2005 Amendment, currently, there is neither a plan in place to adhere to these instruments nor an analysis of the implications on the national legislation. The INIR team was informed that Sri Lanka will seek IAEA assistance in deepening knowledge on the implications of these instruments.

In Sri Lanka, adherence to a convention requires that implementing legislation is developed before joining the convention. In preparation for Phase 2 of the nuclear power infrastructure development where Sri Lanka is expected to have adhered to all relevant international legal instruments, the time required for this procedure needs to be considered.

Areas for further action	**Significant**	International legal instruments
	Minor	Additional Protocol

RECOMMENDATIONS

R-5.1.1 Sri Lanka should carry out an analysis of the conventions to which it is not yet a party and establish a plan with timelines to adhere to these instruments, taking account of the need for necessary implementing legislation.

SUGGESTIONS

S-5.1.1 Sri Lanka is encouraged to finalize the legislative approval process for concluding its Additional Protocol.

GOOD PRACTICES

GP-5.1.1

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 current uses of nuclear technology in Sri Lanka are regulated by the Sri Lanka Atomic Energy Regulatory Council (SLAERC) established under the Sri Lanka Atomic Energy Act. No. 40 of 2014 (which came into operation on 1 January 2015).

As recognized in the comprehensive report, Sri Lanka will need to establish an appropriate legal framework covering all necessary elements for the safety, nuclear security, safeguards and civil liability for nuclear damage.

The SER identified some elements that should be addressed in a comprehensive nuclear law; some of the elements are inadequate and others are missing. Sri Lanka is considering to enhance its legal framework to support a nuclear power programme through an amendment of the existing Act of 2014 or enactment of a new piece of legislation to be established. The INIR team was informed that this decision will be made later, taking into account the legal practice in the country.

Sri Lanka recognizes that an independent regulatory body to regulate nuclear facilities and activities needs to be established in the new legal framework. A decision on whether to expand the functions and responsibilities of SLAERC or to establish a separate organization to regulate the nuclear power programme has still to be made by the Government.

An assessment of the legislative provisions related to nuclear power has not been carried out, and formal plans to develop further nuclear legislation are not in place.

Sri Lanka is aware that nuclear law is a complex area of law and has expressed the need for IAEA assistance in training all stakeholders involved in the legislative drafting and approval processes.

Areas for further action	**Significant**	Legislative studies and plans
	Minor	

RECOMMENDATIONS

R-5.2.1 Sri Lanka should review the 2014 Atomic Energy Act and develop plans that include all necessary provisions of a comprehensive national nuclear law to support its nuclear power programme.

SUGGESTIONS

S-5.2.1

GOOD PRACTICES

GP-5.2.1

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; (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	(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

Sri Lanka has not yet analysed and adequately identified the other legislation that may have an impact on the nuclear power programme. The INIR team was informed that detailed studies will be undertaken at a later stage. Sri Lanka is aware of the complexity of this task as it requires a clear understanding of all relevant issues associated with a nuclear power programme.

Areas for further action	**Significant**	Studies and plans to review non-nuclear laws
	Minor	

RECOMMENDATIONS

R-5.3.1 Sri Lanka should carry out an analysis of laws that may affect the nuclear power programme and plan for their enactment or amendment as appropriate.

SUGGESTIONS

S-5.3.1

GOOD PRACTICES
GP-5.3.1

6. Safeguards Condition 6.1: Terms of international safeguards agreement in place		Phase 1
Summary of the condition to be demonstrated	(a) The Member State has a comprehensive safeguards agreement with associated subsidiary arrangements in force with the IAEA; (b) 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; (c) 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.	
Examples of how the condition may be demonstrated	(1) 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; (2) 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

Sri Lanka has a comprehensive safeguards agreement with the IAEA which entered into force on 6 August 1984. Sri Lanka has not concluded the associated subsidiary arrangements, but the INIR team was informed that in 2020, SLAERC notified the Government of its consent to the proposed text.

Sri Lanka does not have a small quantities protocol to its comprehensive safeguards agreement.

In 2018 Sri Lanka informed the IAEA Director General that the Government had decided to conclude an additional protocol, and a text was approved by the IAEA Board of Governors on 12 September 2018. The INIR team was informed that SLAERC has taken steps to raise awareness of the requirements of the additional protocol including the organization of one national training activity in 2019 in cooperation with the United States National Nuclear Security Administration and engagement with a number of national stakeholders including the Ministry of Foreign Affairs, SLAEB, the Department of Immigration and Emigration and Sri Lanka Customs. The INIR team was informed that the agreement can only be concluded once implementing legislation has been put in place but that the Department of Immigration and Emigration has confirmed that there would be no issue to meet the visa requirements in Article 12 of the Additional Protocol (See issues 5.1. and 5.2. for further details).

Areas for further action	**Significant**	Subsidiary Arrangements
	Minor	

RECOMMENDATIONS

R-6.1.1 Sri Lanka should conclude the Subsidiary Arrangements to its comprehensive safeguards agreement.

SUGGESTIONS		
S-6.1.1		
GOOD PRACTICES		
GP-6.1.1		
6. Safeguards **Condition 6.2: Strengthening of the SSAC planned**		**Phase 1**
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	(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 The INIR team was informed that Sri Lanka recognizes the need to enhance its State system of accounting for and control of nuclear material (SSAC) and that SLAERC is focusing its current efforts on improving accounting for the nuclear material already present in Sri Lanka. Article 87(1)(h) of the Sri Lanka Atomic Energy Act, No. 40 of 2014 provides that SLAERC may make rules in respect of requirements deemed necessary to give effect to the comprehensive safeguards agreement. The INIR team was informed that no such rules have been made to date, but that SLAERC is currently identifying the elements to be included in a safeguards regulation. An analysis of needs for enhancement of SSAC capabilities for a nuclear power programme has not been conducted, and a plan to strengthen the SSAC has not been developed.		
Areas for further action	**Significant**	Plan to strengthen the SSAC
	Minor	
RECOMMENDATIONS		
R-6.2.1 Sri Lanka should analyse the safeguards requirements associated with a new nuclear power programme and develop a plan to strengthen its SSAC.		

SUGGESTIONS		
S-6.2.1		
GOOD PRACTICES		
GP-6.2.1		
6. Safeguards **Condition 6.3: 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 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.	
Observations No review or audit has been conducted on the existing safeguards provisions.		
Areas for further action	**Significant**	
	Minor	
RECOMMENDATIONS		
R-6.3.1		
SUGGESTIONS		
S-6.3.1		
GOOD PRACTICES		
GP-6.3.1		

7. Regulatory Framework **Condition 7.1: Development of an adequate regulatory framework planned**	**Phase 1**
Summary of the condition to be demonstrated	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: (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. 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. *Note: Plans to develop competence are addressed under infrastructure Issue No. 10, Human Resource Development.*
Examples of how the condition may be demonstrated	(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

The current core functions assigned to SLAERC relate to the licensing, the conduct of inspections and the enforcement of regulations with respect to radiation sources. The 2014 Act provides for information and consultation of the public and other stakeholders about the regulatory activities and the safety, health and environmental aspects of the regulated practices, including incidents and accidents.

SLAERC is also mandated to liaise with government agencies, nongovernmental organizations or individuals having competence in health, safety, environmental protection, security, emergency, transport or import and export of nuclear and radioactive materials, and to make recommendations to the Minister on the formulation of a national policy and strategy on protection against ionizing radiation and the safety and security of sources and nuclear and other radioactive materials.

Although the scope of the Act is focused on the safety and security of radioactive sources and other radioactive materials, some provisions of this Act are extended to nuclear materials, such as:

- The establishment of a State system of accounting for and control of nuclear materials;
- Export and import control of nuclear and other radioactive materials;
- The protection from and the security of sources, nuclear and other radioactive materials;
- The implementation of regulatory measures for the security of nuclear and other radioactive materials.

The Act authorizes SLAERC to appoint Advisory Committees and to obtain expert services as advisors or consultants.

Both SLAEB and SLAERC report to the Minister of Power and all regulations prepared by SLAERC are approved and issued by the Minister. At the moment, there is no decision if SLAERC will be responsible to oversee the nuclear power programme or if a new regulatory body will be established.

The report of the Working Group on the Legal and Regulatory Framework (December 2019) recognizes the need for the Government to enhance the regulatory framework to support the nuclear power plant licensing and oversight. This should provide for the establishment of an effectively independent and competent regulatory body, empowered with adequate legal authority, technical and managerial competence, and human and financial resources with clear functions and responsibilities.

The report of the Working Group on the Legal and Regulatory Framework also identifies requirements for the development of the regulatory framework for the nuclear power programme, and recognizes the need for the regulatory body to consider the various regulatory approaches to be applied for a nuclear power programme of the same size, and to tentatively plan its regulatory approach. The INIR team was informed that there is no current plan for the development of regulations and guides covering safety, security and safeguards for the oversight of a nuclear power programme.

Areas for further action	**Significant**	— Plans to establish an independent regulatory body — Plan to develop regulations and guides
	Minor	

RECOMMENDATIONS
R-7.1.1 The NEPIO should provide clear recommendations to the government to enable it to establish and develop an independent regulatory body with a defined organizational structure, functions and responsibilities. **R-7.1.2** The NEPIO should prepare a plan for the development of regulations and guides in line with the needs of the nuclear power programme.
SUGGESTIONS
S-7.1.1
GOOD PRACTICES
GP-7.1.1

8. Radiation Protection **Condition 8.1: Enhancements to radiation protection programmes planned**	**Phase 1**
Summary of the condition to be demonstrated	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. *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.*
Examples of how the condition may be demonstrated	(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.

Observations

Sri Lanka's current radiation protection framework is applicable to facilities and activities involving radiation sources.

SLAEB is the organization that provides radiation protection services in Sri Lanka to all radiation source users and implements the radiation protection measures in the country. The INIR team was informed that its activities are implemented in conformity with the IAEA safety standards and guidelines and are expected to expand to cover the needs of the nuclear power programme. The use of other service providers in the future is an option that is not ruled out.

Sri Lanka has experience in radiation monitoring through a national network of monitoring stations set up to monitor impact of releases from nuclear power plants in neighbouring countries.

Current radiation protection services cover the following:

- The external monitoring service which is provided by the Personal Monitoring Service Laboratory of SLAEB (accredited);
- The Secondary Standard Dosimetry Laboratory (SSDL) (accredited);
- The Analytical measurements capabilities including Spectrometry service.

An internal monitoring programme and associated facilities are being implemented for existing practices with the assistance of the IAEA. The main focus has been given to improve the measurement capabilities of in-vivo and in-vitro dosimetry.

The IAEA team was informed that although NPP operating organizations are expected to have their own workplace monitoring, SLAEB is ready to provide supplementary monitoring if required.

Sri Lanka has identified the need to develop its neutron measurement capacities including neutron dosimetry calibration and verification capabilities, if a decision to proceed with nuclear power is taken. This would require that adequate upskill training is available to understand the specific radiological concerns associated with nuclear power.

There is no plan concerning the expansion of the radiation protection programme to cover radioactive waste management and transport of radioactive material. However, the INIR team was informed that the current draft regulations cover radioactive waste management and transport of radioactive material. The new draft regulations that are intended to be brought in line with the Basic Safety Standards, may need further adjustments to address the nuclear power programme.

Bilateral cooperation in the area of radiation protection is limited, however, Sri Lanka works with the IAEA and with an Asian Pacific group to develop training and awareness programmes for radiation protection officer (RPO) and other individuals.

Areas for further action	**Significant**	Plans for radiation protection to cover NPP
	Minor	

RECOMMENDATIONS

R-8.1.1 The NEPIO is encouraged to continue planning the expansion of its radiation protection programme to meet the need of the nuclear power programme.

SUGGESTIONS

S-8.1.1

GOOD PRACTICES

GP-8.1.1

9. Electrical Grid Condition 9.1: Electrical grid requirements considered	Phase 1
Summary of the condition to be demonstrated	A preliminary study of the grid system has been conducted covering: (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	(1) An analysis of the grid covering: (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: (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

Sri Lanka's electricity demand growth was 5.1% in 2017 and 4.9% in the year 2018, and the national electrification level has reached almost 100%. According to the long-term demand projections the peak demand is expected to reach 4872 MW by 2030 and 7445 MW by 2040. The total installed capacity as at the end of 2020 is 4560 MW.

CEB considers the relatively large unit size of an NPP to be the biggest technical challenge for the Sri Lankan system and has determined that the maximum unit size with current grid characteristics was in the range of 440 MW–490 MW by 2040.

The electricity demand forecast in Sri Lanka is updated every two years with the revision of Long-Term Generation Expansion Plans (LTGEPs). The latest LTGEP is for 2022–2041. However, a new policy guideline has been issued and preparation of the LTGEP 2023–2042 is currently in progress which reflects the new Government policy, which is not to build more coal stations, to have 70% of electricity produced from renewables by 2030 and to be carbon neutral by 2050. Nuclear power is considered as one of the options to achieve the target of carbon neutrality of the power production sector by 2050.

CEB is also pursuing electricity storage projects to accommodate the goal of 70% generation from renewables. Two sites for pumped storage have been identified, with the potential to develop 600 MW and 1400 MW of pumped storage units. Preliminary studies have been completed and the feasibility

<table>
<tr><td colspan="3">studies are in progress. In addition, CEB is investigating a number of battery storage projects. These generation and storage projects will also require significant enhancements to the transmission network.

CEB is also studying a potential link (HVDC) to the Indian electrical grid but financing is yet to be developed.

Historical records show that between 2015 and 2018 there were between 6 and 18 major grid failures and 3 total grid failures. Evaluation of the performance of the grid at present reveals that the improvements are required in frequency and voltage performance to match the industry criteria/guidelines for integrating a nuclear power unit to the grid. However, due to the significant changes planned to the generation and transmission system over the next decade, CEB has not yet analysed the implications of installing an NPP.</td></tr>
<tr><td rowspan="2">Areas for further action</td><td>Significant</td><td>Grid studies</td></tr>
<tr><td>Minor</td><td></td></tr>
<tr><td colspan="3">RECOMMENDATIONS</td></tr>
<tr><td colspan="3">R-9.1.1 CEB should analyse the capability of the grid system to support the integration of a nuclear power plant and identify the scale of grid enhancement required.</td></tr>
<tr><td colspan="3">SUGGESTIONS</td></tr>
<tr><td colspan="3">S-9.1.1</td></tr>
<tr><td colspan="3">GOOD PRACTICES</td></tr>
<tr><td colspan="3">GP-9.1.1</td></tr>
</table>

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	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: (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	(1) An analysis identifying the competences and number of staff needed, covering all the future organizations. The analysis needs to include: (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.

Observations

The INIR team was informed that the nuclear competencies in Sri Lanka are currently focused on non-power applications and that additional analysis and capacity building will be required to develop the human resources needed for a nuclear power programme should the country decide to proceed. A preliminary survey was carried out on the educational and vocational institutions in Sri Lanka, but it did not include an assessment of the current human resource competences and capabilities, or the staffing needs of the key organizations.

The University of Colombo provides Nuclear Physics modules (Particle Physics, Reactor Physics etc.) and Nuclear Science modules (e.g., Radiation Detection and Measurements, Radiochemistry, Health Physics, Medical Physics etc.). The University of Moratuwa and the University of Colombo offer a Nuclear Power Engineering module as part of their Electrical Engineering BSc and MSc. In addition, Science and Engineering faculties of other universities also conduct similar course modules. The INIR team was informed that around 100 students enrol in these modules in each university annually.

Sri Lanka has a Technical and Vocational Education and Training (TVET) programme that supports national development efforts to address youth unemployment and skills shortages in industry, and a National Vocational Qualification (NVQ) framework was established to standardize qualifications. This framework facilitates the progressive qualifications of students in TVET institutions and allows qualification holders to pursue degrees at higher level educational institutions. The TVET programme will be useful to support the development of technicians for the construction and operational phases of the nuclear power programme.

Areas for further action	**Significant**	Assessment of human resources
	Minor	

RECOMMENDATIONS

R-10.1.1 Sri Lanka should perform an assessment comparing the current human resources and competences with those required for the key organizations in the nuclear power programme.

SUGGESTIONS

S-10.1.1

GOOD PRACTICES

GP-10.1.1 The University of Moratuwa and the University of Colombo offer a nuclear power engineering module as part of various BSc and MSc programmes that introduces students to the principles of nuclear power, including the main considerations related to introducing nuclear power in Sri Lanka. This provides a pool of graduates that have a basic understanding of nuclear power that can be recruited by the key organizations.

10. Human Resources Development **Condition 10.2: Development of human resources planned**	**Phase 1**

Summary of the condition to be demonstrated	Outline plans have been agreed to: (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	(1) Plans to develop human resources required including: (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 development and review of the plans.

Observations

The INIR team was informed that plans to enhance Sri Lanka's national education and training infrastructure would be developed after the country makes a commitment to nuclear power. SLAEB is currently planning the establishment of an Education and Training Centre with the Russian Federation, which will include a research reactor, simulators, and laboratories to support the development of nuclear competencies in the country. The INIR team noted that it is important to clarify the role of the Education and Training Centre as part of a broader plan to enhance the national education and training infrastructure.

The NEPIO has given some consideration to the organizations and institutions that would be involved in the nuclear power programme but has not developed a strategy that addresses the human resource needs and competencies that will be required for the key organizations for the next Phase of the programme. The INIR team was informed that these activities would be initiated following the decision of the government to proceed with the nuclear power programme.

Areas for further action	**Significant**	Strategy for human resource development
	Minor	

RECOMMENDATIONS

R-10.2.1 The NEPIO should develop a strategy to address the human resource and competence needs that will be required for the key organizations for the nuclear power programme, including a plan to enhance its national education and training infrastructure.

SUGGESTIONS

S-10.2.1

GOOD PRACTICES

GP-10.2.1

11. Stakeholder Involvement Condition 11.1: Open and transparent stakeholder involvement programme initiated	Phase 1
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	(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

Sri Lanka recognizes that public communication and awareness is a challenge related to the development of a nuclear power programme.

Activities in this area are currently led by SLAEB and have included:

- Participation in national level energy exhibitions in each province of Sri Lanka that includes attendance from local community leaders and the general public;
- Development and distribution of electronic and printed materials related to the benefits of nuclear power programme;
- Representation and attendance at the Energy Committee meetings in the Sri Lankan Parliament;
- Periodic briefings within the Ministry of Power and to other government institutions;
- Development of an E-Magazine on nuclear science and technology, including the role of nuclear power in Sri Lanka energy mix.

SLAEB has also initiated an educational programme in collaboration with the Ministry of Education that is aimed at addressing misconceptions in the public related to nuclear technology by informing students about nuclear science and applications. The programme developed educational curricula for different age groups of students and provided training programmes for teachers to increase awareness

of nuclear science and technology in the country, including the potential role of nuclear power in the national energy mix.

SLAEB also established the Youth Nuclear Society of Sri Lanka (YNSS) for students and young professionals working in or planning careers in nuclear science and technology. This initiative is also expected to help raise awareness and encourage participation of the young generation as stakeholders in the nuclear power programme.

The INIR team noted the importance of developing a stakeholder involvement strategy and plan, with dedicated staff and resources, in order to enable the country to conduct these activities in a systematic manner and track progress as the programme continues.

Areas for further action	**Significant**	Stakeholder involvement strategy and plan
	Minor	

RECOMMENDATIONS

R-11.1.1 The NEPIO should develop a stakeholder involvement strategy and plan, with dedicated staff and resources, to inform and guide its ongoing activities in this area.

SUGGESTIONS

S-11.1.1

GOOD PRACTICES

GP-11.1.1 SLAEB cooperated with the Ministry of Education to develop educational curricula and training programmes on nuclear science and technology for teachers in secondary schools. This initiative will help raise awareness about the potential role for nuclear power in Sri Lanka.

12. Site and supporting facilities **Condition 12.1: General survey of potential sites conducted and candidate sites identified**	**Phase 1**
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	(1) A report covering: (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: (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

An initial site survey was conducted with participants from SLAEB, CEB, SLAERC, the Central Environmental Authority (CEA), the National Building Research Organization (NBRO), the Geological Survey and Mines Bureau, the National Aquatic Resources Research and Development Agency, the Department of Coast Conservation and Coastal Resource Management, the Meteorology Department, and the Disaster Management Centre.

Based on an initial consideration of topography, availability of cooling water and population density, four regions for potential sites were identified. Within each of these areas, protected areas were also identified.

These regions are identified in the figure below:

FIG. 2 Selection of potential sites in Identified Regions for the Next Step (Source: Self-Evaluation Report)

In addition, studies were carried out to identify a number of other key parameters. Seismic evaluation was based on the data available through global databases like the United States Geological Survey (USGS) and the International Seismological Centre (ISC). The Working Group on Siting of NPPs concluded that the existing reports and the calculations indicate that Sri Lanka has a very low potential risk of damages from a direct impact of an earthquake. However, continuous seismic monitoring and data analysis based on further enhanced facilities to the local seismic network will enable a better understanding of the seismicity around Sri Lanka to make an accurate seismic hazard assessment for the island.

The most common natural hazards in Sri Lanka include localized and seasonal floods and associated landslides. Less frequent but more severe hazards include cyclones, droughts, and tsunamis; Sri Lanka was one of the worst hit countries by the 2004 Indian Ocean Tsunami. Major floods in Sri Lanka are associated with the two monsoon seasons.

Sri Lanka has a well-spread road network and railway network for the transportation of the country. The road network is well established with a total length of about 117 093 km (as of 2016).

The Working Group on Siting of NPPs concluded that heavy machinery and the equipment can be transported through the normal road network and the expressway network to all over the country.

The INIR team was informed that in some areas (e.g. meteorology) there is a lack of adequate data due to a lack of historical records.

As noted in the action plan attached to the SER, there is a need to: establish a Site Selection Team to lead the site selection process; identify and document specific criteria for site selection; obtain all the necessary data; develop a quality management process for the process including data qualification and preservation for use in future project phases and identify candidate sites. In preparation for site characterisation in Phase 2, there is also a need to develop regulatory documents related to siting.

Areas for further action	**Significant**	Identification of candidate sites
	Minor	
RECOMMENDATIONS		
R-12.1.1 The NEPIO should continue its work to identify candidate sites based on criteria covering safety, security, cost, socioeconomic issues, engineering and the environment.		
SUGGESTIONS		
S-12.1.1		
GOOD PRACTICES		
GP-12.1.1		

13. Environmental Protection Condition 13.1: Environmental requirements considered		Phase 1
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	(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

SLAEB conducts baseline environmental monitoring programmes for gamma dose activity in soil, air, water and flora, and radon monitoring in soil, air and water through measurements at eight stations, which form part of the National Nuclear Disaster Early Warning System. The number of sampling locations can be increased and establishment of an online monitoring programme can be realized based on the needs of a nuclear power programme.

Sri Lanka has identified four coastal regions for the potential site of a nuclear power plant. The INIR team was informed that no detailed analysis and establishment of environmental requirements related to the siting of a NPP has been undertaken to date and currently only a limited set of data exists. The INIR team was informed that Sri Lanka plans to implement meteorological stations to collect environmental data.

The key areas to be considered further in the siting process and in the environmental impact assessment process include land use, water use, water quality and impacts of low-level radioactive effluents released into the environment, transport of materials, disposal of hazardous materials/waste and water use.

Areas for further action	**Significant**	
	Minor	
RECOMMENDATIONS		
R-13.1.1		
SUGGESTIONS		
S-13.1.1		

GOOD PRACTICES	
GP-13.1.1	
13. Environmental Protection **Condition 13.2: Framework for environmental protection reviewed**	**Phase 1**
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	(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.

Observations

The National Environmental Act No. 47 of 1980 and its Amendments Acts No. 56 of 1988 and No. 53 of 2000 provide requirements for the conduct of an environmental impact assessment (EIA) for large projects. The INIR team was informed that further consideration of the EIA process particular to nuclear power projects would be made.

The CEA under the provision of the Ministry of Environment holds overall responsibility of integrating environmental considerations into the development process of the country. It was given wider regulatory powers under the National Environment Act and its amendments, inter alia to issue an Environmental Protection License (EPL) for industries and activities listed in *The Gazette of the Democratic Socialist Republic of Sri Lanka*, Notification No. 1533/16 dated 25 January 2008.

The following stakeholders were involved in the Working Group considering the existing framework for environmental protection: CEA, SLAERC, SLAEB, CEB, NBRO, the Geological Survey and Mines Bureau (GSMB), the National Aquatic Resources Research and Development Agency (NARA), the Department of Coast Conservation and Coastal Resource Management, the Meteorology Department and the Disaster Management Centre (DMC).

The INIR team was informed that no detailed review of the existing framework for environmental protection in terms of laws, regulations, roles and responsibilities of involved organizations has been undertaken. Although Sri Lanka is party to a number of international legal instruments in the area of environmental protection, a review of international obligations from the perspective of the impact on such obligations if nuclear power is introduced in Sri Lanka has not been performed.

The action plan developed by Sri Lanka for the nuclear power programme acknowledges that the responsibilities of the nuclear regulatory body and CEA in EIA and the licensing process for NPPs would be defined to avoid conflict and overlap of responsibilities.

The INIR team was informed that CEA also intends to introduce a requirement for a strategic environmental assessment that would apply to the nuclear power programme. A process is already

defined and can be applied on a voluntary basis. The requirement is likely to come into force within two years.		
Areas for further action	**Significant**	Review of environmental protection framework
	Minor	
RECOMMENDATIONS		
R-13.2.1 The NEPIO should review the existing framework for environmental protection and identify gaps to ensure environmental protection in a nuclear power programme.		
SUGGESTIONS		
S-13.2.1		
GOOD PRACTICES		
GP-13.2.1		

14. Emergency Planning **Condition 14.1: Requirements of, and resources for, developing an emergency response capability recognized**	**Phase 1**
Summary of the condition to be demonstrated	(a) 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; (b) The NEPIO has identified the main organizations and resources that will need to be involved in the establishment of adequate national EPR capabilities; *(c)* The lead for the execution of the action plan and the action plan coordination framework has been identified. *Notes:* *(1) The process of developing adequate EPR will be initiated in Phase 2 and will be largely carried out in Phase 3;* *(2) The requirements of the conventions on early notification and assistance are covered under infrastructure issue No. 5, Legal Framework.*
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

Sri Lanka Atomic Energy Regulatory Council (SLAERC) is the organization responsible for arranging necessary plans and procedures to protect the people and the environment in case of nuclear or radiological emergencies. The DMC is the response organization in collaboration with other ministries. SLAERC coordinates with operating organizations, technical support organizations, and response organizations to develop and execute the National Nuclear or Radiological Emergency Management Plan (EMP). SLAERC is also the responsible entity for the preparation, revision and maintenance of the EMP.

Emergencies occurring at any type of radiation facility fall within the scope of this EMP as do emergencies arising from nuclear power plants in neighbouring countries. It also includes requirements, arrangements, and coordination with international organizations in the case of nuclear or radiological emergencies occurring outside of Sri Lanka, which will have an impact within Sri Lanka or its territorial waters.

The National Emergency Coordinator (NEC) who is a senior person with knowledge and competence in managing the national radiological and nuclear emergency preparedness and response system of the country is responsible for developing and maintaining the system.

The Technical Advisory Committee (TAC) appointed by SLAERC is responsible for providing technical advice in the event of a radiological or nuclear emergency, issuing alert and early warning to the public and responding to such emergencies.

The INIR team considers that the existing emergency preparedness and response (EPR) arrangement in Sri Lanka is a good starting point to analyse the expansion of the arrangements that will be required for a nuclear power programme. However, it was observed that a gap analysis of existing EPR arrangements and capabilities has not been conducted. Such an analysis would identify the additional arrangements that need to be further developed as well as identify the main organizations and national resources needed for the EPR arrangements for a nuclear power programme.		
Areas for further action	**Significant**	Gap analysis of EPR
	Minor	
RECOMMENDATIONS		
R-14.1.1 The NEPIO should conduct a gap analysis of existing emergency preparedness and response (EPR) arrangements and capabilities with the objective of identifying the additional resources and arrangements that need to be developed for a nuclear power programme.		
SUGGESTIONS		
S-14.1.1		
GOOD PRACTICES		
GP-14.1.1		
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 demonstrated	Presentation of any action plans resulting from a review or audit with progress identified.	
Observations Not applicable		
Areas for further action	**Significant**	
	Minor	
RECOMMENDATIONS		
R-14.2.1		

SUGGESTIONS
S-14.2.1
GOOD PRACTICES
GP-14.2.1

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	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. *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.*
Examples of how the condition may be demonstrated	(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.

Observations

The Cabinet Memorandum No. 10/2016/423/023 dated 20 August 2010, which sets the terms of reference for national consideration of nuclear power and the draft comprehensive report which provides recommendations regarding the development of national infrastructure both recognize the importance of nuclear security and the need to enhance the national nuclear security regime should the Government commit to develop a nuclear power programme.

The NEPIO's Working Group on Nuclear Safety and Security produced an analysis of existing capabilities and requirements for development in the areas of prevention, detection and response. This analysis recognizes that existing threat assessments were primarily conducted for the radiological facilities where high-activity radioactive sources are being used and that threat assessments for nuclear material and associated facilities would need to be conducted in a more comprehensive manner should the Government commit to a nuclear power programme. Several documents in the IAEA Nuclear Security Series are referenced in this analysis.

Based on the Sri Lanka Atomic Energy Act No. 40 of 2014, SLAERC is the regulatory authority for nuclear security matters. The INIR team was informed by SLAERC that the current national security policy does not currently address nuclear security. SLAEB has proposed the creation of a Nuclear Security Council under the National Security Council to bring together all national organizations that have responsibility for nuclear security. The INIR Team considers that the establishment of a national

coordination mechanism to support the future activities in the area of nuclear security for the nuclear power programme is important.

To implement the provisions of the 2014 Act on offences related to nuclear security, the High Court in Colombo judicial zone was designated as the high court for prosecution of offences.

The Government of Sri Lanka has signed cooperation agreements with India, Pakistan and the United States which include cooperation in the area of nuclear security. SLAERC has been participating in the United States Department of Energy's (U.S. DOE's) Global Material Security (GMS) programme from 2009.

Nuclear security for the transport of radioactive material is coordinated and overseen by SLAERC in collaboration with several organizations.

Since Sri Lanka does not have nuclear facilities, there is currently no requirement for the implementation of complex cyber security measures.

Sri Lanka has developed a National Radiological Emergency Response Plan and Chemical Biological Radiological and Nuclear (CBRN) Emergencies Response Plan.

Sri Lanka and the IAEA developed an Integrated Nuclear Security Support Plan (INSSP) in 2017. The INSSP was based on a systematic and comprehensive review of the nuclear security regime in Sri Lanka and identified areas where it can be strengthened. At present, the INSSP addresses radioactive source security.

The INIR team was informed that the 2017 INSSP report was shared with all stakeholders and organizations that participated in its development, and that most of the recommendations have been implemented.

Areas for further action	**Significant**	National coordination mechanism
	Minor	INSSP scope

RECOMMENDATIONS

R-15.1.1 Sri Lanka should develop the national coordination mechanism for nuclear security.

SUGGESTIONS

S-15.1.1 Sri Lanka is encouraged to consider the country's plans for nuclear power during the next review and update of the Integrated Nuclear Security Support Plan (INSSP).

GOOD PRACTICES

GP-15.1.1

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 Not applicable		
Areas for further action	**Significant**	
	Minor	
RECOMMENDATIONS		
R-15.2.1		
SUGGESTIONS		
S-15.2.1		
GOOD PRACTICES		
GP-15.2.1		

16. Nuclear Fuel Cycle **Condition 16.1: Options for nuclear fuel cycle (front end and back end) considered**	**Phase 1**
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	(1) A document: (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

The SER and the comprehensive report contain a description of activities in the nuclear fuel cycle. For the front end only two of the possible options are described:

1. Production of fresh fuel from yellow cake based on national/regional sources;
2. Purchase of fresh fuel elements based on long time contract.

The provided documents do not contain an assessment of the suitable options for Sri Lanka's nuclear power programme. The INIR team was informed that for the initial phase of operation, Sri Lanka plans to purchase fresh fuel from the NPP provider. However, considerations for the later phase will depend on the available options.

The further management of the fuel after removal from the reactor is described without assessing the advantages and disadvantages of direct spent fuel (SF) disposal or SF reprocessing by the vendor country.

It is anticipated that after removal from the reactor, spent fuel will be stored in pools at the reactor site. After an initial cooling period, the SF will be stored in dry storage in casks. The management of SF after this interim storage is not described. A decision was not taken as it will be necessary to complete the nuclear fuel cycle policy first where particular options and their implications will be considered.

The INIR team was informed that Sri Lanka plans to develop a national nuclear fuel cycle policy.		
Areas for further action	**Significant**	Options for the nuclear fuel cycle
	Minor	
RECOMMENDATIONS		
R-16.1.1 The NEPIO should develop a document addressing suitable options for the nuclear fuel cycle in Sri Lanka, including their implications for the nuclear programme.		
SUGGESTIONS		
S-16.1.1		
GOOD PRACTICES		
GP-16.1.1		

17. Radioactive Waste Management Condition 17.1: The requirements for management of radioactive waste from NPPs recognized			Phase 1
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 Two organizations have responsibilities in relation to radioactive waste management: — Sri Lanka Atomic Energy Regulatory Council (SLAERC) as a regulatory authority (regulations and regulatory control), and — Sri Lanka Atomic Energy Board (SLAEB) as a technical body for managing disused sealed radioactive source and storage facility. Radioactive waste management in Sri Lanka is based on experience with disused sealed radioactive sources. The current draft of the National Policy of Sri Lanka on Radioactive Waste Management (prepared by SLAERC) covers radioactive waste arising from existing facilities and activities. Sri Lanka plans to gain from experience on the management of radioactive waste from operating countries. The area of management of radioactive waste will be included into memoranda of understanding and agreements that will be concluded by Sri Lanka. The INIR team noted that the information in the SER and the supporting documents does not demonstrate a thorough understanding of the new waste management requirements arising from a nuclear power programme, including the options for the radioactive waste management and the delineation of responsibilities.			
Areas for further action	**Significant**	Requirements for radioactive waste management	
	Minor		

RECOMMENDATIONS		
R-17.1.1 Sri Lanka should develop a document addressing possible approaches to the management of radioactive waste arising from NPP operation and their implications.		
SUGGESTIONS		
S-17.1.1		
GOOD PRACTICES		
GP-17.1.1		
17. Radioactive Waste Management **Condition 17.2: Options for disposal of all radioactive waste categories understood**		**Phase 1**
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 Sri Lanka has no disposal facility for radioactive waste. Low level waste is expected to be disposed at a shallow repository at the reactor site. Although the SER states that high level waste is planned to be disposed of in a deep geological repository, the INIR team was informed that no final decision on the end point of the nuclear fuel cycle was taken and all options are still open.		
Areas for further action	**Significant**	Evaluation of disposal options
	Minor	
RECOMMENDATIONS		
R-17.2.1 The NEPIO should develop a document addressing disposal options for all types of radioactive waste with initial estimates of the resources and time needed for their implementation to enable informed decision making.		
SUGGESTIONS		
S-17.2.1		

GOOD PRACTICES
GP-17.2.1

18. Industrial Involvement **Condition 18.1: National policy with respect to industrial involvement developed**		**Phase 1**
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	(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

The NEPIO's Working Group on Industrial Involvement includes the participation of key national stakeholders. The working group has familiarized itself with several countries' nuclear codes and standards and several countries' policy approaches to industrial involvement in nuclear power projects. The working group has analysed national data collected by the Ministry of Industries and identified a number of Sri Lankan industrial firms and organizations that may be able to supply commodities, components or services related primarily to the balance of plant for the first nuclear power plant project.

The working group's proposed strategy involves the establishment of a Centralized Information Centre for localisation assessment with the support of the government of Sri Lanka.

The INIR team was informed that the NEPIO plans to engage potential industry partners to raise their awareness of:

— Sri Lanka's plans for nuclear power;
— The industrial codes and standards, and processes that would be involved to become qualified suppliers;
— The Government programmes that could facilitate their participation in a nuclear power project.

The NEPIO plans to use the results of the working group's analysis to develop a draft industrial involvement policy to ensure Sri Lanka is well prepared for discussions or negotiations with potential NPP suppliers. The INIR Team considers that this policy could also help the Government describe the envisioned macroeconomic benefits of the nuclear power programme to Sri Lanka (see also Condition 1.3).

Areas for further action	**Significant**	Industrial involvement policy for the nuclear power programme
	Minor	

RECOMMENDATIONS
R-18.1.1 The NEPIO should continue to engage national industries to raise awareness and gauge interest, and develop recommendations for the Government regarding a national policy for industrial involvement in the nuclear power programme.
SUGGESTIONS
S-18.1.1
GOOD PRACTICES
GP-18.1.1

19. Procurement **Condition 19.1: Requirements for purchasing NPP services recognized**	**Phase 1**
Summary of the condition to be demonstrated	Recognition of the requirements associated with purchasing services.
Examples of how the condition may be demonstrated	(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

Sri Lanka has a set of procurement guidelines that were published by the National Procurement Agency in 2007 (now superseded by the National Procurement Commission). The guideline entitled *Selection and Employment of Consultants* was used to procure consultancy services to support the NEPIO with some activities in Phase 1.

The NEPIO is aware that, if the country decides to proceed with the nuclear power programme, additional external support will be needed to conduct activities in Phase 2. These include, among others:

- Site characterization;
- Environmental impact assessment;
- Engineering;
- Information management system development.

The INIR team was informed that procurements are approved by one of three different levels of Procurement Committees, depending on the overall value of the contract:

- Approval from the Procurement Committee of the Cabinet of Ministers (Value more than LKR 500 million); if foreign funded, LKR 1 billion;
- Approval from the Procurement Committee of the Line Ministry (MPC) (up to LKR 500 million) if foreign funded, up to LKR 1 billion;
- Approval from the Department Procurement Committee (DPC) of the procurement entity (up to LKR 200 million); if foreign funded, LKR 500 million.

The INIR team was informed of the following steps in the procurement process of consultancy services:

- The appropriate organization develops specific requirements for the consultancy services;
- A Consultancy Procurement/Technical Evaluation Committee (CPC/TEC) with relevant stakeholders and expertise is formed to review the technical requirements;
- Based on the TECs work, a final bill of quantity (BOQ) is developed and tender notices are issued;
- Bids will be called;
- The CPC/TEC reviews the bids and makes a recommendation to the appropriate Procurement Committee depending on the overall value of the contract;
- The appropriate Procurement Committee approves/ makes a final selection based on one of several established criteria, most commonly, a quality and cost-based selection.

Sri Lanka's Department of Public Finance also adjust or supplement procurement guidelines if necessary. Finally, the Committee of Public Accounts (COPA), which includes members from the Sri Lankan Parliament, can audit any procurement process conducted by governmental entities.		
Areas for further action	**Significant**	
	Minor	
RECOMMENDATIONS		
R-19.1.1		
SUGGESTIONS		
S-19.1.1		
GOOD PRACTICES		
GP-19.1.1		

APPENDIX 2: LISTS OF THE INIR TEAM MEMBERS AND COUNTERPARTS

INIR MISSION REVIEW TEAM	
Ms Aline Des Cloizeaux	IAEA
Mr José Ferraz Bastos	Team Leader, IAEA
Ms Marta Walker	Mission Coordinator, IAEA
Mr Sean Dunlop	IAEA
Mr Zia Shah	IAEA
Mr Abdelmadjid Cherf	International Expert
Mr Jiři Faltejsek	International Expert
Mr Matthew Van Sickle	International Expert
Mr Sorin Repanovici	International Expert
Mr Stephen Mortin	International Expert

PARTICIPANTS FROM THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA, 4–11 April 2022, Colombo, Sri Lanka			
No.	**INFRASTRUCTURE ISSUE**	**REPRESENTATIVE**	**RESPONSIBLE ORGANIZATION(S)**
1	**National Position** (4 April 2022)	Prof. S.R.D. Rosa, Chairman	Sri Lanka Atomic Energy Board (SLAEB)
		Mr. T. M. R. Tennakoon, Director General	
		Mr. Malinda Ranaweera, Head-PMU, Scientific Officer, International Cooperation Division	
		Mr. Anil Ranjith, Director General	Sri Lanka Atomic Energy Regulatory Council (SLAERC)
		Mr. M. R. M. Zabrin, Assistant Director, Power and Energy	National Planning Department
2	**Nuclear Safety** (5 April 2022)	Mr. Prasad Mahakumara, Director, Radiation Protection and Technical Services Division	SLAEB
		Dr. Viraj Edirisinghe, Director, Industrial Applications Division	
		Mr. Malinda Ranaweera, Head-PMU, Scientific Officer, International Cooperation Division	
		Mr. Kapila De Silva, Director	SLAERC
		Mr. Neel Fernando, Deputy Director	
4	**Funding and Financing** (6 April 2022)	Eng. (Mrs.) M. Dilini V. Fernando, Electrical Engineer, Generation Planning Unit	Ceylon Electricity Board (CEB)
		Mr. M.R.M Zabrin, Assistant Director, Power and Energy	National Planning Department
		Mr. Dileepa Assarapperuma Director, Finance Division	SLAEB
5	**Legal Framework** (4 April 2022)	Mr. Shantha Thenuwara, Director	SLAERC
		Mr. Neel Fernando, Deputy Director	
		Ms. Sakurani Wijerathne, Legal Officer	SLAEB
		Ms. Achini Wickramarathne, Legal Officer	CEB
		Ms. Hasini Opatha, State Counsellor	Attorney-General's Department
		Ms. Tilanie Silva, Deputy Legal Advisor, Legal Division	Ministry of Foreign Affairs
		Ms. Chalani Dayarathne, Legal Research Officer	
		Ms. Chathuri Kapuru Bandara, Assistant Director	Legal Draftsman's Department
		Ms. B.K.N. De Silva, Assistant Director	

		Eng. (Mr.) Chalith Pasindu, Assistant Director	Public Utilities Commission of Sri Lanka (PUCSL)
6	**Safeguards** (5 April 2022)	Mr. Kapila De Silva, Director	SLAERC
		Mr. Nirodha Ranasinghe, Scientific Officer, Radiation Protection and Technical Services Division	SLAEB
7	**Regulatory Framework** (4 April 2022)	Mr. Shantha Thenuwara, Director	SLAERC
		Mr. Neel Fernando, Deputy Director	
		Ms. Sakuarani Wijerathne, Legal Officer	SLAEB
		Ms. Achini Wickramarathne, Legal Officer	CEB
		Ms. Hasini Opatha, State Counsellor	Attorney-General's Department, Sri Lanka
		Ms. Chathuri Kapuru Bandara, Assistant Legal Draftsmen	Legal Draftsman's Department
		Eng. (Mr.) Chalith Pasindu, Assistant Director	PUCSL
		Mr. K. G. S. Jayawaradhana, Director, SEA Division	Central Environmental Authority (CEA)
		Ms. Namalie De Silva, Deputy Director, Environmental Impact Assessment (EIA) Division	
8	**Radiation Protection** (5 April 2022)	Mr. Prasad Mahakumara, Director, Radiation Protection and Technical Services Division	SLAEB
		Ms. Nirasha Rathnaweera, Deputy Director, Radiation Protection and Technical Services Division	
		Mr. Muditha Rathnayake, Scientific Officer, Radiation Protection and Technical Services Division	
		Mr. Kapila De Silva, Director	SLAERC
		Mr. Neel Fernando, Deputy Director	
9	**Electrical Grid** (7 April 2022)	Eng. Asith Kaushalya, Electrical Engineer, Generation Planning Unit	CEB
		Eng. Sampath Fonseka, Chief Engineer, Generation Development Studies	
		Eng. (Mr.) Chalith Pasindu, Assistant Director	PUCSL
10	**Human Resource Development** (6 April 2022)	Ms. Manel Chandrasekara, Director, Administration Division	SLAEB
		Mr. Malinda Ranaweera, Head-PMU, Scientific Officer, International Cooperation Division	
		Eng. Sampath Fonseka, Chief Engineer, Generation Development Studies	CEB

10	**Human Resource Development (cont.)** (6 April 2022)	Dr. Thushara Rathnayake, Senior Lecturer (PhD in Nuclear Engineering)	University of Moratuwa
		Dr. Chithral Ambawatte, Senior Lecturer	University of Ruhuna
		Dr. Manuja Lamabadusuriya, Head of Department	University of Colombo
11	**Stakeholder Involvement** (7 April 2022)	Mr. H.M.N.R. Bandara, Director, International Cooperation Division	SLAEB
		Mr. Malinda Ranaweera, Head-PMU, Scientific Officer, International Cooperation Division	
		Ms. Uththara Perera, Scientific Officer, Industrial Applications	
		Eng. Sampath Fonseka, Chief Engineer, Generation Development Studies	CEB
		Dr. Thushara Rathnayake, Senior Lecturer (PhD in Nuclear Engineering)	University of Moratuwa
		Dr. Chithral Ambawatte, Senior Lecturer	University of Ruhuna
		Dr. Manuja Lamabadusuriya, Head of Department	University of Colombo
12	**Site and Supporting Facilities** (5 April 2022)	Dr. Viraj Edirisinghe, Director, Industrial Applications Division	SLAEB
		Ms. Chathurangi Gunasekara, Scientific Officer, Industrial Applications Division	
		Ms. Shakila Priyadharshani, Scientific Officer, Industrial Applications Division	
		Ms. Uththara Perera, Scientific Officer, Industrial Applications Division	
		Ms. Nilmini Thaldena, Senior Geologist	Geological Survey and Mines Bureau (GSMB)
		Mr. K. G. S. Jayawaradhana, Director, SEA Division	CEA
		Ms. Namalie De Silva, Deputy Director, EIA Division	
		Dr. Deeptha Amarathunghe, Senior Scientist	National Aquatic Resources Research and Development Agency (NARA)
13	**Environmental Protection** (6 April 2022)	Mr. Prasad Mahakumara, Director, Radiation Protection and Technical Services Division	SLAEB
		Dr. Viraj Edirisinghe, Director, Industrial Applications Division	
		Ms. Chathurangi Gunasekara, Scientific Officer, Industrial Applications Division	
		Mr. Nirodha Ranasinghe, Scientific Officer, Radiation Protection and Technical Services Division	

13	**Environmental Protection (cont.)** (6 April 2022)	Ms. Nilmini Thaldena, Senior Geologist	GSMB
		Mr. K.G.S. Jayawaradhana, Director, SEA Division	CEA
		Ms. Namalie De Silva, Deputy Director, EIA Division	
		Dr. Deeptha Amarathunghe, Senior Scientist	NARA
14	**Emergency Planning** (6 April 2022)	Mr. Neel Fernando, Deputy Director	SLAERC
		Ms. Kaushalya Gamage, Scientific Officer	
		Mr. Prasad Mahakumara, Director, Radiation Protection and Technical Services Division	SLAEB
		Ms. Nirasha Rathnaweera, Deputy Director, Radiation Protection and Technical Services Division	
		Mr. Nirodha Ranasinghe, Scientific Officer, Radiation Protection and Technical Services Division	
15	**Nuclear Security** (5 April 2022)	Mr. Prasad Mahakumara, Director, Radiation Protection and Technical Services Division	SLAEB
		Ms. Nirasha Rathnaweera, Deputy Director, Radiation Protection and Technical Services Division	
		Mr. Nirodha Ranasinghe, Scientific Officer, Radiation Protection and Technical Services Division	
		Mr. Shantha Thenuwara, Director	SLAERC
		Mr. Neel Fernando, Deputy Director	
16	**Nuclear Fuel Cycle** (6 April 2022)	Mr. Malinda Ranaweera, Head-PMU, Scientific Officer, International Cooperation Division	SLAEB
		Mr. Nirodha Ranasinghe, Scientific Officer, Radiation Protection and Technical Services Division	
		Mr. Muditha Rathnayake, Scientific Officer, Radiation Protection and Technical Services Division	
17	**Radioactive Waste Management** (6 April 2022)	Mr. Prasad Mahakumara, Director, Radiation Protection and Technical Services Division	SLAEB
		Ms. Nirasha Rathnaweera, Deputy Director, Radiation Protection and Technical Services Division	

17	**Radioactive Waste Management (cont.)** (6 April 2022)	Mr. Nirodha Ranasinghe, Scientific Officer, Radiation Protection and Technical Services Division	SLAEB
		Mr. Muditha Rathnayake, Scientific Officer, Radiation Protection and Technical Services Division	
		Mr. Kapila De Silva, Director	SLAERC
18	**Industrial Involvement** (7 April 2022)	Mr. Chandana Senevirathne, Deputy Director, National Centre for Non-Destructive Testing (NCNDT)	SLAEB
		Ms. Buddhi Weerasinghe, Scientific Officer, NCNDT	
		Mr. B.A.K.W.L. Piyarathna, Director, Sector Development	Ministry of Industries
		Mr. Rizwan Mohammed, Deputy Director, Sector Development	Ministry of Industries
19	**Procurement** (5 April 2022)	Mr. M. R. M. Zabrin, Assistant Director, Power and Energy	National Planning Department
		Eng. (Mrs.) M. Dilini V. Fernando, Electrical Engineer, Generation Planning Unit	CEB
		Mr. Dileepa Assarapperuma, Director, Finance Division	SLAEB

APPENDIX 3: REFERENCES

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APPENDIX 4: ABBREVIATIONS

ALARA	As Low As (is) Reasonably Achievable
AP	Additional Protocol
BOOT	Build-own-operate-transfer
BOQ	Bill of quantity
BSc	Bachelor of Science
CBRN	Chemical Biological Radiological and Nuclear
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
COPA	Committee of Public Accounts
CPPNM	Convention on the Physical Protection of Nuclear Material
CPC/TEC	Consultancy Procurement/Technical Evaluation Committee
CSC	Convention on Supplementary Compensation for Nuclear Damage
DMC	Disaster Management Centre
EIA	Environmental impact assessment
EMP	Emergency Management Plan
EPL	Environmental Protection License
EPR	Emergency Preparedness and Response
GSMB	Geological Survey and Mines Bureau
GMS	Global Material Security (United States Department of Energy's programme)
HVDC	High-voltage, direct current electric power transmission system
IAEA	International Atomic Energy Agency
INIR	Integrated Nuclear Infrastructure Review
INSSP	Integrated Nuclear Security Support Plan
ISC	International Seismological Centre
LTGEP	Long-Term Generation Expansion Plan

LTTDP	Long Term Transmission Development Plan
MoU	Memorandum of Understanding
MSc	Master of Science
NARA	National Aquatic Resources Research and Development Agency
NBRO	National Building Research Organization
NCNDT	National Centre for Non-Destructive Testing, Sri Lanka
NEC	National Emergency Coordinator
NEPIO	Nuclear Energy Programme Implementing Organization
NPP	Nuclear power plant
NVQ	National Vocational Qualification
PMU	Project Management Unit
PPA	Power purchase agreement
PUCSL	Public Utilities Commission of Sri Lanka
R&D	Research and Development
RPO	Radiation Protection Officer
SF	Spent Fuel
SER	Self-evaluation report
SLAEB	Sri Lanka Atomic Energy Board
SLAERC	Sri Lanka Atomic Energy Regulatory Council
SMR	Small modular reactor
SSAC	State system of accounting for and control of nuclear material
SSDL	Secondary Standard Dosimetry Laboratory
TAC	Technical Advisory Committee
TSO	Technical support organization
TVET	Technical and Vocational Education and Training
USGS	United States Geological Survey
YNSS	Youth Nuclear Society of Sri Lanka