IAEA Nuclear Energy Series

No. NG-T-3.6 (Rev. 1)

Responsibilities and Functions of a Nuclear Energy Programme Implementing Organization

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FOREWORD

One of the IAEA's statutory objectives is to "seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world." One way this objective is achieved is through the publication of a range of technical series. Two of these are the IAEA Nuclear Energy Series and the IAEA Safety Standards Series.

According to Article III.A.6 of the IAEA Statute, the safety standards establish "standards of safety for protection of health and minimization of danger to life and property". The safety standards include the Safety Fundamentals, Safety Requirements and Safety Guides. These standards are written primarily in a regulatory style, and are binding on the IAEA for its own programmes. The principal users are the regulatory bodies in Member States and other national authorities.

The IAEA Nuclear Energy Series comprises reports designed to encourage and assist R&D on, and application of, nuclear energy for peaceful uses. This includes practical examples to be used by owners and operators of utilities in Member States, implementing organizations, academia, and government officials, among others. This information is presented in guides, reports on technology status and advances, and best practices for peaceful uses of nuclear energy based on inputs from international experts. The IAEA Nuclear Energy Series complements the IAEA Safety Standards Series.

An appropriate infrastructure is essential for the safe, secure, peaceful and sustainable use of nuclear power. Member States considering the introduction of nuclear power face the challenge of building the necessary infrastructure for the first nuclear power plant. The IAEA supports these Member States through increased technical assistance, missions and workshops, and with new and updated technical publications.

IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones in the Development of a National Infrastructure for Nuclear Power, first issued in 2007 and updated in 2015, divides the introduction of nuclear power into three phases and defines three milestones, each of which corresponds to the end of a phase. It provides detailed guidance for each phase and milestone for 19 infrastructure issues, ranging from a government's national position on nuclear power to the procurement of items and services for the first nuclear power plant. The guidance provided in this publication is referred to as the Milestones approach.

An important element of the Milestones approach is a mechanism to coordinate efforts among the many organizations and individuals who have roles to play in considering and developing a nuclear power programme. This mechanism is referred to as a nuclear energy programme implementing organization (NEPIO).

As more Member States started to consider nuclear power, they requested more detailed guidance from the IAEA, including additional information on how to establish a NEPIO, especially in the earliest phases of a programme. The original version of this publication was prepared in 2009 to provide information on the responsibilities and required capabilities of a NEPIO, as well as to give an indication of how it relates to the other key national organizations in the implementation of a nuclear power programme, such as the owner/operator and the regulator, and how its functions change over the course of the three phases.

This revision incorporates lessons learned from Integrated Nuclear Infrastructure Review (INIR) missions and IAEA technical assistance activities. In a number of embarking countries, the NEPIO's responsibilities and functions are discharged effectively by interagency policy committees rather than a stand-alone organization. This revision attempts to clarify that there are many ways to structure a NEPIO and that each could result in the successful execution of all functions and activities. Several case studies are included to provide examples. In addition to describing a NEPIO's responsibilities and functions, this revision describes the specific activities NEPIOs may carry out in relation to each of the 19 infrastructure issues during each phase of development. Consistent with the revision of the Milestones guide published in 2015, this publication recognizes that the NEPIO plays an important and evolving role in each of the three phases of nuclear power infrastructure development.

The preparation of this publication was based on contributions from both IAEA staff and external experts. The IAEA wishes to acknowledge the assistance provided by the contributors listed at the end of the publication. The IAEA officer responsible for this publication was S. Dunlop of the Division of Nuclear Power.

EDITORIAL NOTE

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CONTENTS

1. INTRODUCTION

1.1. BACKGROUND

Developing a nuclear power programme is a major undertaking requiring a long term commitment. Simply building a nuclear power plant (NPP) is insufficient to ensure that it will operate effectively and sustainably and meet safety, security and safeguards requirements. The necessary institutional, human and physical infrastructure to license, construct, operate and regulate an NPP must first be built. A demonstrated government commitment to the development and maintenance of such infrastructure sends an important signal to stakeholders and potential project investors and reduces construction and operational risk.

A successful NPP project requires a nuclear power programme to establish this infrastructure. IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones in the Development of a National Infrastructure for Nuclear Power [1] (hereafter referred to as the IAEA Milestones guide), distinguishes between a nuclear power programme and an NPP project. The programme includes one or more NPP projects, possible related projects such as uranium exploration or fuel fabrication, and the supporting infrastructure. As a new nuclear power programme develops, many specific activities will be undertaken to implement the first NPP project. The infrastructure establishes the processes and capabilities to enable all project activities and the subsequent operation of the NPP.

Three key organizations are involved: the government, the owner/operator of the NPP and the regulatory body[1]. Each has a specific role to play, with responsibilities that evolve as the programme advances.

The three phases in the Milestones approach are:

— Phase 1: Considerations before a decision to launch a nuclear power programme is taken.
— Phase 2: Preparatory work for the contracting and construction of an NPP after a policy decision has been taken.
— Phase 3: Activities to implement the first NPP.

The three milestones are:

— Milestone 1: Ready to make a knowledgeable commitment to a nuclear power programme.
— Milestone 2: Ready to invite bids/negotiate a contract for the first NPP.
— Milestone 3: Ready to commission and operate the first NPP.

Figure 1 is a schematic representation of the phases and milestones. The 19 infrastructure issues that need to be addressed in each phase are the following:

(1) National position;
(2) Nuclear safety;
(3) Management;
(4) Funding and financing;
(5) Legal framework;
(6) Safeguards;
(7) Regulatory framework;
(8) Radiation protection;
(9) Electrical grid;
(10) Human resources development;
(11) Stakeholder involvement;
(12) Site and supporting facilities;
(13) Environmental protection;
(14) Emergency planning;

[1] There may be more than one regulatory body. For example, there may be one for nuclear safety and another for nuclear security. Thus, statements in this publication about ‘the regulatory body’ should generally be read as ‘the regulatory body or bodies’.

(15) Nuclear security;
(16) Nuclear fuel cycle;
(17) Radioactive waste management;
(18) Industrial involvement;
(19) Procurement.

An important element of the Milestones approach is a mechanism to coordinate efforts among the many organizations and individuals with roles in considering and developing a nuclear power programme. This mechanism is referred to as a nuclear energy programme implementing organization (NEPIO). This designation is used for illustrative purposes only. The State may organize coordination in the manner most appropriate to its own customs and needs, and each State will have to determine for itself the level of responsibility assigned to a NEPIO. This publication describes a set of NEPIO responsibilities, functions and activities that States can use as guidance. It is based on IAEA guidance publications and documents, as well as the experience and good practices of States that are introducing nuclear power or have NPPs in operation.

Responsibilities, leadership and oversight functions, as well as organizational, technical, legal and communication capabilities, are vital to the ultimate success of a nuclear power programme. The government should ensure that its NEPIO has competent human resources and sufficient funding to carry out its mission. If a knowledgeable commitment is made to proceed with a nuclear power programme, specific areas of responsibility may shift from a NEPIO to other organizations that either exist or will be established, such as the regulatory body and the owner/operator. Such transitions must be carefully considered and prepared to ensure the proper transfer of information and knowledge.

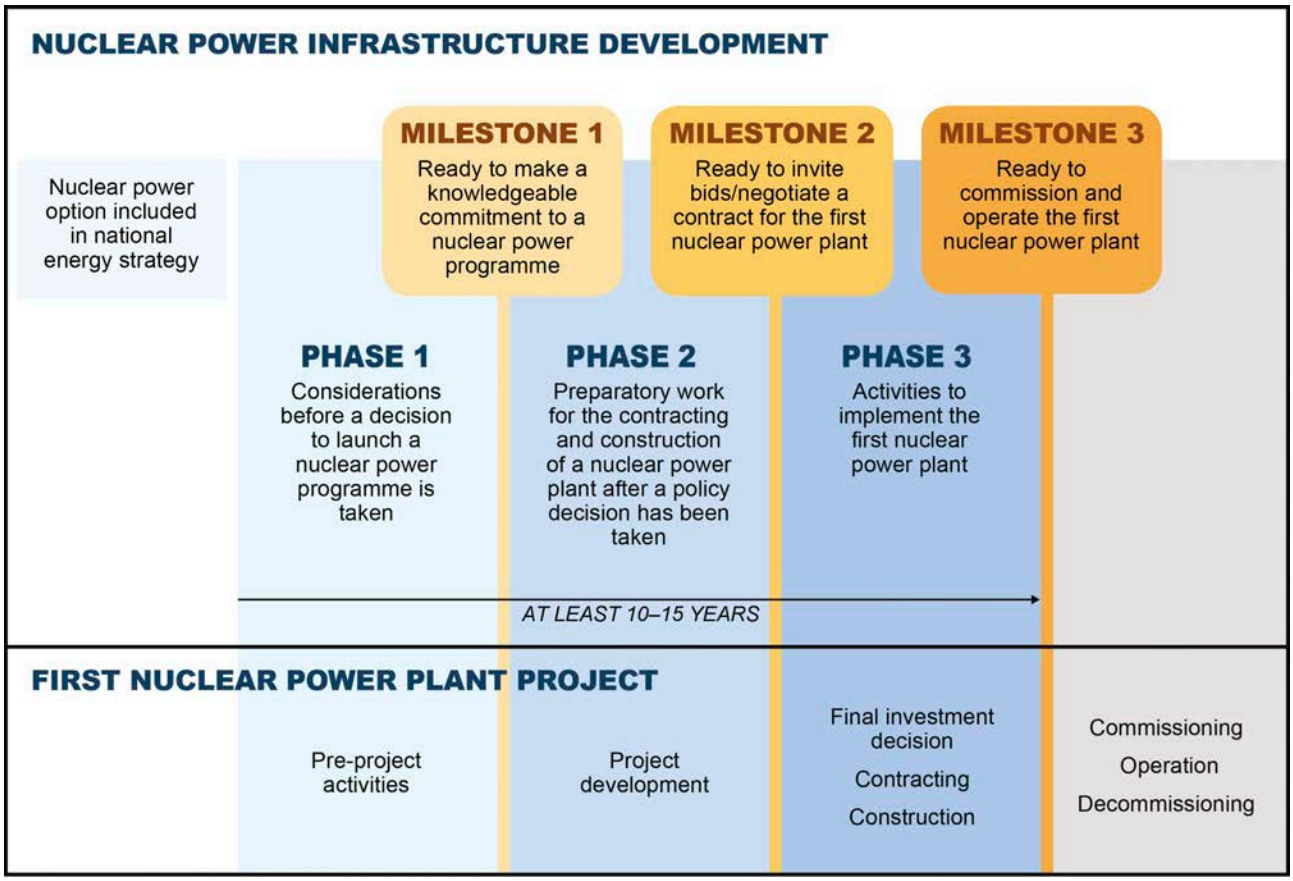

FIG. 1. Development of the infrastructure for a national nuclear power programme.

1.2. OBJECTIVE

This publication describes the responsibilities and functions of a NEPIO based on the IAEA Milestones approach. It is intended as guidance to Member States introducing nuclear power. As examples, it includes case studies describing NEPIO structures in several embarking States. There are differences among the structures, but the responsibilities and functions of the different NEPIOs are largely the same.

1.3. SCOPE

The publication covers the responsibilities, functions and activities that can help a NEPIO successfully plan, coordinate and oversee the organizations involved in introducing nuclear power. The information provided here, which describes good practices, represents expert opinion but does not constitute recommendations made on the basis of a consensus of Member States.

1.4. USERS

This publication is for senior managers and advisers from the government, utilities, industries and regulatory bodies of a Member State involved in launching or expanding nuclear power. It will be of primary interest to the government and the NEPIO.

1.5. STRUCTURE

Following this introduction, Section 2 discusses the government commitment and the authority necessary for a NEPIO to fulfil its responsibilities. Section 3 describes a NEPIO's overall responsibilities and functions in each of the three phases of the Milestones approach. Section 4 describes the necessary capabilities of a NEPIO, as well as possible ways to structure it. Appendices I–III include tables describing the functions and activities of a NEPIO in each phase for each of the 19 infrastructure issues. Case studies describing the NEPIO in five States in various phases of the Milestones approach are included in Annexes I–V.

2. GOVERNMENT COMMITMENT AND THE ESTABLISHMENT OR DESIGNATION OF A NEPIO

At the beginning of Phase 1, it is assumed that a State has determined that it needs additional energy and is considering nuclear power as a possible option to meet some of these needs. The government should establish a NEPIO or designate an existing entity to function as the NEPIO, with responsibility for coordinating the work of all the organizations involved in the different phases of the Milestones approach. In many embarking States, the NEPIO includes a high level policy making mechanism as well as a working level mechanism coordinating and carrying out day to day activities.

The NEPIO's success will depend on the strength of the government's commitment and its continuous support. The establishment of the NEPIO should come from a high level authority in the government to make the strength of the commitment clear. The NEPIO should be clearly charged with its responsibilities and granted commensurate authority. It should have access to the expertise needed to fulfil all assigned functions and responsibilities. To this end, the NEPIO should have the authority to enlist the participation of other government organizations and to employ consultants and advisers as necessary. It is recommended that it have the authority to engage all relevant stakeholders and international organizations, such as the IAEA. Regular reporting to senior government officials is also encouraged to maintain a strong government commitment.

The government may issue formal terms of reference stating the NEPIO's authority and responsibilities. These terms of reference should call for a comprehensive review of all 19 infrastructure issues required to enable the government to make and maintain a knowledgeable commitment to a nuclear power programme. All relevant stakeholders, including the country's major utilities; the regulatory body or bodies for security, radiation safety and environmental protection; other relevant government agencies; legislative representatives and other decision makers should be included in the work of the NEPIO. The NEPIO's role in the nuclear power programme should be recognized by all relevant ministries. A critical part of the government's commitment is to ensure that the NEPIO has the human and financial resources necessary to execute all the functions established in its terms of reference.

An official announcement of the establishment of the organization or mechanism functioning as a NEPIO should be made so that all interested parties understand the government's objective and the NEPIO's identity, responsibilities and authority. This announcement might include the government's reasons for exploring nuclear power. It should emphasize that interested stakeholders will be consulted and involved at appropriate times.

3. RESPONSIBILITIES AND FUNCTIONS OF A NEPIO IN EACH PHASE OF NUCLEAR POWER INFRASTRUCTURE DEVELOPMENT

The NEPIO is responsible for leading and managing a coordinated effort involving all important parties for the consideration and subsequent development of a national nuclear power programme. In Phase 1, the NEPIO's principal responsibility is to coordinate the preparation of the studies and compile the information necessary for the government to make a knowledgeable commitment to proceed with the development of a nuclear power programme. If the government decides to proceed, the NEPIO's principal responsibility in Phase 2 is to coordinate and monitor the development of the necessary infrastructure among the various responsible parties — for example, government ministries, regulators and the designated owner/operator — to bring the country to a point of readiness to issue a bid or negotiate a contract for the first NPP project. In Phase 3, the NEPIO, with representation from the owner/operator, the regulatory body and the specific agency now responsible for the government's role in the nuclear power programme, ensures the overall development of the infrastructure to sustainably implement the national strategy.

3.1. RESPONSIBILITIES AND FUNCTIONS OF A NEPIO IN PHASE 1

During Phase 1 of nuclear power infrastructure development, the NEPIO should be the lead organization guiding the country to Milestone 1, where the State will be in a position to make a knowledgeable commitment to a nuclear power programme. The NEPIO has an important responsibility to identify the obligations and activities necessary to implement an effective, safe, secure and peaceful nuclear power programme. This requires the NEPIO to ensure overall coordination and the engagement of all important stakeholders.

The main responsibilities of a NEPIO in Phase 1 are as follows:

— Identify the expertise needed to fulfil all functions and responsibilities assigned to the NEPIO (see Section 4.1) and identify where, how, when and under what conditions such expertise can be obtained;
— Establish working groups to coordinate the preparation of pre-feasibility studies evaluating various aspects of introducing nuclear power (many States assign working groups responsibility for a cluster of issues; see Annexes I–V for examples);
— Prepare a strategy and plan for stakeholder involvement, including public communication, and implement the plan in consultation with the relevant agencies, opinion leaders and key stakeholder groups;
— Prepare a notional schedule and timeline for the development of the national infrastructure for nuclear power and implementation of the first nuclear power project (some States refer to this document as a roadmap);

— Prepare a comprehensive report defining and justifying a national strategy for nuclear power that includes an assessment of the national capacity related to each of the 19 infrastructure issues and a plan to guide the implementation of the programme;
— Coordinate a self-evaluation of the status of national nuclear power infrastructure development.

By the end of Phase 1, a NEPIO should have carefully considered each of the 19 issues identified in the IAEA Milestones guide [1] and produced a comprehensive report clearly delineating the commitments and processes necessary to undertake a nuclear power programme. This comprehensive report should be backed up by the pre-feasibility studies for these issues. Additional guidance regarding the preparation of a comprehensive report is provided by IAEA Nuclear Energy Series No. NG-T-3.14, Building a National Position for a New Nuclear Power Programme [2], and IAEA Nuclear Energy Series No. NG-T-3.2 (Rev. 1), Evaluation of the Status of National Nuclear Infrastructure Development (see condition 1.3) [3], as well as the Milestones guide [1] (see section 3.1.1).

The time frame for completing Phase 1 will depend on the expertise available to the NEPIO and the resources provided.

The comprehensive report may recommend policies to be adopted or developed by the government and strategies to implement them. During the development of these strategies, the required funding should be estimated and a schedule for implementation considered. It is the responsibility of the NEPIO by the end of Phase 1 to ensure that the status of each of the 19 infrastructure issues matches the conditions for Milestone 1 described in Ref. [3].

The NEPIO functions and activities in Phase 1 relating to each nuclear power infrastructure issue are described in Appendix I.

The outputs of all NEPIO activities should be well documented. Potential strategies need to be developed for most infrastructure issues in Phase 1. Following a government decision to proceed with a nuclear power programme, these strategies could form the basis for the development of detailed action plans in Phase 2.

3.2. RESPONSIBILITIES AND FUNCTIONS OF A NEPIO IN PHASE 2

During Phase 2, following a policy decision to proceed with the development of a nuclear power programme, substantive work towards achieving the necessary level of technical and institutional competence should be undertaken by all relevant organizations. This phase requires a significant continuing commitment from the government. The State should put in place all legislation that might affect the nuclear power programme. An effectively independent regulatory body should be developed to a level at which it can fulfil the necessary authorization and inspection duties in line with the time frame of the project. The owner/operator should be designated in Phase 2. The NEPIO should coordinate and drive the work of all organizations to implement the approved action plans for the nuclear power programme.

The main responsibilities of a NEPIO in Phase 2 are as follows:

— Oversee the development of the national infrastructure for nuclear power;
— Coordinate the development and implementation of policies and action plans for the nuclear power programme;
— Support the establishment of a legal and regulatory framework;
— Support the implementation of a plan to align national educational and vocational programmes with the human resource needs of the nuclear power programme;
— Continue to implement and maintain the stakeholder involvement plan initiated in Phase 1;
— Conduct activities related to the first NPP project until the regulatory body and owner/operator are created/designated, and then ensure that relevant NEPIO knowledge is transferred to them and that they develop the necessary competences;
— Coordinate a self-evaluation of the status of national nuclear power infrastructure development.

In this phase the country will develop the national infrastructure for nuclear power to the point of complete readiness to invite bids and negotiate a commercial contract between the NPP owner/operator and the NPP supplier and/or engineering, procurement and construction contractor. As described in the IAEA Milestones guide [1], during Phase 2 the NEPIO ensures that the approved programme's policies and strategies are translated into a firm

action plan that is consistent with the project schedule and covers each of the 19 infrastructure issues. The NEPIO should ensure that corresponding responsibilities are assigned to the organizations that will become permanent parts of the overall infrastructure.

In this phase the NEPIO should:

— Maintain momentum and provide a continuing forum for communication and cooperation among the involved organizations (e.g. the NPP owner/operator, the grid operator, the regulatory body, emergency response organizations, other relevant government agencies, legislators and other decision makers);
— Ensure that the roles of the key organizations (i.e. the government, regulatory body and NPP owner/operator) are well defined and understood by all stakeholders;
— Ensure that the key organizations develop in line with the NPP project schedule;
— Ensure that the rationale for the national decision to introduce nuclear power is well understood by all stakeholders;
— Ensure that the contracting approach and technical specifications remain consistent with the State's nuclear power development strategy.

The NEPIO functions and activities in Phase 2 for each nuclear power infrastructure issue are described in Appendix II.

By the time the country reaches Milestone 2, the functions and activities for many aspects of the nuclear power programme may have been assigned to key organizations (i.e. the NPP owner/operator and regulatory body) or other institutions within the country. The NEPIO, as a coordinating mechanism, should include representatives from the key organizations and other involved governmental institutions and oversee the development of the nuclear power infrastructure.

3.3. RESPONSIBILITIES AND FUNCTIONS OF A NEPIO IN PHASE 3

During Phase 3 the NEPIO — with representation from the NPP owner/operator, the regulatory body and other institutions, such as the national emergency response and waste management organizations — should ensure the overall coordination of nuclear power infrastructure development to meet the national strategy. Specific areas requiring coordination are listed on page 14 of the IAEA Milestones guide [1].

The main responsibilities of a NEPIO in Phase 3 are as follows:

— Continue to oversee the development of the national infrastructure for nuclear power, ensuring that any remaining gaps are addressed;
— Oversee the implementation of the policies and strategies developed in Phases 1 and 2, including those for stakeholder and industrial involvement;
— Manage knowledge gained during the development of the national infrastructure for nuclear power to ensure that knowledge is available to support the next nuclear power project, regardless of the amount of time that may elapse;
— Support the development and implementation of programmes to ensure the long term sustainability of the nuclear power programme, such as the development of national technical support organizations (TSOs) for the owner/operator and regulatory body or a research and development programme;
— Coordinate a self-evaluation of the status of national nuclear power infrastructure development.

Much of the work on nuclear power infrastructure development should be well advanced at this stage. Having successfully completed this phase, the State will have established a national nuclear infrastructure that is capable of delivering the energy security and economic development that were envisioned in the national decision.

The NEPIO functions and activities in Phase 3 for each nuclear power infrastructure issue are described in Appendix III. In order to implement the functions, the NEPIO will perform specific activities related to leading/coordination, assessment, verification and review.

4. CAPABILITIES AND POSSIBLE STRUCTURES OF A NEPIO

4.1. NEPIO CAPABILITIES

To successfully accomplish its responsibilities, a NEPIO must fully understand all 19 infrastructure issues. As the programme consideration and development proceed through Phases 1, 2 and 3, the role and the NEPIO's functions and activities are likely to evolve, as described in Section 3. These changes would reflect a shift from studies and planning in Phase 1 to the coordination of all aspects of infrastructure development with the project schedule in Phases 2 and 3, along with the progressive shift of some responsibilities from the NEPIO to implementing organizations.

Many of the NEPIO's capabilities may come from staff within government agencies or other organizations. This could be achieved through secondment or through some other arrangement. As the nuclear power programme advances, NEPIO staff may also rotate into implementing organizations, taking with them personal networks and perspectives fostered in the NEPIO. Consultants and other experts should be used as necessary where domestic expertise is unavailable and impractical to develop for one-time use. However, the leadership should remain with national authorities, and the NEPIO should be capable of evaluating outside work.

The NEPIO's leadership should be well acquainted with the national culture, the government structure, the country's current industrial and economic status and its economic development goals. It should have a general knowledge of the legal and technical aspects of nuclear power and the ability to build trust and respect for its work from the government, industry and the public.

The NEPIO should be knowledgeable about all 19 infrastructure issues, either because its members have personal knowledge of them or because it engages the necessary consultants. Ideally, where there is expertise within government and other national organizations, those experts will support the work of the NEPIO.

For legal and regulatory issues, the NEPIO needs expertise in the State's legislative process and the structure of government ministries. To recommend policies and strategies for a comprehensive legal and regulatory framework, the NEPIO should consult with national regulators for radiation safety, security and emergency response; foreign regulators; and relevant international organizations. Its recommendations should take international legal instruments and IAEA safety standards into account.

The NEPIO personnel responsible for national grid and NPP planning (including finance) should be familiar with the country's energy systems, the available funding and financing avenues, government funding mechanisms for infrastructure development and support, the technical requirements for the grid and the national industries that might participate in the nuclear power programme. They should know about any expected expansion of the grid and about grid stability and reliability. Possible sources for such expertise include the utilities, grid operators and electricity regulators. Consultants can fill gaps where local expertise may not be available.

The NEPIO personnel responsible for stakeholder involvement must understand the national culture. While consultants may bring expertise in developing a public information programme and carrying out surveys, they need guidance that reflects a deep knowledge of the country and its people.

The NEPIO personnel responsible for human resource development should include educational professionals who are familiar with the needs for general engineering, technical and trade specialties. They should know the universities and training academies in the country. Consultants can be employed as needed to identify special educational objectives for nuclear technology and address educational opportunities at foreign universities or institutions.

The NEPIO must be able to understand the reactor technology and nuclear fuel cycle options that are available from nuclear vendors. It must also have specialized knowledge about NPP site requirements. Consultants from nuclear vendors or architect–engineering companies can be used while indigenous expertise is being developed.

The NEPIO's working groups must have expertise in the development of specific policies and strategies. The use of consultants to help understand and support the development of policies is encouraged, as needed. In choosing consultants, programmatic implementation experience should be considered in addition to technical expertise.

In Phase 2, the NEPIO will ensure that the approved programme policies and strategies are translated into firm action plans for each of the 19 infrastructure issues and that corresponding responsibilities are assigned to the organizations that will become permanent parts of the overall infrastructure. The NEPIO must therefore have the capability to develop such action plans itself or prompt their successful development by appropriate government agencies or other organizations. Specialized consultants will probably be needed for some of the 19 issues.

The other key capabilities for Phase 2 are the ability to coordinate progress on all 19 infrastructure issues and the ability to make an informed assessment at the end of the phase that the country is ready to either invite bids for its first NPP or begin negotiating a specific contract with a previously designated NPP supplier. Coordination requires people with the appropriate skills who are also granted the necessary authority and resources. Making an informed assessment requires expertise, or access to expertise, that can judge a country's readiness. Some of the expertise can come from the NEPIO and the national organizations it engages, and some can come from outside consultants and international organizations.

In Phase 3, the NEPIO's responsibility is to ensure the overall development of the infrastructure to meet the national strategy, with particular attention to the areas listed in Section 3. As in Phase 2, fulfilling this responsibility requires the expertise to evaluate progress and the necessary skills, authority and resources to effect coordination and continuing progress.

4.2. POSSIBLE NEPIO STRUCTURES

There are many ways to structure a successful NEPIO. What is important is that the NEPIO be capable of addressing each of the 19 issues and coordinating all of the stakeholders to move the programme forward. The case studies in the annexes show how five embarking Member States structured their NEPIOs.

In some countries the NEPIO is an organization that is appointed by the government, with its own staff and budget. In other cases, the NEPIO is a committee whose staff and budget have been borrowed from other organizations in the State. In all cases, the NEPIO should include a high level interagency decision making mechanism to ensure that its recommendations to the government have strong and broad support.

In Phase 1, the NEPIO may consider establishing working groups for the 19 infrastructure issues. For efficiency and coordination, many States group some of the 19 issues into clusters of related issues. As emphasized earlier, the NEPIO should be structured to include representatives from all relevant ministries and organizations, including the country's major utilities, the regulatory body for security and radiation safety, other relevant government agencies, legislative representatives and other decision makers.

As the country proceeds through Phases 2 and 3, the structure of the NEPIO may evolve. Many NEPIO staff members may move into positions of responsibility in other organizations. For example, with the establishment or expansion of the State's nuclear regulatory body, the NEPIO's role may evolve to that of monitoring progress rather than establishing regulatory policy. Similarly, the NPP owner/operator will assume responsibility for many of the actions leading to Milestone 2 and the implementation of an NPP project, while the NEPIO will monitor progress, provide a mechanism for coordination and lead as needed. The NEPIO's structure should be flexible enough to accommodate the transfer of some responsibility from the NEPIO to other organizations.

Appendix I

FUNCTIONS AND ACTIVITIES OF A NEPIO IN PHASE 1

Issue	NEPIO functions	NEPIO activities
1. National position	Ensure engagement, communication and cooperation among all relevant stakeholders	— Involve relevant stakeholders in identifying the information that needs to be assembled and the preliminary studies that need to be performed before the comprehensive report is written. Involve them in planning the NEPIO's work, assigning tasks and maintaining coordination.
	Coordinate the preparation of the studies and compile the information necessary for the government to make a knowledgeable commitment to a nuclear power programme	— Ensure that the studies are comprehensive and consistent. — Prepare a comprehensive report to be the basis for the government's decision about whether to proceed to Phase 2. If the NEPIO recommends proceeding, the report should define and justify a national strategy for nuclear power. — Prepare a clear statement to be adopted by the government expressing its commitment to safety, security and non-proliferation.
2. Nuclear safety	Develop relevant stakeholders' understanding of the importance of committing to participate in the global nuclear safety regime	— Ensure that the Phase 1 studies and comprehensive report take into account the items in section 3.2.1 of the Milestones guide [1] concerning safety standards, safety responsibility, the legal and regulatory framework, leadership, decommissioning and waste, accidents, emergencies and siting; — Ensure that the comprehensive report addresses the importance of safety and security culture in key organizations; — Study other States' practices; — Review options for bilateral or regional cooperation, especially with States with established nuclear power programmes.
3. Management	Develop relevant stakeholders' understanding of the importance of organizational leadership and management systems	— Ensure decision makers understand the need for a commitment to leadership and management systems that will promote a safety and security culture; — Understand the role and obligations of the future owner/operator with respect to planning, procuring, licensing, constructing and operating an NPP; — Ensure that knowledge gained during Phase 1 is shared with the future regulatory body and owner/operator; — Interact with the IAEA and other relevant organizations.
4. Funding and financing	Identify funding needs for infrastructure development	— Identify the areas of infrastructure development that will require funding; — Identify funding sources based on consideration of the options.
	Identify potential options for NPP financing	— Carry out a review of financing and risk management options, considering the long term economics and risks associated with the NPP and including the extent of government funding, equity partners, borrowing, etc.; — Organize meetings with relevant governmental institutions to discuss options and obtain feedback.

Issue	NEPIO functions	NEPIO activities
5. Legal framework	Develop relevant stakeholders' understanding of the need to implement international legal instruments and enact a comprehensive nuclear law	— Identify relevant international legal instruments; — Organize meetings with the appropriate governmental institutions to explain the need for a national legal framework for the nuclear power programme; — Engage the IAEA and other relevant organizations; — Prepare a plan that includes actions, responsibilities and timescales for enacting a comprehensive nuclear law and adhering to all relevant international legal instruments; — Ensure that the need for an independent nuclear regulatory body with adequate human and financial resources and a clear and comprehensive set of functions is understood by the relevant governmental institutions.
	Develop relevant stakeholders' understanding of the need to enact legislation and/or amend existing legislation affecting the nuclear power programme	— Identify national legislation that could affect the nuclear power programme, including in the areas of environmental protection, emergency preparedness and response, occupational health and safety of workers, protection of intellectual property, local land use controls, foreign investment, taxation, fees, electricity tariffs and incentives, the roles of national and local governments, stakeholders and public involvement, international trade and customs, financial guarantees and any other area of finance, and research and development; — Develop a plan with actions, responsibilities and timescales for enacting and/or amending legislation as necessary; — Interact with the IAEA and other relevant organizations.
6. Safeguards	Identify the additional efforts related to safeguards that will be needed with the introduction of nuclear power	— Ensure that the NEPIO includes a representative who is knowledgeable regarding the obligations of the State's international safeguards agreement; — Develop a plan with the actions, responsibilities and timescales necessary for enhancing the existing national infrastructure for safeguards; — Ensure that the plan covers the implementation of national legislation, policies and procedures relevant to safeguards; — Include in the plan outreach activities to ensure all existing and future entities having to report to the State authority for safeguards implementation are aware of their roles and obligations.
7. Regulatory framework	Develop relevant stakeholders' understanding of the need to establish an appropriate regulatory framework	— Coordinate discussions on the need to establish an appropriate regulatory framework with relevant governmental institutions; — Identify prospective senior managers for the regulatory body and involve them in the plan preparation; — Identify possible approaches for licensing and regulating the first NPP project; — Develop a phased plan for developing the regulatory body and issuing regulations; — Interact with the IAEA and other relevant organizations.
8. Radiation protection	Plan enhancements to existing radiation protection infrastructure	— Prepare a report describing the additional hazards presented by NPP operation over and above those posed by medical, industrial and research applications of ionizing radiation; — Identify necessary enhancements to existing radiation protection infrastructure.

Issue	NEPIO functions	NEPIO activities
9. Electrical grid	Assess the capability and reliability of the electrical grid in view of NPP technical requirements	— Bring together all the grid stakeholders, including the grid operator(s), electricity regulators, and generation, transmission and distribution utilities; — Prepare a report on the status and capability of the current grid, the historical reliability of the grid, projected growth and available NPP technologies, and potential sites and their impact on the grid; — Evaluate the potential for and feasibility of local or regional grid interconnections.
10. Human resources development	Perform a gap analysis for human resource needs and develop a national plan	— Identify the full range of scientific, technical, managerial and administrative disciplines that will be needed and assess their availability within the country; — Assess the domestic and foreign capacity for educating and training the people who will be needed; — Identify specialized recruiting and training that will be needed in nuclear safety, nuclear security, safeguards, radiation protection and management systems; — Assess the domestic and foreign availability of specialized training; — Assess the domestic research capabilities that may need to be developed; — Outline plans to either develop or import the human resources needed by both the owner/operator and the regulatory body in order to implement the nuclear power programme; — Align human resource development plans with the State's policy on industrial involvement; — Interact with the IAEA and other relevant organizations.
11. Stakeholder involvement	Prepare and implement an open and transparent stakeholder involvement strategy and plan	— Understand the importance of gaining and keeping the confidence of the public and the international community by maintaining open and timely interaction regarding all aspects of the nuclear power programme; — Secure a clear government mandate to engage with all relevant stakeholders; — Ensure a professional communications team is available to the NEPIO; — Conduct surveys to establish a baseline of the public's knowledge of and receptiveness to nuclear power; — Develop appropriate public information tools that address key issues and identified concerns; — Explain the government's interest in nuclear power, the potential benefits and risks, and how the government will ensure safety, security and non-proliferation; — Develop and begin implementing a plan of interaction with all stakeholders, including neighbouring countries. — Train senior staff to interact with stakeholders.
12. Site and supporting facilities	Survey potential sites and identify candidate sites	— Prepare a report on safety and security criteria for initial NPP site selection, national criteria (e.g. socioeconomic and environmental), and engineering and cost criteria; — Issue an assessment report for regional analysis and the identification of potential sites; screen potential sites and select candidate sites; — Ensure that the staff responsible for NPP site selection are competent and have suitable experience; — Develop plans for the work that will be required in Phase 2 to select and justify the site; — Ensure that site survey activities are systematically documented for use by future organizations.

Issue	NEPIO functions	NEPIO activities
13. Environmental protection	Consider environmental requirements related to the siting of an NPP	— Prepare a report outlining 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. — Interact with specialists in countries operating NPPs.
	Review the national framework for environmental protection	— Prepare a report regarding the suitability of the State's existing framework for environmental protection and meeting international obligations; — Develop basic elements of a procedure for the elaboration, reporting and assessment of environmental studies for an NPP and related facilities, including standardized content.
14. Emergency planning	Assess the State's current emergency preparedness and response (EPR) arrangements in relation to the nuclear power programme	— Identify the main organizations that will need to be involved in establishing national EPR arrangements that are adequate for a nuclear power programme; — Identify the main elements of an action plan to make necessary enhancements in Phases 2 and 3.
15. Nuclear Security	Develop relevant stakeholders' understanding of the nuclear security requirements related to nuclear power	— Identify all competent authorities that are involved in nuclear security and ensure there is a coordinating body or mechanism that brings together all of the organizations that have responsibility for it; — Use international cooperation and assistance to enhance nuclear security.
16. Nuclear fuel cycle	Develop relevant stakeholders' understanding of the options for the nuclear fuel cycle (front end and back end)	— Compile and prepare a document with options for the national nuclear fuel cycle (front end and back end); — Identify the available national natural resources and capacities for individual steps in the nuclear fuel cycle, together with potential sources of supply and services, and assess the available options for a national fuel cycle strategy, taking account of non-proliferation issues; — Indicate the need for adequate spent fuel storage capacity at the reactor site and raise the possibility of interim storage of spent fuel at a dedicated facility; — Assign responsibility for the development of the fuel cycle policy and strategy (front end and back end) to be undertaken during Phase 2; — Interact with the IAEA and other relevant organizations; — Discuss the options with the appropriate governmental institutions to explain the content and obtain feedback.
17. Radioactive waste management	Develop relevant stakeholders' understanding of the need for management of radioactive waste from NPPs and options for disposal	— Identify existing national capabilities for radioactive waste management; — Identify additional capabilities to be developed to manage waste arising from operation and decommissioning; — Identify potential options for the disposal of different categories of radioactive waste, including high level waste.

Issue	NEPIO functions	NEPIO activities
18. Industrial involvement	Develop a national policy concerning industrial involvement in the nuclear power programme	— Develop relevant stakeholders' understanding of NPP supply chain issues, including the qualifications necessary to provide equipment and services; — Assess industry's interest in participating in the nuclear power programme; — Assess national and local industrial capabilities and potential for participation; — Develop relevant stakeholders' understanding of the industrial development programmes and investments that would be required for national and local industries to meet required quality standards; — Recommend goals for short and long term industrial participation and policies to reach those goals.
19. Procurement	Develop relevant stakeholders' understanding of the requirements for purchasing NPP services	— Identify the unique requirements associated with purchasing services for pre-project activities; — Identify potential issues related to services for Phase 2 activities (both national and foreign suppliers); — Organize meetings with the appropriate government stakeholders to explain the need for NPP services procurement.

Appendix II

FUNCTIONS AND ACTIVITIES OF A NEPIO IN PHASE 2

Issue	NEPIO functions	NEPIO activities
1. National position	Secure approval of a national policy decision to proceed with the development of a nuclear power programme based on the Phase 1 comprehensive report	— Advise the government on the strategy for developing contract arrangements for the NPP developed by the owner/operator; — Establish a strategy for developing contract arrangements for the NPP.
	Ensure that the approved programme policies and strategies are translated into firm action plans for each of the 19 infrastructure issues	— Ensure corresponding responsibilities are assigned to the organizations that will become permanent parts of the overall infrastructure; — Ensure that the roles of key entities (i.e. the government, regulatory body and owner/operator) are well defined and understood by all stakeholders; — Ensure that the key organizations progress in line with the project schedule; — Ensure that relevant government agencies expand their capabilities to be ready to handle expanded demands (e.g. for managing environmental protection, immigration, import and export controls, and emergency preparedness and response).
	Ensure that coordination functions are carried out and that responsibilities are clear	— Maintain momentum and provide a continuing forum for communication and cooperation among the involved organizations (e.g. the owner/operator, the grid operator, the regulatory body, relevant government agencies, legislators and other decision makers).
2. Nuclear safety	Ensure that safety requirements are recognized by the key organizations	— Monitor and report to the government on the implementation of the: • Nuclear safety principles and requirements developed by the regulatory body and owner/operator; • Appropriate training for regulators, owner/operators and technical specialists; • Programmes to promote safety culture through leadership; • Protocol agreed for interactions between the owner/operator, regulator, vendor and technical support organizations; • Process and responsibilities defined for the review and understanding of information supplied by the vendor during construction.

Issue	NEPIO functions	NEPIO activities
3. Management	Ensure that the owner/operator has been designated to begin to implement the defined strategy for the first NPP and to prepare to negotiate a commercial contract	— Ensure that the owner/operator has: • Defined an organizational structure and recruited appropriate staff; • Established an integrated management system; • Developed a financing strategy, a contracting strategy, a fuel supply strategy, and a spent fuel and radioactive waste management strategy; • Initiated staff training to create a safety and security culture; • Established a nuclear security programme; • Assessed alternative technologies to determine which are most appropriate or preferred; • Completed site selection, site assessment and environmental impact studies; • Implemented a stakeholder involvement programme, especially with respect to candidate sites; • Established bid/contract specifications and evaluation criteria; • Built project management capabilities and a competent procurement team, recognizing that different contracting approaches (turnkey, split package or others) will require different levels of competence; • Established working relationships with the regulatory body; • Trained staff and established a project management organization that will emphasize quality management and be able to ensure that all contract requirements are fully met; • Instituted procedures to ensure that knowledge that is critical to safe and secure operation will always be preserved.
	Ensure that the detailed implementation is in accordance with the national strategy	— Maintain momentum and provide a continuing forum for communication and cooperation among the involved entities (e.g. the owner/operator, the grid operator, the regulatory body, relevant government agencies, legislators and other decision makers).
4. Funding and financing	Prepare a funding plan for all aspects of the nuclear power programme that are the responsibility of the government	— Conduct a study to estimate the scale of the costs for all aspects of the programme; — Ensure that the funding plan is matched to the NPP project plan, including all national commitments for participation in construction, and establish the owner/operator costs, regulator costs, other stakeholder costs, emergency planning costs, etc.
	Ensure that a financing plan for the NPP(s) and a strategy for the management of financial risks have been prepared	— Ensure that a report on financing options and risk management strategies that considers the long term economics and risks associated with the NPP and includes the extent of government funding and guarantees, equity partners and borrowing has been prepared.
5. Legal framework	Oversee implementation of the actions included in the plans approved at Milestone 1 that relate to the legal framework	— Monitor the country's process for adherence to the international legal instruments; — Monitor the country's process for enacting a comprehensive nuclear law; — Monitor the country's process for reviewing the legislation affecting the nuclear power programme; — Report periodically to the involved governmental institution regarding the status of national legislative framework development and implementation; — Verify the status of the implementation of the obligations arising from the legislative framework developed for the national nuclear power programme.

Issue	NEPIO functions	NEPIO activities
6. Safeguards	Ensure that the State system of accounting for and control of nuclear material (SSAC) is developing appropriately	— Ensure that the owner/operator is aware of the obligations of nuclear material accounting and control, including the necessary staffing, training and technical resources; — Ensure that measures are being implemented to enhance the SSAC's capability; — Ensure that safeguards obligations are being incorporated in the licensing process; — Ensure that all relevant stakeholders recognize design information obligations for safeguards.
7. Regulatory framework	Verify and confirm that the regulatory framework is developing in line with the needs of the project	— Ensure that an effectively independent regulatory body with sufficient competence is being developed and staffed in line with the programme schedule; — Monitor the development of the NPP licensing process, regulations and guides, and the oversight process (inspections and enforcement).
8. Radiation protection	Ensure that a programme to control and monitor any exposure to radioactive material is being developed	— Ensure the development of specific regulations by the regulatory body; — Ensure the development of protection plans for workers by the owner/operator, including plant design and procurement; — Ensure that planning for the recruitment of staff, training and the procurement of equipment is proceeding.
9. Electrical grid	Ensure that detailed studies to determine necessary grid enhancements are under way	— Ensure continued coordination among all the grid stakeholders; — Ensure that a comprehensive study to evaluate any expansion, upgrade or improvement is being prepared; — Ensure that plans, funding and a schedule for grid enhancement have been prepared; — Ensure that any requirements for strengthening the regional interconnections for grid reliability are being addressed.
10. Human resources development	Ensure that all relevant organizations have developed a plan to develop and maintain the human resources needed in Phase 3 and coordinate the plans of the different organizations to optimize the country's efforts	— Ensure that all relevant organizations have conducted an analysis of what resources and competences are needed at what time during Phase 3; — Ensure that the BIS or contract specification addresses what is required from suppliers, including competence development for national personnel (training and on-the-job experience), the provision of a full scope simulator and other training infrastructure needs, and the development of national trainers; — Coordinate a national strategy to address any gaps identified in national educational and vocational programmes.

Issue	NEPIO functions	NEPIO activities
11. Stakeholder involvement	Ensure that each key organization is maintaining and implementing a stakeholder involvement plan and that these plans are coordinated	— Ensure that each key organization has a clear understanding of its respective role with regard to communication and stakeholder involvement, as well as a competent communications team that engages with senior staff; — Provide training and experience opportunities for spokespersons; — Coordinate a national strategy among the key organizations; — Provide a continuing forum for communication and cooperation among the key parties and ensure clarity about the roles and responsibilities of each organization in stakeholder involvement.
	Continue public information programme activities according to the plan developed in Phase 1 and regularly update this plan	— Communicate with stakeholders regarding energy policy and energy needs, the role of nuclear power in the energy mix, the benefits and risks of nuclear power, and the 'non-zero' potential for severe accidents, and respond to the issues raised; — Regularly review public understanding and acceptance through means such as opinion polls or meetings; — Develop and plan public information centres, including required budgets and facility design; — Engage on a regular basis with local stakeholders, including on construction plans, opportunities for local jobs and benefits to the community.
12. Site and supporting facilities	Ensure that detailed site characterization is being conducted and that plans to prepare the site for construction are being developed	— Verify that the site characterization is proceeding in line with the requirements established by the regulatory body; — Ensure that the owner/operator reviews the current site and supporting infrastructure and has plans to implement any required enhancements; — Ensure that the BIS/contract specification include a clear description of the existing and planned site facilities.
13. Environmental protection	Ensure that an environmental impact assessment is performed	— Ensure that the owner/operator is conducting an environmental impact assessment for the preferred candidate site or sites according to the country's environmental laws and regulations; — Ensure that the environmental site conditions, factors, characteristics and data for the site are included in the BIS/contract specifications; — Ensure that clear interfaces are established between the environmental regulatory body and the nuclear regulatory body.
14. Emergency planning	Ensure that an action plan to enhance the infrastructure for EPR is being implemented	— Ensure that the response organizations at the national, regional and local levels with responsibilities for EPR and a national coordination mechanism have been identified; — Ensure that the general approach for EPR on the basis of the probability and severity of possible emergencies, both safety and security related, is being documented; — Ensure that gaps in existing national and local institutions and communication networks are identified and filled or are included in an action plan to be implemented in Phase 3.
15. Nuclear security	Ensure that the appropriate requirements, programmes and protocols have been established for the security and protection of nuclear materials and facilities related to the nuclear power programme	— Ensure that nuclear security requirements for the physical protection of nuclear material and facilities are defined through the development of design basis threat(s); — Ensure that each key organization puts in place programmes for the management of sensitive information, promotion of a nuclear security culture and trustworthiness of personnel; — Ensure that roles and responsibilities are assigned for preparing for, detecting and responding to nuclear security events.

Issue	NEPIO functions	NEPIO activities
16. Nuclear fuel cycle	Coordinate the preparation of a document defining a realistic front end and back end nuclear fuel cycle strategy	— Organize the preparation of the document, together with the owner/operator, identifying how the availability of nuclear fuel will be ensured in the short and long term, as well as plans/options for storage (at reactor and away from reactor), possible reprocessing or arrangements for fuel take back; — Verify that the actions and timescales of the strategy are consistent with the planned NPP construction programme; — Verify that the BIS or contracting specification for the first NPP is consistent with the nuclear fuel cycle strategy.
17. Radioactive waste management	Develop a strategy for waste management (including processing, storage and disposal of low level waste, intermediate level waste and high level waste) and decommissioning	— Ensure the identification of a responsible organization to lead national planning for waste disposal; — Consider the suitability of the geological conditions in the country for the disposal of all types of radioactive waste; — Ensure that the owner/operator includes the relevant elements of the strategy in the bid invitation or contract specification; — Ensure that the preliminary decommissioning plan is included by the owner/operator in the BIS or contract specification.
18. Industrial involvement	Finalize a national industrial capabilities assessment and plan to enhance capabilities in line with the national policy	— Ensure that the national and local capabilities to supply commodities, components and services for building and operating an NPP are being assessed; — Ensure that the results are taken into account in developing localization criteria for the BIS or contract specification; — Work with relevant stakeholders to establish programmes to facilitate the participation of local suppliers in the nuclear power programme.
19. Procurement	Verify the availability of required procurement capabilities	— Ensure that the owner/operator and the regulatory body have procurement capabilities for the pre-project services required in Phase 2; — Check the existence of the specific procurement procedures; — Check the inclusion of the applicable quality standards in the service specifications.

Appendix III

FUNCTIONS AND ACTIVITIES OF A NEPIO IN PHASE 3

Issue	NEPIO functions	NEPIO activities
1. National position	Ensure that programmes to ensure the long term sustainability of the nuclear power infrastructure are being implemented	— Monitor the development of the infrastructure that will be required for the operating phase of the nuclear power programme, such as long term education and training programmes, the development of technical support organizations, the development of an R&D programme, etc.
	Ensure that the approved action plans for each of the 19 infrastructure issues are being implemented in line with the programme needs	— Ensure that the key organizations continue to develop in line with the project schedule; — Ensure that other relevant government agencies continue to expand their capabilities to be ready to handle expanded demands (e.g. for import and export controls, immigration, EPR).
	Ensure that coordination mechanisms remain effective	— Maintain momentum and provide a continuing forum for communication and cooperation among the involved entities (e.g. the owner/operator, the grid operator, the regulatory body, relevant government agencies, legislators and other decision makers); — Ensure that mechanisms are in place to receive support from and exchange information with other States operating nuclear power and with international organizations.
2. Nuclear safety	Ensure that the national policy and strategy for safety continues to be implemented	— Ensure that the technical aspects of nuclear safety are well understood by the owner/operator and the regulatory body; — Ensure that the senior management of all organizations provides effective leadership and that a safety culture is evident; — Ensure that research centres and other relevant organizations focus their research on the features and safety aspects of the NPP that will be constructed, including features and aspects that are specific to the actual plant site.
3. Management	Ensure that the arrangements with the supplier to support operation are clear	— Ensure that the required levels of support from the vendor and other bodies and mechanisms for information exchange, training, technical support, etc. have been defined.
	Ensure that the owner/operator evolves to respond to the various needs of construction, commissioning and operation	— Ensure that the organizational structure of the owner/operator and its management system develop appropriately.
4. Funding and financing	Develop funding mechanisms according to the plan prepared in Phase 2	— Coordinate the development of funding mechanisms for waste management, spent fuel management and decommissioning; — Coordinate the development of mechanisms to implement the provisions of legislation on civil liability for nuclear damage.
	Coordinate the development of financing mechanisms to ensure adequate income to sustain operation	— Coordinate the development of a tariff and cost structure to provide adequate income to the owner/operator.

Issue	NEPIO functions	NEPIO activities
5. Legal framework	Continue to monitor the implementation of the legal framework	— Develop an action plan to address any remaining issues with the national legal framework and coordinate the implementation of any necessary amendments; — Ensure that the relevant organizations are prepared to implement obligations under the international legal instruments, including reporting.
6. Safeguards	Ensure that the SSAC is being developed for the nuclear power programme	— Ensure that procedures are being developed relating to accounting for and control of nuclear material based on a system of reports, records and measurements; — Ensure that procedures are being developed for the provision of required information, access of IAEA inspectors and facilitation of verification; — Ensure that training is being provided to responsible staff in the relevant organizations, as needed.
7. Regulatory framework	Monitor the development of the regulatory framework to ensure it is able to respond to the project demands and schedule	— Ensure that the organizational structure of the regulatory body and its management system develop appropriately; — Ensure that the regulatory body is hiring the staff and developing the competencies needed to review and assess the safety documentation submitted by the owner/operator; — Ensure that the regulatory body develops a programme to oversee construction; — Ensure that the regulatory body develops the competencies to oversee commissioning and operations; — Monitor the development and completion of a comprehensive set of regulations and guides covering safety, security and safeguards.
8. Radiation protection	Ensure that the radiation protection infrastructure required for operations is being developed in the relevant organizations	— Ensure that equipment for dose monitoring and control is being procured; — Ensure that a radiation protection programme is being implemented by the owner/operator.
9. Electrical grid	Ensure that the plans for grid enhancement and the development of interfaces are being implemented	— Ensure that the necessary upgrades and enhancements to the grid and interconnections are being implemented and tested in a timely manner; — Ensure that cross-border grid arrangements are being developed, as needed; — Ensure that a protocol is being developed between grid operators and the NPP owner/operator.
10. Human resources development	Ensure that all relevant organizations are implementing human resource development plans and that the development of educational programmes is coordinated	— Ensure the implementation of institutional human resource development programmes in line with the development of the nuclear power programme; — Coordinate the development and implementation of the national educational and vocational programmes and R&D required to support the nuclear power programme; — Ensure that adequate funding is planned and available for the development and implementation of educational and vocational programmes.

Issue	NEPIO functions	NEPIO activities
11. Stakeholder involvement	Ensure that the key organizations in the nuclear power programme maintain transparent and open communications	— Ensure that the government, owner/operator and regulatory body have stakeholder involvement programmes that maintain a proactive, transparent and open approach and fulfil any statutory obligations; — Communicate in a range of formats with key stakeholders, including elected officials, opinion leaders, local government, industry, business groups, the media, non-governmental organizations, opposition groups, educational institutions and neighbouring countries.
	Continue to coordinate stakeholder involvement plans	— Provide a continuing forum for communication and cooperation among the key parties and ensure clarity about the roles and responsibilities of each organization in stakeholder involvement.
12. Site and supporting facilities	Ensure that siting activities are proceeding in line with the project schedule	— Ensure that the owner/operator has a plan for ongoing monitoring to ensure that the site continues to meet design intent; — Ensure that any necessary local infrastructure improvements, such as access services and facilities, are proceeding.
13. Environmental protection	Ensure that environmental monitoring programmes are being implemented	— Coordinate the development and implementation of an environmental monitoring programme that allows the impact of operation to be assessed through comparison with the baseline study.
14. Emergency planning	Ensure that on-site and off-site arrangements for emergency preparedness and response are being implemented	— Ensure that any gaps in existing national and local institutions and communication networks are addressed; — Ensure that the response organizations are developing EPR procedures; — Ensure that arrangements for regular training, drills and exercises are in place and that a full scope exercise is carried out before fuel delivery.
15. Nuclear security	Ensure that the nuclear security programme for the NPP is being developed and implemented	— Ensure that the physical protection programme for the NPP is being developed and implemented in line with the regulatory framework for nuclear security; — Ensure that each key organization is implementing programmes for the management of sensitive information, promotion of a nuclear security culture and trustworthiness of personnel.
16. Nuclear fuel cycle	Coordinate the implementation of the front end and back end nuclear fuel cycle strategy	— Ensure that contractual arrangements for fuel supply are being considered and developed; — Ensure that spent fuel management arrangements, including on-site and interim storage, are being developed.
17. Radioactive waste management	Ensure that arrangements for radioactive waste management (including processing, storage and disposal of low level waste, intermediate level waste and high level waste) are being implemented	— Ensure that needed enhancements or new facilities for the storage of low level waste are being developed; — Ensure that the preliminary decommissioning plan is being developed by the owner/operator; — Continue to follow international efforts and progress towards ultimate high level disposal and plan to revise the national policy, as appropriate.
18. Industrial involvement	Ensure that the national strategy for industrial involvement in the nuclear power programme is being implemented	— Promote industrial development for national participation in the nuclear power programme for the operating phase (e.g. engineering and maintenance services, calibration, dosimetry).
19. Procurement	Ensure that procurement capabilities for the owner/operator are being developed	— Ensure that processes for procurement are being developed, in particular for the urgent procurement of additional supplies and equipment as needed in emergency situations.

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Annex I

CASE STUDY: KENYA

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Nairobi, Kenya

I–1. INTRODUCTION OF KENYA's NUCLEAR POWER PROGRAMME

Kenya's national development agenda is anchored in Kenya Vision 2030, which aims to create "a globally competitive and prosperous country with a high quality of life by 2030". Kenya Vision 2030 has three key pillars: economic, social and political. It has identified energy as a key foundation and one of the infrastructural 'enablers' upon which the three pillars of this long term development strategy will be built. The Least Cost Power Development Plan (LCPDP), which is the country's long term energy strategy, recognizes the need for the inclusion of nuclear energy in Kenya's energy mix. The LCPDP projects a need for up to 4000 MWe of nuclear capacity by 2031.

I–2. ESTABLISHMENT OF THE NEPIO

In November 2010, the Ministry of Energy established the Nuclear Electricity Project Committee.[1] It served as Kenya's nuclear energy programme implementing organization (NEPIO) until 2012, when it was upgraded to become the Kenya Nuclear Electricity Board (KNEB), a statutory body.[2] Since then, KNEB has served as Kenya's NEPIO.

I–3. RESPONSIBILITIES AND FUNCTIONS OF THE NEPIO

KNEB, as Kenya's NEPIO, is responsible for coordinating all aspects of Kenya's nuclear power programme. Progressively, other institutions will be established, or existing institutions appointed, to take up specific roles in the programme as it matures. Most importantly, these include the nuclear regulator and the owner/operator.

KNEB was mandated to undertake preparatory activities towards the development and implementation of the country's nuclear power programme, including:

— Promoting and expediting the development of nuclear electricity in Kenya;
— Undertaking nuclear pre-feasibility and feasibility studies;
— Promoting public education and awareness regarding Kenya's nuclear power programme;
— Identifying, preparing and facilitating the implementation of a roadmap for Kenya's nuclear power programme;
— Developing a comprehensive legal and regulatory framework for nuclear electricity generation in Kenya, in collaboration with relevant government agencies;
— Developing a human resource capacity to ensure that Kenya has the requisite manpower to successfully establish and maintain a nuclear power programme;
— Identifying appropriate sites in Kenya for the construction of NPPs and related facilities;
— Entering into collaborative programmes related to nuclear power research and development with other international and national organizations;
— Establishing a library and information centre for nuclear science and technology.

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[1] Kenya Gazette Notice No. 14188 (19 November 2010).
[2] Under the State Corporations Act (Cap 446) through Legal Notice No. 131 (16 November 2012).

The NEPIO undertook a pre-feasibility study (PFS) for Kenya's nuclear power programme, which was finalized in December 2013. The study's main objective was to identify the key issues and preparatory steps and propose measures to develop Kenya's infrastructure to meet international standards for a successful programme. The NEPIO assembled a team of assessors and key resource personnel to work with it on the PFS. The objective was to include their expertise and perspectives and, by doing so, build stakeholder support and government commitment for the resulting PFS. The PFS used the IAEA's Milestones approach. It grouped the 19 infrastructure issues into five clusters, as shown in Fig. I–1. Each cluster was headed by a leader who reported to the overall PFS leader.

The NEPIO has commenced countrywide public education on nuclear power. It has also developed a 15 year strategic plan for Kenya's nuclear power programme. The strategic plan outlines all key Kenyan nuclear stakeholder organizations and their roles in the implementation of a nuclear power programme, as well as the commitments required from the government and other agencies. The plan focuses on 22 issues, which include the 19 infrastructure issues in the Milestones approach plus three more: research and development, nuclear knowledge management, and the internal and external environments.

Kenya has developed draft legislation to set up an independent nuclear regulatory body. To fulfil Kenya's international obligations and demonstrate its commitment to the peaceful use of nuclear energy, the government has also ratified several international treaties on the use of nuclear technology and has begun the ratification process for four others.

The NEPIO has initiated a capacity building programme targeting young Kenyans to be trained in fields related to nuclear science and engineering. Since 2012, this has included a programme with a local university to sponsor 15 Kenyans annually for Masters' degrees in nuclear science. Further to the local capacity building, the NEPIO initiated memoranda of understanding in human resource capacity building with China, the Republic of Korea, the Russian Federation, Slovakia and the United States of America. The NEPIO's capacity building has also benefited greatly from collaboration with the IAEA's technical cooperation projects.

In April 2014, the Government of Kenya, through the NEPIO, asked the IAEA to conduct a Phase 1 Integrated Nuclear Infrastructure Review (INIR) mission. The objective was to review Kenya's status for all 19 infrastructure issues. Prior to the mission, the NEPIO prepared a national self-evaluation report with inputs from stakeholders. The Phase 1 INIR mission took place in August 2015.

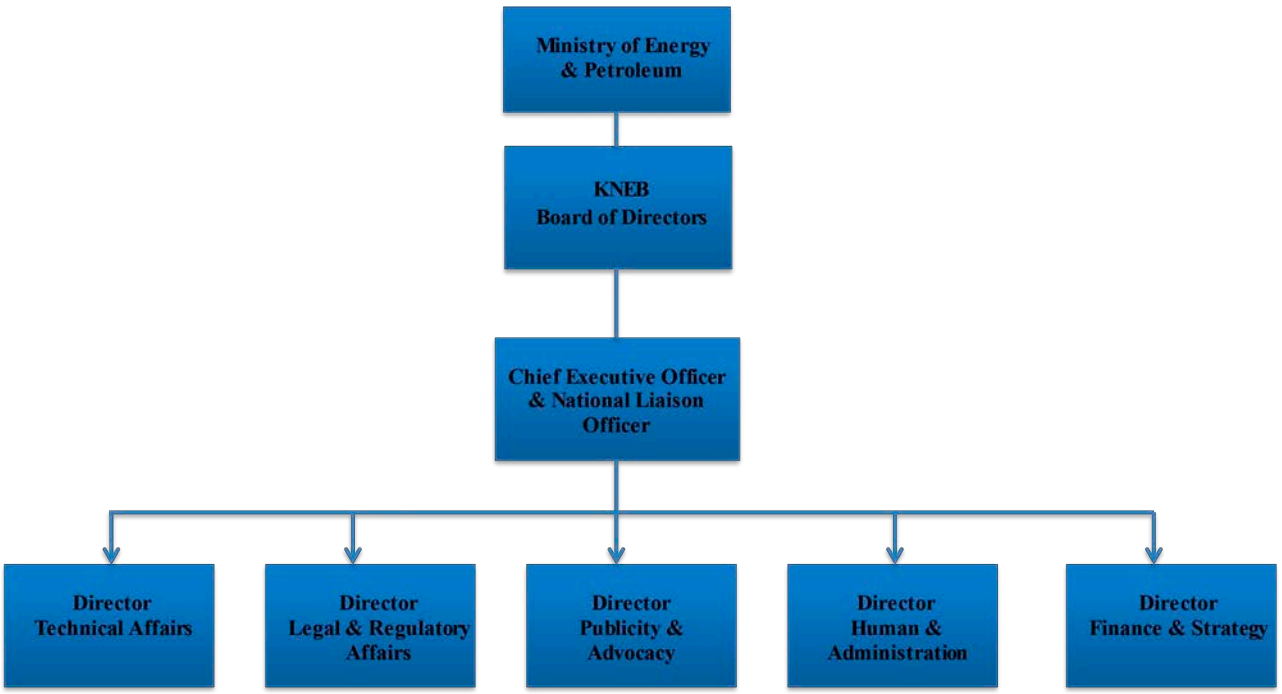

FIG. I–1. Organization of Kenya's NEPIO within the Ministry of Energy and Petroleum.

I–4. FUNDING OF THE NEPIO

KNEB is fully funded by the Government of Kenya.

I–5. SUBCONTRACTING OF TASKS

For tasks for which adequate experience and capacity do not exist within the local team, consultants are considered. To date, KNEB has contracted with consultants for three tasks: (1) the technical evaluation of the electrical grid's ability to support NPPs; (2) public opinion polls; and (3) development of the strategic plan for Kenya's nuclear power programme. The consultants work very closely with a local team to ensure transfer of knowledge to the internal team.

I–6. POSITIVE LESSONS FOR OTHER COUNTRIES

Some of the reasons for the success of Kenya's NEPIO are as follows:

— Constant engagement with stakeholders and their incorporation into relevant NEPIO activities to ensure ownership at the national level;
— Continual support from the highest levels of government;
— Use of an internationally accepted approach — the Milestones approach — to develop the nuclear power programme;
— Identification of the main concerns of stakeholders through early public opinion polls, with the results being used to build a comprehensive communications strategy;
— Early commencement of capacity building across a number of relevant competence areas — this has created a rich pool of trained persons to support programme planning and development.

I–7. CHALLENGES THE NEPIO HAS FACED OR CURRENTLY FACES

Kenya's NEPIO has nonetheless faced challenges, including:

— Difficulties in achieving seamless coordination among relevant stakeholders;
— Inadequate funding;
— Inadequate specialized skills and expertise in various fields.

I–8. CONCLUSION

Kenya's experience is that having a NEPIO with a clearly defined role provides many advantages. Because of the NEPIO's exclusive focus on nuclear matters, Kenya initiated the upfront activities to determine the appropriateness of nuclear power reasonably quickly. This has enhanced coordination among stakeholders and prevented conflict among institutions with overlapping mandates. As the single focal point on nuclear power matters, the NEPIO also provides a clear national engagement framework for all matters pertaining to nuclear power.

The establishment of a NEPIO in a State considering nuclear power is a significant positive step. However, it is important that the NEPIO be funded adequately to conduct the studies necessary to make a knowledgeable decision about whether to proceed with the development of nuclear power. The NEPIO can start by undertaking a PFS and then follow up with further technical studies. The results should all be compiled in a comprehensive report to be submitted to the government to provide adequate information to make a knowledgeable decision.

It is also highly recommended that the appointment of the NEPIO come from a high level in the government and that the NEPIO be empowered with the authority necessary for carrying out its functions.

Annex II

CASE STUDY: MOROCCO

A. ÇAOUI
Nuclear Power and Seawater Desalination Committee (CRED),
Rabat, Morocco

II–1. NATIONAL NUCLEAR ENERGY CONTEXT

Morocco is highly dependent on external resources for its electricity supply. More than 94% of its needs are met from external sources. The national electricity demand is currently 35 TWH and this is expected to grow threefold between 2015 and 2030 to reach around 100 TWH/year.

The national energy strategy adopted in 2009 planned for short and medium term conventional and renewable energy sources and considered nuclear power to be a long term option beyond 2030. The Ministry of Energy, Mines, Water and Environment (MEMEE) therefore created the Nuclear Power and Seawater Desalination Committee (CRED) in January 2009 to assume the responsibilities and functions of a nuclear energy programme implementing organization (NEPIO). This committee has the task of developing a strategy for the possible introduction of nuclear power in Morocco, including seawater desalination. In 2014–2015, the CRED prepared for a Phase 1 Integrated Nuclear Infrastructure Review (INIR) mission, which was conducted in October 2015.

It is worth noting that in all its successive energy plans since the 1980s, Morocco has considered the nuclear power option to be an open alternative. Between 1984 and 1994 Morocco carried out an exhaustive feasibility study for its first nuclear power project, in addition to the selection and qualification of a site located on the Atlantic coast. In parallel, Morocco has developed a legal and regulatory framework covering the use of radiation sources, as well as the research reactor at the Maamora Nuclear Center, which was licensed for operation in 2009.

The comprehensive nuclear law on safety, security and safeguards enacted in 2014 established an independent regulatory body: the Moroccan Nuclear and Radiation Safety and Security Agency (AMSSNuR).

II–2. MEMBERSHIP OF THE NEPIO

At the request of the MEMEE, the members of the CRED are designated by various entities:

— The Ministerial Departments of Energy, Water, Environment and Health;
— The National Office of Electricity and Potable Water, which is the national electricity and water utility;
— AMSSNuR, the regulatory body;
— The National Centre for Nuclear Energy, Sciences and Technology (CNESTEN), a technical support organization (TSO);
— Sidi Mohamed Ben Abdellah University of Fes;
— The Moroccan Association of Nuclear Engineers (AIGAM), a non-governmental organization.

The CRED is chaired by the Director General of CNESTEN, who reports directly to the Minister of Energy.

II–3. MISSION OF THE NEPIO

The ministerial orientations defined CRED's mission as follows:

— To study energy mix scenarios, including the nuclear power option beyond 2030;
— To conduct an evaluation of national infrastructure development in terms of strength and weaknesses;

— To make recommendations and develop an action plan to provide a strategic vision for the nuclear power programme.

II–4. ORGANIZATION OF THE NEPIO

Following the IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones in the Development of a National Infrastructure for Nuclear Power (2015), the CRED was organized into four working groups covering the 19 infrastructure issues:

— WG1: National Position — energy planning, NEPIO, nuclear power strategy and funding.
— WG2: Legal and Regulatory Framework — safety, security, safeguards, legal and regulatory framework, radiation protection and stakeholder involvement.
— WG3: Nuclear Power Project Development — management, financing, electrical grid, site and supporting facilities, nuclear fuel cycle, industrial involvement and human resources development.
— WG4: Waste Management and Environmental Protection — radioactive waste management and environmental protection infrastructure issues.

II–5. DOCUMENT APPROVAL PROCESS

Most documents produced by the CRED follow three phases: (1) working paper — prepared by one of the working groups and presented for discussion at CRED meetings; (2) intermediary documents — after validation by the CRED; and (3) final documents — after approval by the MEMEE.

II–6. MAIN OUTPUTS OF THE NEPIO

In 2010, the CRED submitted a first evaluation report that included a general evaluation of the nuclear power infrastructure and recommendations for establishing a strategic vision for the nuclear power programme. In 2013, the MEMEE requested that the IAEA carry out a Phase 1 INIR mission. During 2014–2015, the CRED prepared a self-evaluation report following the IAEA methodology described in IAEA Nuclear Energy Series No. NG-T-3.2, Evaluation of the Status of National Infrastructure Development. The INIR mission was conducted in October 2015 and resulted in a mission report with recommendations and suggestions to assist Morocco in making further progress in its infrastructure development, as well as good practices that might benefit other countries considering the introduction of nuclear power. The CRED is currently preparing an action plan that addresses all of the recommendations made by the INIR mission.

II–7. CURRENT KEY CHALLENGES

The current key challenges the CRED faces include:

— Expanding the CRED's membership with representatives from other relevant stakeholders (Departments of Foreign Affairs, the Interior, Industry and Finance) and reinforcing its role;
— Disseminating CRED reports to the appropriate governmental level to develop the debate among the relevant stakeholders concerned with establishing the nuclear power programme strategy;
— Implementing the action plan resulting from the INIR mission;
— Considering the upcoming new energy planning study results covering the period up to 2050, in order to develop the national position;
— Completing competitiveness and social, economic and environmental impact studies for the nuclear power option in comparison with other energy sources.

II–8. GOOD PRACTICES

The CRED's good practices include:

— Involving key organizations, including the energy planning department, the national electricity utility, the regulatory body and CNESTEN as a TSO;
— Involving a nuclear power project team with experience in preparing a PFS for a nuclear power programme — this team provided significant support during the preparation of the self-evaluation report;
— Leveraging experience related to safety and security culture gained from the establishment of the nuclear research centre and from the licensing process for the research reactor;
— Involving the Sidi Mohamed Ben Abdellah University of Fes and AIGAM as an encouraging sign of openness and transparency vis-à-vis all stakeholders.

Annex III

CASE STUDY: TURKEY

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Ministry of Energy and Natural Resources,
Ankara, Turkey

III–1. CONTEXT FOR TURKISH NUCLEAR POWER PROGRAMME

Turkey plans to build nuclear power plants (NPPs) to meet its increasing demand for electricity and support its economic development. The share of nuclear power in Turkish electricity generation is expected to reach 10% by 2023. Several nuclear power projects have been proposed in Turkey since the 1970s, but none has yet been realized.

In May 2010, an intergovernmental agreement (IGA) was signed with the Russian Federation for the construction and operation of the first NPP at the Akkuyu site as a build–own–operate (BOO) project. A project company, the Akkuyu Nuclear Power Plant Electricity Generation Joint Stock Company (also known as Akkuyu Project Company or APC) was established. In February 2011, the Turkish Atomic Energy Authority (TAEK) recognized APC as the owner. APC submitted an application for a construction licence to TAEK in 2017.

A second NPP will be built at the Sinop site. Turkey signed an IGA with Japan in May 2013. According to the IGA, the national utility, the Electricity Generation Company (EÜAŞ), will be a shareholder of the Sinop NPP project company, together with the Japanese Consortium (JAPCO), which consists of Mitsubishi Heavy Industries, Itochu and Gaz de France Suez. EÜAŞ and JAPCO will incorporate a project company to implement the project. Since the project company will be responsible for the operation of the NPP, its organizational structure will be strengthened to oversee construction and be involved in the operation. Extensive site characterization activities are ongoing. A third project is under consideration.

III–2. ESTABLISHMENT OF THE NEPIO

Turkey has designated the Ministry of Energy and Natural Resources (MENR) as the nuclear energy programme implementing organization (NEPIO) for implementation of the IGAs. Within MENR, the Nuclear Energy Project Implementation Department (NEPID) has been assigned to coordinate the government's role in the development of the nuclear infrastructure.

The major provisions of the IGAs indicate that the projects will be subject to all applicable laws, regulations and codes in Turkey; that all necessary licences, permits and approvals from related governmental organizations shall be obtained by the project companies; and that Turkey will take all the necessary measures, as permitted by the applicable laws and regulations of the Republic of Turkey, to assure the timely issuance of all the necessary permits and licences in accordance with Turkey's laws and regulations. These provisions raise the importance of a mechanism for coordination and the necessary legislative framework.

The Prime Minister of Turkey announced a circular order that was issued in the Official Gazette (No. 28240, 21 March 2012) in order to facilitate the implementation process for the Akkuyu nuclear power project. The circular referred to the 2010–2014 Strategy Document, the Electrical Energy Market and Supply Security Strategy Document and the IX Development Plan (2007–2013), and stated that, "Within the framework of the Akkuyu NPP, which will be executed through an IGA, coordination among Turkish public authorities and institutions will be provided by MENR. Therefore, public authorities and institutions will conclude every necessary step, procedure and undertaking in order to prevent any doubt that the project implementation is on time."

NEPID shared the circular with the Turkish authorities, institutions and organizations that are affiliated with the nuclear programme so that it can be referenced as needed.

III–3. RESPONSIBILITIES AND FUNCTIONS OF TURKEY's NEPIO

NEPID is assigned the following duties:

— Ensuring coordination among ministries, public authorities and organizations, universities, and non-governmental and private sector organizations for the purposes of realizing NPP projects;
— Ensuring coordination among organizations so that the required infrastructure is prepared in areas such as legislation for the implementation of NPP projects, human resources, training, industry and technology, and carrying out or organizing the required work in these areas;
— Carrying out or organizing work in connection with informing the public about NPPs;
— Participating in the work being performed by national and international organizations in connection with NPPs.

III–4. CAPABILITIES AND STRUCTURE

The organization of NEPID under MENR (Fig. III–1) was established in compliance with IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones in the Development of a National Infrastructure for Nuclear Power (2015). The workforce of NEPID consists of people with backgrounds ranging from engineering (electrical, physics, nuclear, industrial, environmental and mining) to social sciences (public administration, law and management).

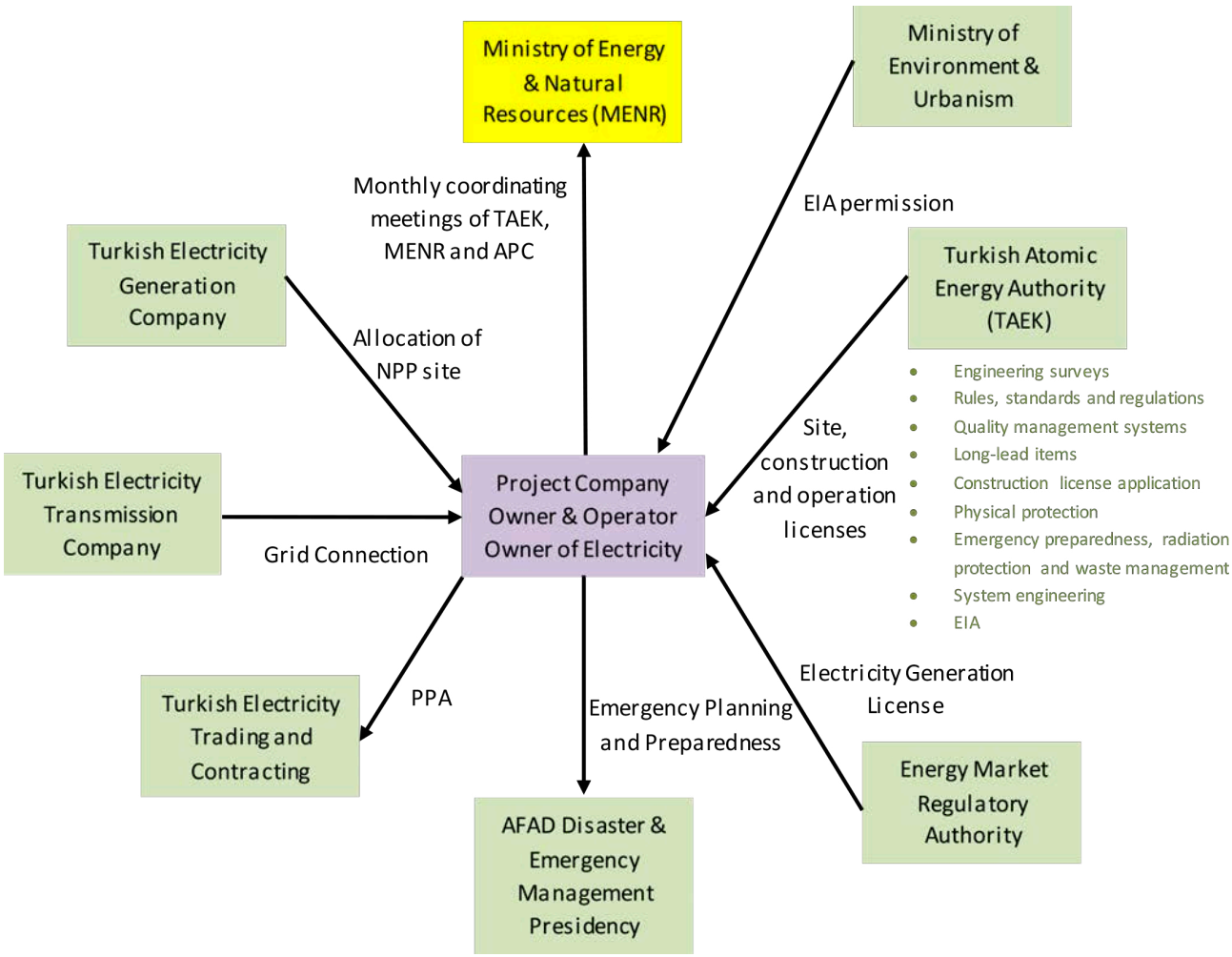

FIG. III–1. Organizational chart of interfaces; AFAD — Disaster and Emergency Management Authority; APC — Akkuyu Project Company; EIA — environmental impact assessment; MENR — Ministry of Energy and Natural Resources; NPP — nuclear power plant; PPA — power purchase agreement; TAEK — Turkish Atomic Energy Authority.

The NEPID sections and their functions are as follows:

— Nuclear Safety, Security and Radiation Protection:
  - Nuclear safety;
  - Nuclear security;
  - Radiation protection.
— Project Applications and Project Engineering:
  - Licensing:
    - Plant licenses;
    - Site licenses;
    - Power purchase agreement (PPA);
    - Electricity generation.
  - Economic analyses:
    - Determination of the parameters for economic analyses during NPP negotiations;
    - Nuclear economy analysis and cost estimation;
    - Nuclear statistics book.
  - Human resources:
    - Student issues.
    - Planning/implementation.
    - Non-Turkish nationals:
      - Permits;
      - Planning.
  - Communication strategy.
  - Foreign relations and discussions.
— Site Projects:
  - Site selection:
    - Establishment of a geographical information system;
    - Determination and viewing of candidate sites.
  - Emergencies.
— Legal Team.
— Local Procurement Plan.
— Radioactive Waste Management Policy.
— Fuel Cycle Policy.
— Other.

III–5. FUNDING

NEPID prepares its own budget within the framework of requirements included in MENR's strategic plan and budget preparation guide with budget income and expense offers. NEPID submits the budget for approval by the Minister and then the budget is submitted by MENR to the Department of Finance. The budget is reviewed and edited by the Department of Finance and then submitted for approval to the Grand National Assembly of Turkey. After the Grand National Assembly of Turkey and the President of the Republic approve the budget, it enters into force by 1 January upon the publishing of the Official Gazette.

NEPID's income and expenses are planned according to the related year's budget published in the Official Gazette.

III–6. SUBCONTRACTING

NEPID has subcontracted a variety of tasks.

— Example 1:

Within the scope of Public Procurement Law No. 4734, service procurement was carried out for Creating the Road Map for Developing Industry, R&D, Human Resources and Education Infrastructure Related Nuclear Industry in Turkey.

— Example 2:

With regard to MENR's need to manage social media communication to promote nuclear energy and create opinion polls concerning nuclear energy, within the scope of Public Procurement Law No. 4734, a service procurement was carried out regarding "following up and tracking the public opinion reflections of nuclear power plants to be built in Turkey in social media platforms (Turkey source oriented Facebook, Twitter, YouTube etc.), informing the public regarding nuclear power projects to promote the nuclear power plant projects in Turkey, creating, developing, managing and reporting the digital strategy of NEPID."

— Example 3:

To increase the capacity and enrolment of Turkish industry in NPP projects in Turkey and to collect and store the information of Turkish companies digitally, a web site service named Supplied Management System was commissioned. This service procurement and system were intended to enable NEPID and MENR to access any information needed regarding related companies.

— Example 4:

Brochures and books regarding NPPs were designed and printed in both Turkish and English.

III–7. FUTURE PLANS

Based on the various NPP projects' current stages, the number of personnel supporting NEPID is expected to fall from 2019 and then remain constant.

III–8. SUMMARY OF ACTIVITIES/LESSONS LEARNED

Turkey is progressing in the development of its national infrastructure to support its nuclear power programme. Turkey is the first country to use a BOO approach for a nuclear power project. Turkey found advantages in conducting direct negotiations for the IGA and the BOO approach, to both initiate a project without having to go through a bidding process and to secure financing. The strong support from the Government of Turkey is evident. It established NEPID within MENR to coordinate the Government's role in the nuclear infrastructure over the past three years. NEPID rapidly established effective mechanisms for this purpose.

The IAEA's Nuclear Power Human Resources model has been used to determine staffing numbers for:

— NEPID;
— The regulatory authority;
— Project companies;
— NPPs;
— Academia.

Due to bidding process failures that led to the country having a shortage of qualified personnel and time, the country would recommend having a NEPIO in place in Phase 1 so that, among other things, a State that is new to the process could ensure that all necessary legislation is in place.

Annex IV

CASE STUDY: MALAYSIA

J.K. IBRAHIM
Malaysia Nuclear Power Corporation (MNPC),
Cyberjaya, Malaysia

IV–1 ESTABLISHMENT OF THE NEPIO

The nuclear energy programme implementing organization (NEPIO) in Malaysia was established as the Malaysia Nuclear Power Corporation (MNPC), a fully Government owned and funded company limited by guarantee, without share capital, under the Prime Minister's department, based on an executive decision of a meeting of cabinet ministers. The objectives of this NEPIO are to plan, spearhead and coordinate the implementation of a nuclear power development programme, to take the necessary action to realize the development of the first NPP while ensuring that the development of the nuclear infrastructure for the State is in line with IAEA guidelines covering the 19 infrastructure issues, and to identify the owner and/or operator of this NPP.

It is, thus, a fully dedicated, full-time, business-like NEPIO, but non–profit making, with no other function or responsibility beyond nuclear power programme development, and its objectives are also clearly stated in the memorandum and articles for the establishment of MNPC as a company under the law, as well as in the order issued under the law on the functions of the Minister and the government entities under their respective responsibilities.

IV–2. GOVERNANCE AND FUNCTIONS

As a company, the NEPIO is governed by: (1) a Board of Directors, comprising the Director General of the economic planning unit (EPU) of the Prime Minister's department, as the key national economic planning agency; (2) the Secretary General of the Ministry of Energy, Green Technology and Water, responsible for energy and electricity; (3) the Ministry of Science, Technology and Innovation, responsible for the Malaysian Nuclear Agency (Nuclear Malaysia) as the national nuclear research agency; (4) the Atomic Energy Licensing Board (AELB) as the current nuclear regulatory body, as ex officio members; and (5) independent members from industry and the nuclear professions. A Minister in the Prime Minister's department is also entrusted with responsibility for the NEPIO.

The fully dedicated NEPIO supersedes a nuclear power development steering committee led by the Ministry of Energy, Green Technology and Water, and supported by three working committees, namely those on nuclear power programme development (led by Nuclear Malaysia), nuclear power project development (led by Tenaga Nasional Berhad, as the electricity utility for Peninsular Malaysia) and nuclear power legislative development coordination (jointly led by AELB and the Energy Commission, as regulatory bodies). All relevant ministries and government agencies were represented in the steering committee and its three working committees, which had collectively served as a precursor to the NEPIO. However, as committees, they were not a fully dedicated or full-time NEPIO.

The establishment of the NEPIO is also part of the implementation of preparatory work for the nuclear power programme, which is incorporated into a national economic transformation programme (ETP) encompassing 12 national key economic areas (NKEAs), with the overriding aim of transforming the country into a high income economy. The implementation of the ETP for each of the NKEAs is governed by a separate ministerial level steering committee, and the NEPIO also reports to the steering committee for the NKEA on oil, gas and energy under the ETP, as well as to a ministerial level economic council, also chaired by the Prime Minister, in addition to reporting to the Board of Directors and the Minister responsible for the NEPIO in the Prime Minister's department.

IV–3. ORGANIZATIONAL STRUCTURE OF THE NEPIO

The organizational structure of the NEPIO is divided into nuclear power programme development, nuclear power project development, and legislative and regulatory development coordination, as were the three working committees under the preceding nuclear power development steering committee, which had collectively served as the precursor to the NEPIO.

To facilitate the functions of the NEPIO, the 19 infrastructure issues are grouped into four major functional areas — policy, regulations, financing and technical support/project development — with each generally involving the same group of stakeholders among the ministries and government agencies with which the NEPIO has to consult and work. The infrastructure issues on national position, management, human resources development, stakeholder involvement, nuclear fuel cycle and industrial involvement are grouped under policy; nuclear safety, legislative framework, safeguards, regulatory framework, radiation protection, environmental protection, emergency planning, security and physical protection, and radioactive waste are grouped under regulations; funding and financing and procurement are grouped under financing; and electrical grid and site and supporting facilities are grouped under technical support/project development.

IV–4. FUNDING

The funding for the NEPIO is provided exclusively by the Government, with the funding for its operation being provided under the Government's annual operating budget, and the funding for nuclear power programme development studies being provided under a five year development budget. For specialized work or studies for nuclear power programme development, such as legal and regulatory development studies, the formulation of infrastructure development and comprehensive communications plans, and feasibility studies, the NEPIO engages international and local consultants who are experienced in the relevant fields. The work and reports of the consultants are reviewed by project task review panels and steering committees comprising representatives of all relevant ministries and government agencies, and other relevant organizations, including universities with nuclear related and other relevant technical and non-technical departments. Around 50 such ministries and government agencies and other relevant organizations are thus involved and work closely with the NEPIO on a regular basis for this purpose.

The establishment of the NEPIO as a company that operates in a business-like manner, even though it is still fully owned and funded by the Government, accords it a certain level of flexibility for faster procurement of external services, including the engagement of specialized consultancy services for nuclear power programme development, even though it is still generally subject to government procurement procedures. The fact that it is a fully dedicated, full-time NEPIO also enables it to focus exclusively on nuclear power programme development activities.

IV–5. LESSONS LEARNED

A critical factor in the NEPIO's success has been the extensive and intensive inter-agency coordination and cooperation among all relevant stakeholders, particularly in preparing the comprehensive report on all 19 infrastructure issues. Reviewing the work and reports of the external consultants in working towards a successful conclusion to Phase 1 and the achievement of Milestone 1 in order to be ready to make a knowledgeable commitment to a nuclear power programme has also been key. This should serve as a firm foundation for sustained inter-agency coordination for subsequent phases of nuclear power programme development.

The NEPIO thus integrates the input and work of all relevant stakeholders and external consultants, and fills any gap between the input and work of those stakeholders and of external consultants, particularly in preparing the report the Government will use as a basis for deciding on the nuclear power programme.

For a NEPIO that is publicly funded to work on developing a nuclear power programme involving the construction of the first NPP in the country, public communication is of critical importance in gaining public confidence and trust in the NEPIO and the work it is doing.

Annex V

CASE STUDY: BELARUS

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Minsk, Belarus

V–1. INTRODUCTION

Belarus does not have sufficient fuel and energy resources available. More than 80% of them are imported, mainly from the Russian Federation. This affects the security of the energy supply.

Belarus began preparations to introduce nuclear power in the early 1980s, but terminated this process after the Chernobyl nuclear accident in 1986. In July 2006, the Government of Belarus decided to reconsider the nuclear energy option.

The Concept of Energy Security of the Republic of Belarus, approved by a Presidential Decree in 2007, envisaged commissioning by 2020 the construction of a two unit nuclear power plant (NPP) with a total capacity of 2000 MW. The goal was to strengthen national energy security and diversify the country's energy resources.

The political decision to launch a national nuclear power programme was made by adopting Resolution of the Security Council of the Republic of Belarus No. 1 from 31 January 2008, On Development of Nuclear Energy in the Republic of Belarus.

Prior to selecting an NPP design, experts from the National Academy of Sciences and the Ministry of Energy conducted extensive studies on and assessments of the designs that were available in the global market and their vendors. Advanced third generation pressurized water reactors (PWRs) with a capacity of about 1000 MW were found to be the most suitable design for implementation in Belarus. The Ministry of Energy contacted the three leading companies offering such designs, namely AREVA, Westinghouse/Toshiba and Rosatom. Rosatom confirmed that it was ready to construct the NPP on a turnkey basis. The AES-2006 NPP design was selected and Atomstroyexport was appointed the general contractor for construction.

The general contract on NPP construction between the state company Directorate for Nuclear Power Plant Construction and Atomstroyexport was signed in July 2012.

V–2. ESTABLISHMENT OF THE NEPIO

In Belarus, the nuclear energy programme implementing organization (NEPIO) is the Inter-departmental Commission for NPP Construction (IDC). It was established in 2006 with the goal of coordinating implementation of the national nuclear power programme. The IDC is headed by the Deputy Prime Minister and includes top level officials from all the relevant ministries and organizations involved in the nuclear power programme. The IDC meets monthly to discuss major issues related to the nuclear power programme and to review the status of its implementation.

In accordance with Decree of the President of the Republic of Belarus No. 565 of 12 November 2007, the following institutions were established:

— The Directorate for Nuclear Power Plant Construction, to perform the functions of the customer for preparatory and design and survey activities;
— The Department of Nuclear and Radiation Safety (Gosatomnadzor) under the Ministry for Emergency Situations, to supervise nuclear and radiation safety.

Decree of the President of the Republic of Belarus No. 378, dated 10 July 2008, established the Nuclear Energy Department of the Ministry of Energy. Its main function is implementation of the national policy for nuclear energy.

The key institutions — the operating organization, the regulatory body and the Nuclear Energy Department of the Ministry of Energy as the NEPIO — were formed in Phase 1, and their staff numbers were gradually increased in line with the development of the nuclear power programme. All these institutions are funded by the Government of Belarus.

V–3. RESPONSIBILITIES AND FUNCTIONS OF NEPIO

The main responsibilities of the key institutions involved in the implementation of the nuclear power programme are defined in the Law on Atomic Energy, adopted in 2008. The law specifies the responsibilities of the Government, the Ministry of Energy and the Ministry for Emergency Situations (regulatory body), as well as the Belarusian NPP company (operator) and other organizations.

The main function of the NEPIO in Phase 1 was to learn about international experience in implementing nuclear energy programmes and select the NPP design and vendor (Fig. V–1). The Ministry of Energy and the National Academy of Sciences of Belarus developed the national strategy on implementation of the nuclear power programme, which included assessment of the national capacity, and reported to the Government.

The main functions of the NEPIO in Phase 2 included:

— Coordination of preparatory activities for NPP construction;
— Coordination of activities related to the development of nuclear power infrastructure, including legislation, human resources, industry involvement, public communication, etc.

<table>
<tr><th rowspan="2">Phase</th><th colspan="3">NEPIO
Inter-departmental Commission
(30 high-level representatives of ministries and organizations, involved in the implementation of the Belarusian nuclear power plant)</th></tr>
<tr><th>Nepio</th><th>The operator</th><th>The regulator</th></tr>
<tr><td>Phase 1
(2006–2008)</td><td>The Ministry of Energy, Nuclear Technology Sector (number of staff:3)</td><td>The Directorate for Nuclear Power Plant Construction (number of staff:~70)</td><td rowspan="2">The Ministry for Emergency Situations, Gosatomnadzor (number of staff:~30)</td></tr>
<tr><td>Phase 2
(2008–2013)</td><td rowspan="2">The Ministry of Energy, Nuclear Energy Department (number of staff:11)</td><td>The Directorate for Nuclear Power Plant Construction (number of staff:~350)</td></tr>
<tr><td>Phase 3
(2013–2020)</td><td>RUE‘Belarusian NPP’ (number of staff:~1100)</td><td>The Ministry for Emergency Situations, Gosatomnadzor (number of staff:~80)</td></tr>
</table>

FIG. V–1. NEPIO structure by phase.

In January 2009, to streamline all these activities, the Government approved the Master Plan of Key Organizational Measures for the Construction of a Nuclear Power Plant in the Republic of Belarus.

The NEPIO organized a self-evaluation of the status of the national nuclear power infrastructure development for Phases 1 and 2, and coordinated the implementation of relevant action plans based on the recommendations of the Integrated Nuclear Infrastructure Review (INIR) mission.

In Phase 3, the NEPIO continues to implement its functions, as described above, and is also responsible for supporting:

— The development and implementation of programmes related to the long term sustainability of the nuclear power programme, such as improving legislation, human resources development, public communication, radioactive waste and spent fuel management;
— The development of the system of technical support orgenizations (TSOs).

V–4. POSITIVE LESSONS FOR OTHER COUNTRIES

The NEPIO has identified several good practices that may benefit other countries considering the introduction of nuclear power, including:

— A high level IDC working on a continuous basis to ensure coordination among and concerted activities for the extensive number of ministries and organizations involved in the project;
— The development of the National Program on Human Resources Development for Nuclear Energy at the early stage of implementation of the nuclear power programme — five universities and a few other educational institutions train students in the relevant knowledge and skills;
— The development and implementation of the national nuclear power programmes with due consideration of the experience gained by other countries, and active international cooperation based on bilateral intergovernmental agreements;
— The use of relevant IAEA review and assessment missions to identify gaps in early stages of the nuclear power programme development;
— The establishment of the working group on localization activities under the Ministry of Industry.

V–5. CHALLENGES FOR THE NEPIO

The NEPIO has also faced several challenges in its work, including:

— Long lasting discussions with neighbouring Lithuania within the framework of the Espoo Convention;
— The development of TSOs with the required level of expertise to support the operating organization and the regulatory body;
— The recruitment of qualified personnel for the operating organization due to a deficit of qualified specialists;
— An insufficient number of construction workers at the NPP site;
— The lack of experience of Belarusian institutions in equipment and material manufacturing for NPP construction.

V–6. CONCLUSION

As the State is fully responsible for the use of nuclear power in a safe and secure manner, the nuclear power programme requires continuous support throughout its entire life cycle (preparatory works, construction, commissioning, operation and decommissioning). For this reason, the relevant governmental institution (or a dedicated unit within its structure) is needed to ensure the efficient coordination of activities among all organizations involved in the implementation of the nuclear power programme.

ABBREVIATIONS

BIS	bid invitation specification
BOO	build–own–operate
CRED	Nuclear Power and Seawater Desalination Committee
EPR	emergency preparedness and response
IDC	Inter-departmental Commission
IGA	intergovernmental agreement
INIR	Integrated Nuclear Infrastructure Review
KNEB	Kenya Nuclear Electricity Board
MEMEE	Ministry of Energy, Mines, Water and Environment
MENR	Ministry of Energy and Natural Resources
NEPID	Nuclear Energy Project Implementation Department
NEPIO	nuclear energy programme implementing organization
NPP	nuclear power plant
PFS	pre-feasibility study
SSAC	state system of accounting for and control of nuclear material
TAEK	Turkish Atomic Energy Authority
TSO	technical support organization

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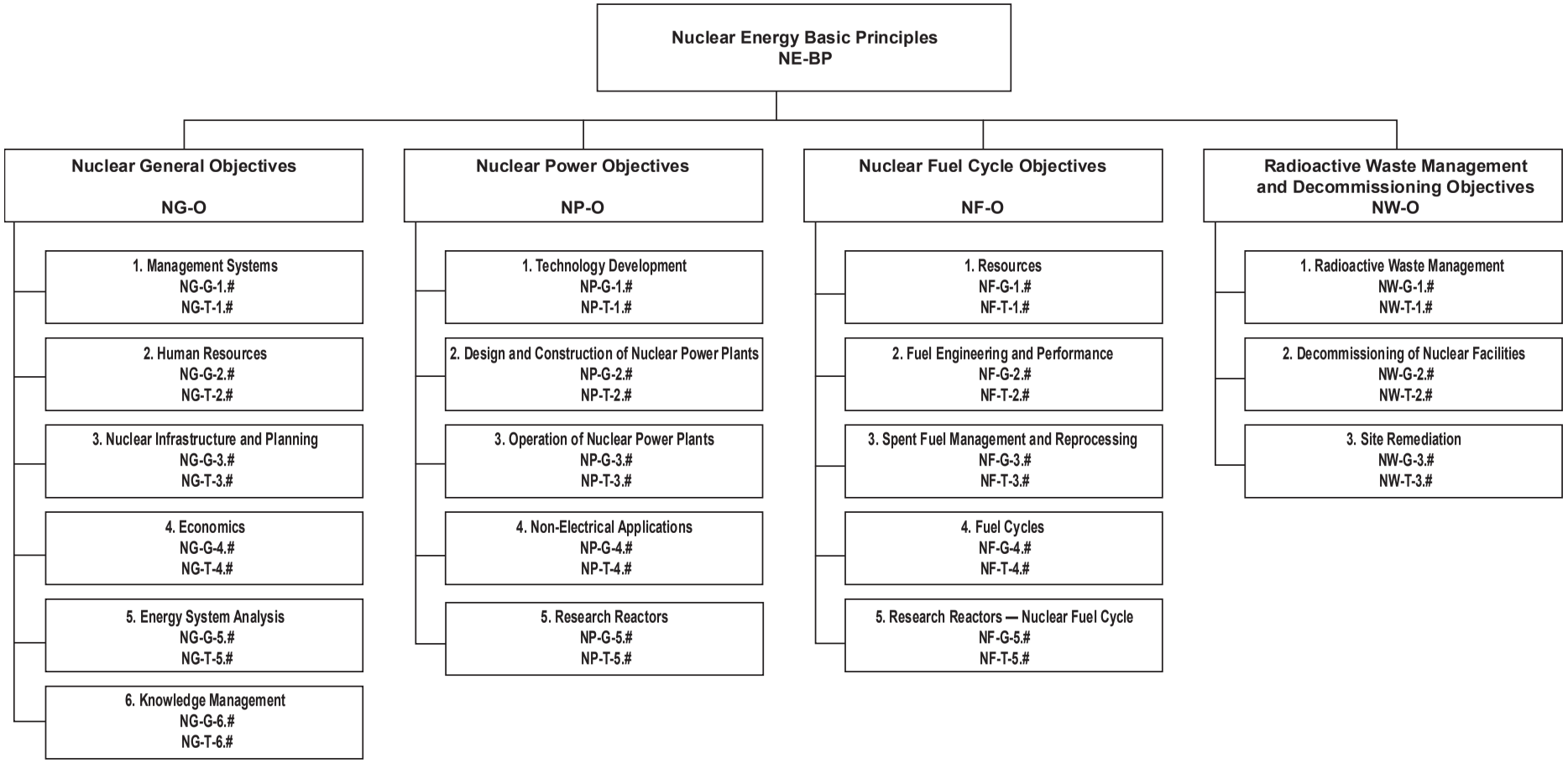

Key

BP: Basic Principles
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