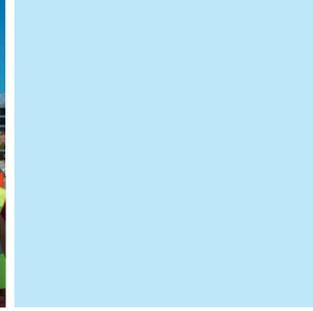
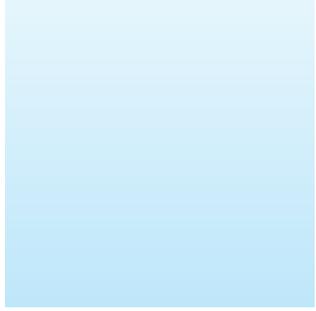
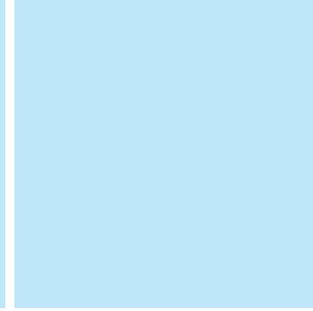
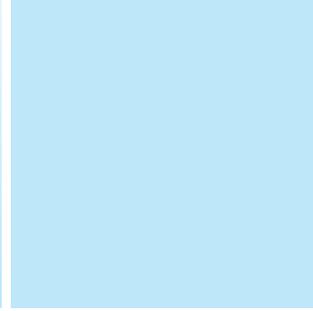
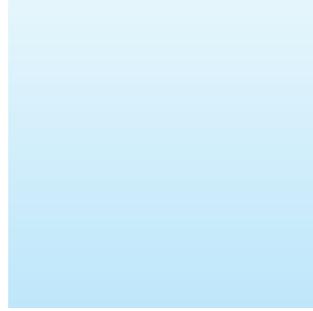
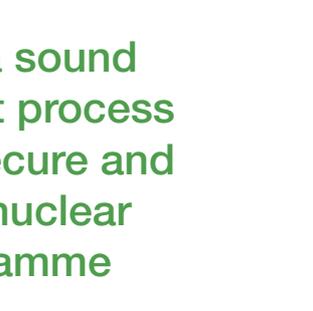
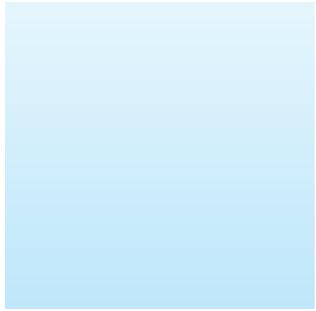
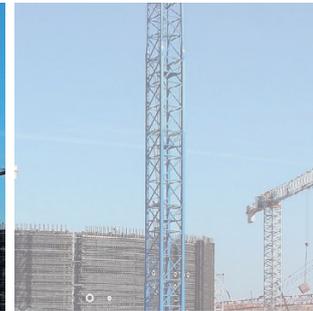
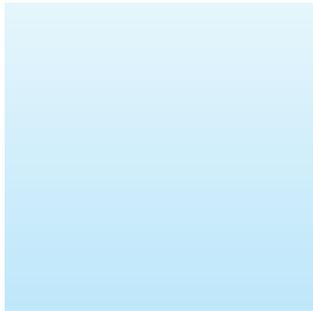
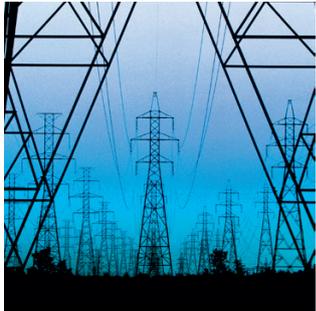


IAEA Milestones Approach

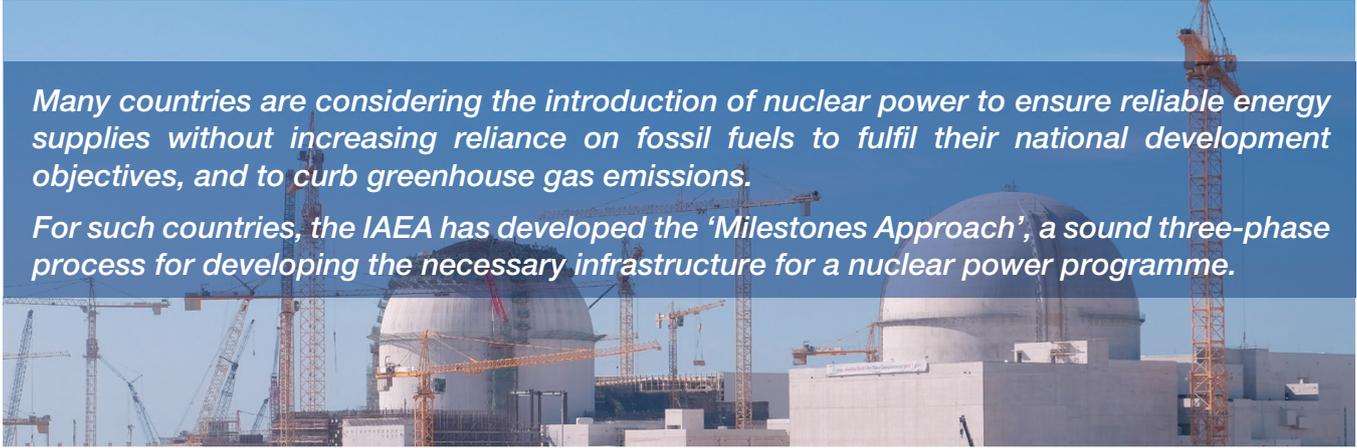
Developing the National Infrastructure for Nuclear Power

Supporting a sound development process for a safe, secure and sustainable nuclear power programme



IAEA

International Atomic Energy Agency



Many countries are considering the introduction of nuclear power to ensure reliable energy supplies without increasing reliance on fossil fuels to fulfil their national development objectives, and to curb greenhouse gas emissions.

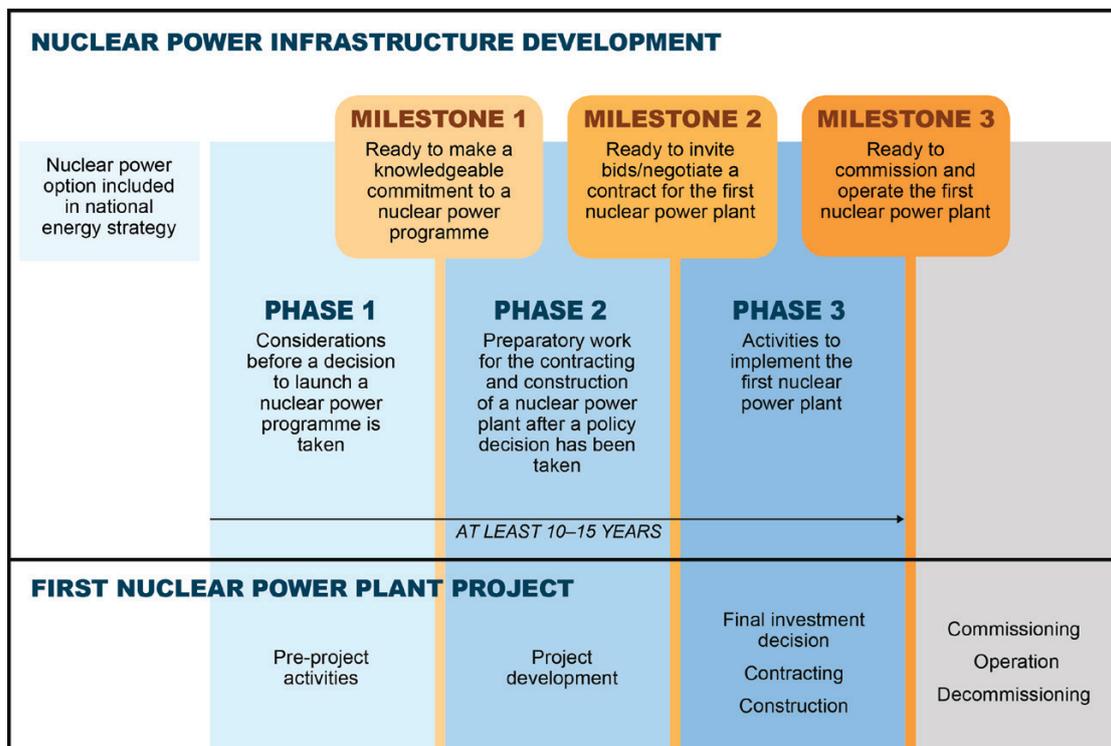
For such countries, the IAEA has developed the 'Milestones Approach', a sound three-phase process for developing the necessary infrastructure for a nuclear power programme.

Launching a nuclear power programme is a major undertaking that requires careful planning, preparation and investment in time, institutions and human resources. While nuclear power is not alone in this respect, it is different because of the safety, security and safeguards requirements associated with using nuclear material.

A nuclear power programme involves 10-15 years of preparatory work and a commitment of at least 100 years. Developing the national infrastructure for a successful introduction or expansion of nuclear power requires many activities, such as building national institutions, establishing a legal and regulatory framework, developing human resources and financial strategies, addressing radioactive waste management and involving stakeholders.

It is the sovereign decision of every country to launch a nuclear power programme. When a country decides to go that route, the IAEA provides guidance, advice, training and review services. It has developed the '**Milestones Approach**', an internationally accepted methodology that supports a sound development process for a new nuclear power programme, enabling a country to understand, and prepare for, the commitments and obligations associated with developing a safe, secure and sustainable nuclear power programme. Countries that already have nuclear power can use the Milestones Approach to assess their preparedness for expansion of the installed capacity.

The Milestones Approach is documented in the IAEA guidance publication *Milestones in the Development of a National Infrastructure for Nuclear Power*.





Three Phases and Three Milestones

The Milestones Approach comprises three phases for the development of a national infrastructure for nuclear power. At each phase, nineteen infrastructure issues need to be considered.

In **Phase 1**, the country will analyse the implications of introducing nuclear power. A pre-feasibility study will help a country establish a strong national position and answer the key question: why nuclear? This process begins early in Phase 1 after nuclear power is included as an option in the national energy strategy. The country will also establish a preliminary roadmap for nuclear infrastructure development and the nuclear power plant project.

In **Phase 2**, the preparatory work for the contracting and construction of a nuclear power plant is undertaken, after the Government has decided to embark on a nuclear power programme. In this phase, the necessary nuclear infrastructure is developed. Key organizations as well as the legal and regulatory frameworks are established.

In **Phase 3**, activities to contract, license and construct the first nuclear power plant are undertaken.

The completion of each phase is marked by a specific 'milestone' at which the progress of the developments can be assessed and a decision can be made to move on to the next phase. These are:

Milestone 1: the country is ready to make a knowledgeable commitment to a nuclear power programme (or to decide not to proceed).

Milestone 2: the country is ready to invite bids or negotiate a contract for their first nuclear power plant.

Milestone 3: the country is ready to commission and operate the first nuclear power plant.

Nuclear Infrastructure Issues

The Milestones approach includes 19 nuclear infrastructure issues which require specific actions during each of the three phases. Completion of the actions for a phase represents the achievement of the associated milestone. The order in which the 19 infrastructure issues are presented does not imply relative importance. All issues require appropriate attention.

- National position
- Nuclear safety
- Management
- Funding and financing
- Legal framework
- Safeguards
- Regulatory framework
- Radiation protection
- Electrical grid
- Human resource development
- Stakeholder involvement
- Site and supporting facilities
- Environmental protection
- Emergency planning
- Nuclear security
- Nuclear fuel cycle
- Radioactive waste management
- Industrial involvement
- Procurement.

Key Organizations

Numerous organizations are involved in a nuclear power programme, including different ministries, regulatory authorities, universities and vocational schools, several sectors of the industry, emergency and disaster management organizations, security forces, hospitals, waste management organizations, and others.

However, three entities play a fundamental role to ensure that the programme is implemented in a safe, secure and cost-effective manner: the government, the regulatory body (or regulatory bodies) and the owner/operator; each has a specific role to play with responsibilities changing as the programme advances.

The **government** is responsible for formulating policies and strategies, maintaining and updating the roadmap for the overall nuclear power programme, and coordinating the work of all organizations involved. The overall responsibility for safety lies with the government.

A competent, independent nuclear **regulatory body** must be developed; it is responsible for establishing requirements and regulations for nuclear safety, licensing, and ensuring compliance with the regulatory framework.

The **owner/operator** must be competent to operate the nuclear power plant in a safe, reliable and cost-effective manner and meet regulatory requirements.

Integrated Nuclear Infrastructure Review Service

Based on the Milestones Approach, the IAEA offers the Integrated Nuclear Infrastructure Review (INIR) service to both embarking countries and those that are expanding their nuclear power programme. It helps ensure that the infrastructure required for the safe, secure and sustainable use of nuclear power is developed and implemented in a responsible and orderly manner. Since its launch in 2009, the INIR service has been widely used by countries in the development or expansion of their nuclear power programmes.

The INIR service includes four clearly defined steps. A request from a Member State for this service signifies the commitment to all steps.

Step 1: Assessment of the Self-Evaluation Report (SER) prepared by the Member State requesting the service; the SER is based on the IAEA document *Evaluation of the Status of National Infrastructure Development (Rev.1)*. The IAEA will review the country's assessment of its nuclear infrastructure and may organize a SER support mission, if required.

Step 2: Conduct of a pre-INIR mission, where the INIR process will be presented and discussed with the Member State and terms of reference for the main INIR mission will be agreed upon.

Step 3: Conduct of the main INIR mission, where the status of the nuclear power infrastructure will be reviewed by a team of IAEA staff and external experts, based on the SER, supporting documents and interviews with key counterparts. The result will be the main INIR mission report with recommendations and suggestions in areas requiring additional work. Good practices will be recognized.

Step 4: Follow-up INIR mission, to assess the implementation of recommendations and suggestions provided during the main mission. The timing, to be agreed with the Member State, will be 18–30 months after the main mission.



Related Publications

Milestones in the Development of a National Infrastructure for Nuclear Power
IAEA Nuclear Energy Series No. NG-G-3.1 (Rev. 1)

Guidelines for Preparing and Conducting an Integrated Nuclear Infrastructure Review (INIR)
IAEA Services Series No. 34, 2017

Evaluation of the Status of National Infrastructure Development (Rev.1)
IAEA Nuclear Energy Series No. NG-T-3.2 (Rev. 1)

Introducing Nuclear Power: The Role of National Leadership
available also in Arabic, Chinese, French, Russian, Spanish
<https://www.iaea.org/publications/factsheets>

Other relevant publications are available in the **IAEA Nuclear Infrastructure Bibliography**
<https://www.iaea.org/topics/infrastructure-development/bibliography>

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<https://www.iaea.org/about/organizational-structure/department-of-nuclear-energy/division-of-nuclear-power/nuclear-infrastructure-development-section>