

# Expanding Peaceful Uses of Nuclear Power

## Ghana: Lessons Learned

### The peaceful use of nuclear power

Energy is at the heart of the UN Sustainable Development Goals and the Paris Agreement on Climate Change. Ensuring access to affordable, reliable, sustainable and modern energy for all would generate economic growth, job opportunities, better education and health care for billions of people and facilitate the creation of more sustainable, equitable and inclusive communities.

The increasing need for energy brings into focus the technology options for low carbon electricity generation, one of which is nuclear power. Nuclear power requires careful planning, with investment in time and resources, and numerous investigative studies, due to the nuclear safety, security and safeguards requirements associated with the possession and handling of nuclear material and the long-term commitment required for nuclear power.

### The infrastructure needed for nuclear power

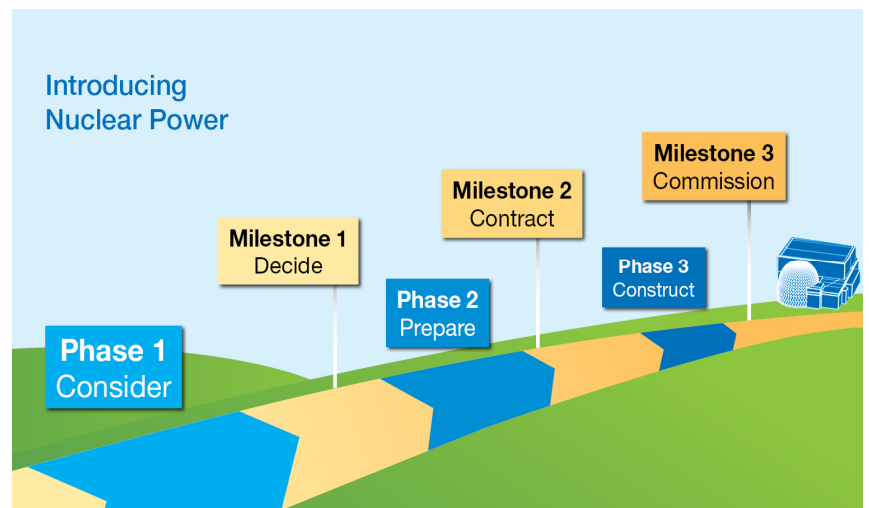
The investment in time and resources is required not only for the construction of the nuclear power plant (NPP) itself, but also for developing and adopting relevant policies, establishing appropriate legal and regulatory frameworks, and establishing institutions and developing human resources. A wide range of technical studies and evaluations will be required for developing new, or enhancing existing, physical infrastructure (for example the national electrical grid, environmental monitoring systems or radioactive waste management facilities). These activities are typically referred to as “development of the infrastructure needed for nuclear power” also known as the 19 nuclear infrastructure issues\* of the IAEA Milestones Approach. For a country which does not already have nuclear power, it may take up to 10–15 years to develop the necessary nuclear infrastructure.

\*For more information on the 19 infrastructure issues:  
<https://www.iaea.org/topics/infrastructure-development/milestones-approach>

### Role of the IAEA: The Milestones Approach

The International Atomic Energy Agency (IAEA) has developed a programme management framework, (the “Milestones Approach”) to assist countries proceed through the steps necessary to successfully develop and implement the infrastructure needed for nuclear power. The Milestones Approach splits the activities necessary to establish the infrastructure for nuclear power into three progressive phases of development, with the duration of each dependent on the degree of commitment and resources applied in the country. The completion of each phase is marked by a specific “Milestone” at which progress can be assessed and a decision can be made about the readiness to move on to the next phase.

To support countries implementing the Milestones Approach, the IAEA provides guidance documents, training and expert advice on nuclear safety, security and safeguards matters, and conducts peer reviews, in particular the Integrated Nuclear Infrastructure Review (INIR) to assist countries to evaluate the status of development of the necessary infrastructure.



IAEA Milestones Approach. (Photo /IAEA)

### Nuclear safety, security and safeguards

Also referred to as the 3S concept, nuclear safety, security and safeguards are the three technical areas which need to be addressed in establishing and implementing an adequate legislative and regulatory framework for the peaceful uses of nuclear energy. Measures taken to address one of these key areas can contribute to addressing the others as well. For example, the adoption of measures for physical protection of nuclear material can also help to ensure the safe uses of this material, while also protecting against diversion for malicious purposes. Each of the 3Ss are important in their own right but when implemented independently and not in coordination with one another, competing aims can overwhelm the efficacy of the 3S system. This could be addressed by including the 3Ss under one regulatory authority.



### Ghana nuclear power programme



Ghana's strategy is to plan for future electricity generation through clean fuels, including nuclear power. The government is pursuing the nuclear power agenda to help meet the current electricity needs of the country, to stimulate economic development - specifically the mining sector - and to contribute to regional electricity capacity in West Africa, and to regional integration.

Ghana's nuclear power programme builds on existing experience with a research reactor operated by the National Nuclear Research Institute in Accra. It also has experience with radiation safety, nuclear security, emergency preparedness and safeguards as a result of other nuclear activities related, for example, to health, agriculture and scientific research. In 2008, the Government established a presidential committee to report on the feasibility of adding nuclear to Ghana's energy mix and started investing in nuclear training and education. Ghana does not have the resources of an upper-middle income country but nevertheless has been able to methodically progress through Phase 1 of the Milestone Approach. In 2012 the Ghana Nuclear Power Programme Organisation (GNPPO) was established and took the lead in ensuring the recommended studies were conducted and a comprehensive legal framework developed. The GNPPO facilitated the establishment of the Ghana Nuclear Regulatory Authority (GNRA) and Nuclear Power Ghana (NPG—owner/operator of the future nuclear power plant), and enabled the Ghana nuclear power programme to successfully transition into Phase 2. While the GNRA develops the necessary regulations, NPG will take the leading role in implementing the Phase 2 activities including completing the site selection process, and further engagements with stakeholders and the public.



Girl students from the African Institute of Mathematical Sciences visiting the Ghana Atomic Energy Commission



### Lessons Learned

#### Lessons learned from Ghana

- \* Ensure political commitment to the goal of producing nuclear power. The Ghanaian Government has not wavered from its decision to embark on nuclear power and has matched the commitment by investing in the partnerships and the development of human resources necessary to realise this goal.
- \* Establish an organization to implement the nuclear energy programme (referred to as a Nuclear Energy Programme Implementing Organization (NEPIO) by the IAEA) early on with well-defined objectives and mandate (in Ghana this is the GNPPO).
- \* Assemble a dedicated and competent team as the technical support to the NEPIO in order to address the 19 infrastructure issues. The Nuclear Power Institute under GAEC has performed this role admirably, providing the technical support itself or coordinating the support of other competent organizations within Ghana, coordinating the IAEA INIR Phase 1 mission to Ghana, establishing a management system for Phase 1 activities and coordinating the development of the Comprehensive Report at the end of Phase 1.
- \* Establish national project(s) with the IAEA Technical Cooperation Department, and identify people who are committed to working in this field and are able to work with the different IAEA line departments to achieve the objectives of the project(s).
- \* Ensure close cooperation on nuclear safety, security and safeguards. This has been achieved in Ghana by placing them all under the mandate of one regulatory authority, the Ghana Nuclear Regulatory Authority.



### For Further Reading

#### IAEA Milestone Approach

[https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1704\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1704_web.pdf)

#### IAEA INIR Phase 1 mission to Ghana

<https://www.iaea.org/newscenter/pressreleases/iaea-reviews-ghanas-nuclear-power-infrastructure-development>

#### IAEA INIR Phase 1 Follow-Up mission to Ghana

<https://www.iaea.org/newscenter/news/iaea-reviews-progress-of-ghanas-nuclear-infrastructure-development>

#### Nuclear Infrastructure Bibliography

<https://www.iaea.org/topics/infrastructure-development/bibliography>

#### Side Event on Ghana's Successful Implementation of Phase 1 of the IAEA Milestone Approach

<https://vcdnp.org/ghanas-successful-implementation-of-phase-1-of-the-iaea-milestones-approach>