

(The Ghana Nuclear Power Programme Organization (GNPPO) is mandated with the task of coordinating, overseeing and administering the phase-to-phase implementation of the Nuclear Power Programme in Ghana until the commissioning of Ghana's first nuclear power plant.)

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# GNPPO NEWSLETTER



## ENVIRONMENTAL CONSIDERATION FOR NUCLEAR POWER

### BACKGROUND

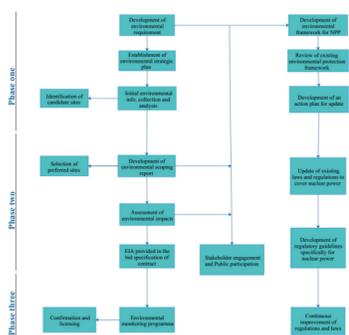
A decision to start a nuclear power programme (NPP) is strongly based on a commitment to use nuclear power in a safe, secure and peaceful manner. This commitment requires establishing sustainable national infrastructure for the nuclear power program throughout its lifecycle. The responsibility with establishing a sustainable national infrastructure lies solely on the country introducing nuclear power. The International Atomic Energy Agency's (IAEA) Energy Series Publication (NG-G-3.1) identifies nineteen nuclear infrastructure issues every member state introducing nuclear power should address. Environmental protection is one of the nineteen issues. All issues relating to environmental protection are to be addressed to ensure the programme is deployed in an environmentally safe and sound manner. This is in line with the Environmental Protection Agency (EPA) law that mandates any new undertakings to first meet Environmental Impact Assessment requirements.

### APPROACH FOR DEVELOPING ENVIRONMENTAL PROTECTION FRAMEWORK FOR THE NUCLEAR POWER PROGRAMME

The principal objective of developing an environmental protection framework is to protect natural resources, preserve cultural and historic resources and enhance socioeconomic benefits. These are the bases for issuing an environmental permit for the construction and operation of a nuclear power plant, that all the necessary environmentally related issues are addressed including the fulfilment of all international obligations and adherence to national laws.

There are three main steps in developing environmental protection framework for nuclear power programme. These are:

- Development of environmental requirements for site selection
- Review of the suitability of existing laws and regulations
- Completion of environmental impact assessment process



### ENVIRONMENTAL REQUIREMENT FOR SITE SELECTION

Location of a suitable site for a nuclear power plant involves several considerations which cover safety, security and environment issues. The environmental considerations in the site selection process enable the assessment of site suitability for the nuclear power plant during construction and operational stages. These issues would be featured in the update of environmental regulatory guidelines, and the data would be the basis for the development of Environmental Impact Assessment (EIA) report. Among the considerations are the following:

- » Water use and quality;
- » Geology and Soils;
- » Land use;
- » Meteorology and air quality;
- » Ecology;
- » Socioeconomics;
- » Historic and cultural resources;
- » Noise and visual resource.

### ENVIRONMENTAL PROTECTION FRAMEWORK

The framework provides the basic provisions relevant to addressing environmental issues which are important for the implementation of nuclear power programme. These provisions, among others, include the regulatory and legal environmental framework, and guidelines for conducting nuclear EIA for NPP. Any newcomer country needs to ensure that its legal and regulatory frameworks are in place, including all international obligations, and appropriately accounting for the unique safety and environmental aspects of the programme.

It is expected that environmental laws and regulations would be either developed or enhanced. It is therefore essential that the country's environmental framework is reviewed to assess the suitability, with an action plan on how to address the identified deficiencies.

### LEGAL FRAMEWORK

The introduction of nuclear power requires total commitment and recourse to legal framework. Critical issues of public health and protection of the environment from the impact of nuclear activities are captured in the legal framework. Radiological impacts which are mainly covered by nuclear laws, may not address all environmental impacts issues and therefore additional environmental laws may be required to ensure adequate protection of the environment. Hence the legal framework for protection of the environment and the public is categorised into two separate bodies of laws, the nuclear laws and environmental laws. The nuclear laws typically handle the aspects that deal with radioactivity, and the environmental laws cover all kinds of hazards which may include requirements for the protection of the environment against the harmful effects of ionizing radiation.

To ensure that there are comprehensive laws in place for addressing the full range of environmental issues resulting from a nuclear power programme, the country's existing laws on environmental protection are to be assessed extensively to identify areas of laws that need addition, revision and upgrade. The review includes all international obligations of the country.

### INTERNATIONAL LEGAL INSTRUMENTS

This is another key aspect of legal framework that would require attention as a new member state. The body of international environmental conventions and treaties includes those that focus on the development of general principles and decision-making practices; protection of specific environmental media (e.g. air and the atmosphere, oceans and seas, freshwater resources, and soil), wildlife and natural resources, and prevention of specific types of pollution like the dispersion of radionuclides. These objectives reflect key government policies and enable countries to work together to address these vital environmental issues that are trans-boundary or global in nature. Many of the important environmental impacts of nuclear power plant project are not radiological in nature, therefore, for States that are party to conventions, treaties or regional agreements on environmental protection, the non-radiological aspects are often dealt with under such international legal instruments. With regards to radiological protection of the environment, the following are international nuclear legal instruments available to deal with such issues:

- Convention on Nuclear Safety;
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
- Convention on Early Notification of a Nuclear Accident;
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

Ghana has ratified or acceded to two of the conventions. Parliament has given approval for accession of the remaining two conventions.

### REGULATORY FRAMEWORK

Following the establishment of a legal framework, regulations on the environmental activities required by law are expected to be developed and implemented. Therefore, if the country's existing regulations for EIA does not effectively address the introduction of nuclear power project, there is the need for modification of the regulations to fully address such aspects of the nuclear power project. The country will need to ensure that organizations responsible for implementing environmental laws and regulations applicable to the nuclear power programme have sufficient technical capacity and clearly defined responsibilities. EIA regulations generally address the following areas:

- Process of conducting EIA and methodology;
- The Scope of EIA;
- EIA Report Content;
- Environmental Impact Assessment;
- Environmental Monitoring Programme;
- Required Interfaces with other Legislation.

### PROCEDURES FOR CONDUCTING NUCLEAR EIA (EIA PROCEDURE AND CONTENT)

The EIA process broadly consists of several steps that result in the development of three reports:

- Initial environmental information report;
- Environmental scoping report (ESR);
- Environmental impact assessment (EIA).

### INITIAL ENVIRONMENTAL INFORMATION

The first and second phases of the siting activities consist of site survey and selection process where several investigations are conducted including that of environmental investigation. The environmental studies commence with gathering and analysis of available information which is included in the scope of site survey activities leading to the selection of candidate sites. Further in the early part of second phase, detailed studies are conducted with collection of additional data and interpretation, providing further guidance to selection of the preferred site(s) and would be used as basis for the development of the Environmental Scoping Report (ESR). The initial environmental information report contains available data/information covering among others, the following thematic areas: land use, historical and cultural resources, meteorology and air quality, geology, hydrology, ecology, socioeconomics and environmental justice, the radiological and chemical environment, and related national projects.

The task of conducting the initial environmental information analysis in the first phase, and possibly in the early stage of the second phase, in most cases would be the responsibility of the Country's Nuclear Power Programme Organisation.

### ENVIRONMENTAL SCOPING REPORT (ESR)

When site selection has been concluded and the site(s) have been chosen for the detailed EIA, all available information is collected and incorporated into the ESR. The ESR uses the initial environmental information as the starting point for planning the scope of the detailed EIA report. It provides the necessary guidance to conduct the EIA study. The report provides the review of available environmental information and the project scope, and then identifies the data gaps that should be filled to enable a complete assessment of the environmental impacts. The ESR also identifies the baseline data, the power plant technical information that should be collected and the methodology to be used to evaluate the information, assesses the impacts and addresses them in the EIA report.

The development of the draft ESR is done through the involvement of all stakeholders, where their input would be considered in the finalization of the report. The responsibility of drafting the report lies with the owner/operator.

### ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA is conducted to ensure that environmental considerations are explicitly addressed and incorporated into the decision making process. It is also to avoid and minimize the adverse significant biophysical, social and other relevant effects of the nuclear power programme development; protect the productivity and capacity of natural systems and the ecological processes

A typical content of EIA report includes the following:

- Executive Summary
- Introduction
- Project Description
- EIA procedure, communication and Participation
- Description of the Affected Environment

- Meteorology, climatology and air quality;
- Technical description of the project
- Land use
- Geology and soils;
- Water use and quality;
- Ecology;
- Noise and visual resources;
- Historical and cultural resource;
- Socioeconomic;
- Public and occupational health; and
- Waste management;
- Environmental impact assessment for the project;
- Prevention and mitigation of adverse impacts;
- Environmental impact monitoring programme.
  - Radiological monitoring
  - Physiochemical monitoring
  - Ecological monitoring

### APPLICATION OF EIA

The final development of the environmental impact assessment report would be used in the following key areas;

- Preparation of the bid invitation specification or contract
- Basis for subsequent licenses and permits
- Development of the environmental monitoring programme

### STATUS OF GNPPO'S ENVIRONMENTAL ACTIVITIES

The technical body of GNPPO, the Nuclear Power Institute (NPI) has five centres handling the various infrastructure issues. The Nuclear Safety Assessment Centre (NSAC), one of the five centres, is responsible for addressing siting, environmental protection, emergency preparedness, nuclear safety, security and safeguard issues. The Environmental Protection Unit, under NSAC constitutes five working groups namely, Wildlife Preservation, Land Use, Archaeological and Cultural Preservation, Community Impact Assessment and Water Availability and Quality. These Groups are responsible for activities relating to environmental protection which are well captured in the GNPPO roadmap for nuclear power programme development.

The main environmental activities for phase one of the roadmap include the development of environmental requirement for siting, initial environmental data collection and analysis which would contribute to the selection of candidate sites and review of the suitability of the country's environmental protection framework (see fig 1 above). These activities are currently being carried out.

### ONGOING ACTIVITIES

The environmental requirements to be considered in the site selection process have been developed. Details of these requirements are captured in the Siting Charter Document. These requirements were developed in collaboration with a number of environmental stakeholders, and were done through a stakeholder workshop which was conducted in July 2014. At the workshop, various working groups engaged their stakeholders in discussion on the environmental issues needed to be considered in the site selection process. The following stakeholders participated in the workshop: EPA, Ministry of Chieftaincy and Traditional Affairs, Lands Commission, Nuclear Regulatory Authority, Ghana Ports and Harbours Authority, Forestry Commission, and Ministry of Fisheries. Ghana is also required to review the suitability of existing environmental protection framework, and initial data collection and analysis to identify candidate sites.

These activities are also part of the recommendations made by the International Atomic Energy Agency during the Integrated Nuclear Infrastructure Review (INIR) mission held in January 2017. Currently, a team from EPA, NRA, Volta River Authority (VRA) and NPI (the Legal team and Environmental unit) is being constituted to conduct the review. The key areas being focused on include our law and regulations with regards to nuclear power, and guideline process in conducting environmental impact assessment for nuclear power. Alongside with these activities, the GNPPO Environmental Unit is also working on collection of environmental data and analysis to identify candidate sites.