

(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.)

July, 2017

Vol 2. No. 007

GNPPO NEWSLETTER



THE NEED TO DEVELOP INDUSTRIAL INFRASTRUCTURE

BACKGROUND

A key requirement to developing local industry infrastructure in any nuclear power programme is ensuring and sustaining safety during construction and operation of the nuclear power plants.

A large number of construction and supply chain jobs and businesses would be generated when the Ghana Nuclear Power Programme which seeks to generate electricity from nuclear power plant(s) enters Phase 3 of its activities. Phase 3 of the nuclear power programme involves contracting and construction activities.

Nuclear power plant construction project is a multi-billion investment project that requires the supply of a range of goods and services and also continuous competent human and industrial supports for its safe, reliable and successful operation over an average lifetime of 40 to 60 years. The costs of equipment, components and materials used for the construction of a nuclear power plant, as presented in IAEA document "Developing Industrial Involvement to Support a National Nuclear Power Programme", represent approximately 30% to 40% of the overall cost of the plant. Furthermore, about 30% of the total nuclear power plant investment cost is typically related to civil construction and erection on-site. These constitute significant business opportunity for local industry and a great avenue for job creation.

Optimum local industry participation in the country's nuclear power programme is key and should not only be targeted at satisfying local content laws and requirements but also ensuring economic and industrial opportunities as well as technology transfer that will have positive impact on the standards and competitiveness of the local industry.

Construction of nuclear power plants requires the use of advanced technology and high quality component parts. It is, therefore, a requirement for local industries to comply with strict codes and standards and rigorous quality programmes associated with goods and services for the construction and operation of nuclear power plant(s).

For instance, during construction, bulk materials including metal sections, welding electrodes, bolts, screws, nuts, washers, standard pipes, fittings and supports, conduits, lubricants, sealants, paints, NDE (Nondestructive Evaluation) materials, chemicals for leak detection, cleaning marking, consumables, concrete anchors, pull boxes, junction boxes terminals among others will be used. The manufacture and supply of these materials as well as provision of these services by local industries will generate appreciable business and create jobs.

These business opportunities, the avenues for job creation and upgrade of local industry present a clear justification for directing efforts at building local industrial infrastructure suitable and capable of competing for sub-contracts in the nuclear power programme.

AREAS OF PARTICIPATION

The local industry can participate in four major areas depending on their ability to meet requirements. These are: Design and Planning, Manufacturing and Procurement, Construction and Installation and Operation and Maintenance. Information on some categories of targeted industries is given below;

1. Engineering Companies: National Industries with experience in the design and engineering of conventional thermal power plants systems. Basic engineering design competencies expected for this category of industries include civil designers having the expertise to design the nuclear power plant site, buildings and structures; mechanical designers of nuclear power plant systems having the expertise to design piping and pipe support systems; equipment engineers with the expertise to create equipment specifications and data sheet to be used in procurement and in contract negotiations; electrical designers having the expertise to design electrical equipment, wiring and lighting, computer aided design and drafting technicians and computational software and hardware engineers.

2. Manufacturing Companies: National Industries with experience in manufacturing thermal power plant equipment or non-nuclear safety related equipment could be qualified to manufacture equipment for nuclear power plant if they can meet reliability targets and other conventional manufacturing requirements. These companies may include electrical and mechanical equipment manufacturing companies.
3. Civil Construction and Installation Companies: National industries with experience in the construction of ports, complex buildings, roads and hydro projects should be able to qualify to participate in the construction of nuclear power plants, Balance of Plant (BOP) structures and other auxiliary or supporting facilities.
4. Operations and Maintenance Companies: The industry with the capacity to perform electrical and mechanical maintenance, testing, calibration, in-service inspection, components/equipment replacement and upgrades.
5. Heavy Equipment Handling and Transportation Companies: National industries having the resources and experience to successfully deliver heavy equipment, extra heavy and extra-large modules and components to the nuclear power plant construction site. Industries with the capacity to operate very heavy lift cranes and platform for unloading heavy equipment from ships and also for the handling of modules and large components at the nuclear power plant construction site.

DEVELOPING LOCAL INDUSTRY CAPACITY: THE GNPPO APPROACH

The graded approach for effective participation of Ghanaian local industries in the nation's nuclear power program has been put into the following categories:

1. Determining the Localization Provisions
2. Performing Local Industry Information Screening
3. Establishing Industry Policy for Nuclear Power Programme
4. Developing Local Industry Upgrade and Incentive Programmes
5. Qualification and Participation

Determining Localization Provisions

Nuclear power programmes lead to stable energy production, job creation and trigger national industry development, technology development and transfer. The development of technology will also result in spin-offs such as nuclear and non-nuclear related businesses. A broad range of industrial activities such as engineering, construction, operation and maintenance that are typical of high capital value infrastructure development programmes are the key drivers of the business spin offs. The participation of local industry is therefore a pre-requisite to attaining these business expectations.

Localization provisions must be such that national/local industries with the requisite characteristics effectively participate in the project phase. Generally nuclear power programmes have such features as Advanced Technology, High Quality Standards, Special Materials, Long Time Schedules and a Safety Culture requirement that applies to the entire supply chain. These special features for local industries must be considered when defining the share of national industry participation in the entire programme. Major entry points for local industry in the nuclear power programme are the design and planning stage, manufacturing and procurement stage, construction and installation stage and operation and maintenance stage.

To determine the localization ratio, a national analysis of potential local industry capacity at each possible entry level should be conducted based on three major parameters, codes and standards employed by potential local industries, investment capability of potential industries and also the availability of human capacity to

meet project schedules. A study to determine the participation of local industry in present and completed infrastructural projects such as the Oil and Gas infrastructure project in Ghana, the hydro power plants infrastructure projects, the thermal power plant infrastructure projects and other relevant construction projects should also be conducted to determine the participation of local industry in these previous projects. This knowledge will then be used as basis for setting localization ratio for the nation's nuclear power contract agreement.

Local Industry Information Screening

It is a general requirement for local industry to possess and comply with strict codes and standards and rigorous quality programmes related to the goods and services that they could provide for the construction and operation of nuclear power plants.

To be selected to participate in the project in any qualified capacity, there is the need to screen local industry information. This is primarily because local participation that is not backed by proven experience may involve appreciable risk in the form of schedule delays, cost overruns and poor performance. The objective is also to identify the existing capacity and capability of local industry and hence fashion out measures to support local industry to upgrade in order to meet the nuclear power project requirements. This support could come in various forms including industry specific training and qualification programmes by international experts and in partnership with experienced suppliers.

The screening process should cover such areas as Technology (engineering, design, manufacturing, assembly and installation), Human Capacity (engineers, technicians and skilled Labour), Test and Inspection Capacity and Capability (inspection, testing and qualification), Financial Incentives, Codes and Standards and Research and Development. The approaches being considered by the GNPPO are:

1. Categorization of Industries
2. Performance of desktop survey on the categories identified
3. Performance of detail survey
4. Conduct of Site Visitation, Inspection and Appraisal of Industry

The screening outcome will guide policy direction on industrial involvement and also inform the design of short, medium and long-term capacity improvement plans to address existing gaps and meet targeted upgrade within local industry. After evaluation of the specific data, expert visit to the various industries will be conducted to physically verify/inspect and ascertain information gathered through the desktop and detail surveys. The outcome of this final stage of the screening process will be factored in, to duly appraise and subsequently qualify each industry for suitability to participate in any extent possible in the nuclear power programme.

Based on the extent to which the qualification criteria are satisfied, a spectrum of industries with varying grades will be constituted into a Nuclear Industries Association. The zoning is to among many other objectives assist to effectively tailor training programmes to meet the upgrade needs of each zone:

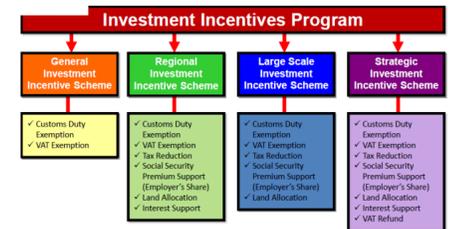
ESTABLISHING INDUSTRIAL INVOLVEMENT POLICY

There is the need to mobilize and motivate local industries to participate and support Ghana's nuclear power programme. The GNPPO's plan is to participate in initiating dialogue with potential vendors and lead local industries to make partnerships in specific sectors of relevance to the nuclear power programme. These efforts must however be well anchored within the nuclear industry involvement policy; stability in government's policy is the insurance for local industry participation.

Industrial policy should be informed by results of industrial diagnosis and also based on realistic targets (sub-sector and proportion) for local participation. This is required to reduce the risk of localization and ensure profitability. Realistic participation ratio for the first unit for a new comer country is considered to be within 20% to 30%. The industrial policy should ensure that, local industries participate in government's research and development projects for upgrade and enhancement. It should also insist on the need for continuous re-assessment and qualification of businesses as a requirement to participating in any industrial sub-sector.

INVESTMENT INCENTIVE PROGRAMME

Industrial development requires a well-structured investment incentive programme which should be clearly specified in the industrial development policy. The focus should be on the need to develop an investment programme which categorizes investment and assigns appropriate incentives to each category of investment. Consideration could be given to an investment programme as shown.



Nuclear power development requires strategic national investment and hence stable, long-term incentive programme should be designed to encourage private sector participation in upgrade and qualification programmes. Financial incentives should lead to increasing availability of and access to long term investment and finance facilities to local industries at competitive rates. Comprehensive mechanisms should also be integrated within industrial development policy to monitor the proper application of incentive regimes to meet the industrial development targets.

UPGRADE PROGRAMMES

A number of activities have been considered in the strategy to develop a competitive local industry. The establishment of state-of-the-art technology transfer centers in universities, polytechnics and training institutes will support the transfer and adoption of new and advanced technologies within the local industry. Industry focused, competency-based training programmes by the Council for Technical and Vocational Education and Training (COTVET) should be reinforced to produce the base human resource for industrial upgrade. A well-structured and mandatory programme that allows foreign headquartered industries (construction, manufacturing and design) operating in Ghana to support indigenous industries in building capacity through the transfer of technology and skill development will contribute to meeting localization ratio. Enhancing technology transfer by creating a working relationship between industry and training institutions should be pursued. Indigenous knowledge and technology which are scattered all over Ghana should be assembled, improved, well-resourced and constituted into regional centres of technology and skill development to serve industry and training institutions. Upgrade programme with the objective of satisfying and adhering to international codes and standards should be targeted. These programmes should be planned with the involvement of potential vendors, foreign and locally established industries.

There must be a sense of business within local industry association which should include policy making, training and qualification and also engineering. Industry association should have training programmes for all industrial sub-sectors and organize workshops, seminars on codes and standards (international and local). Formation of alliances and ventures among many are essential pathways to creating competitive and profitable local industry.

FUTURE OUTLOOK BY THE GNPPO

1. Involve stakeholders in the design and implementation of a project within government's plans for industrial development, to perform a diagnosis of local industries with the aim of identifying gaps and developing measures to redress.
2. Constitute an industrial involvement team to be made up of relevant industrial sub-sector leadership of AGI, representative of NDPC, MOTI, GhIE and GNPPO to develop and facilitate the implementation of a national industry involvement policy which will also specify nuclear power programme supplier quality assurance approaches.
3. Conduct vendor specific workshop for local industry. There is the plan to engage in the near future potential NPP suppliers to better understand areas that Ghanaian industry could participate as well as the required quality standards and procedures for qualification of contractors. In this process, a non-disclosure agreement will be signed to enable potential vendors to participate in national survey on local industry capability by providing breakdown of their specific technology components.

CONCLUSION

A viable nuclear power programme should rely on strong governmental support and national investment directed at progressively building skilled human resources, competitive industrial sector and local supply chain in a medium to long term national development framework.

It has been recognized that, Ghana has a comparatively low level of industrial capability and capacity. It is therefore essential that active steps be instituted, as part of any nuclear transaction, to introduce new capabilities and upgrade existing capabilities in the many different areas of nuclear project. Arrangements as in joint ventures, technology transfer initiatives, financing and incentives among others are needed to support local industry.