

Bid Preparation and Evaluation for Nuclear Power Plant Project Management

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Abstract

Bid preparation and evaluation is one of the main activities in Nuclear Power Plant Project management. International Atomic Energy Agency guide and Korean experience was studied for Malaysian requirement in realization of first Nuclear Power Plant. Several aspects shall be taken into consideration such as political scenario, financial capabilities, sitting, human resource, technologies, fuel supplies and decommissioning for long term exceeded hundred years. Bidding process and activities is proposed for our country requirement. The main activities included but unlimited to Bid Invitation Specification, Bid Evaluation Process, Technical Evaluation, Economic Bid Evaluation and Contracting. On the end of day, Malaysia need safe and reliable Nuclear Power Plant. Malaysian Economic Transformation Programme also get benefit from spin-off localization products and services as well as Technology Transfer Programme.

Key words -- Bid preparation and evaluation, Nuclear Power Plant, Project management, Economic Transformation Programme, Technology Transfer Programme.

INTRODUCTION

Dato' Sri Mohd Najib bin Tun Haji Abdul Razak, Prime Minister of Malaysia, have launch Economic Transformation Programme (ETP) on 26 October 2010. 131 entry point projects (EPPs) have been identified that concretely outline actions required to growing the economy. Deploying nuclear energy for power generation is one of the EPP under Oil, Gas and Energy sectors.

Nuclear Power Infrastructure Development Plan (NPIDP), is targeted to be ready by 2013. Prior to conducting these necessary studies, a nuclear power pre-feasibility study and initial site selection study has already been undertaken. Building the twin unit nuclear plant is expected to require a RM21.3 billion investment up to 2020.

Figure 1, shows planned activities to realizing first Nuclear Power Plant (NPP) for Malaysia. During preparation and decision phase bid preparation and evaluation need to be implemented, specifically for procurement and award contract activities.

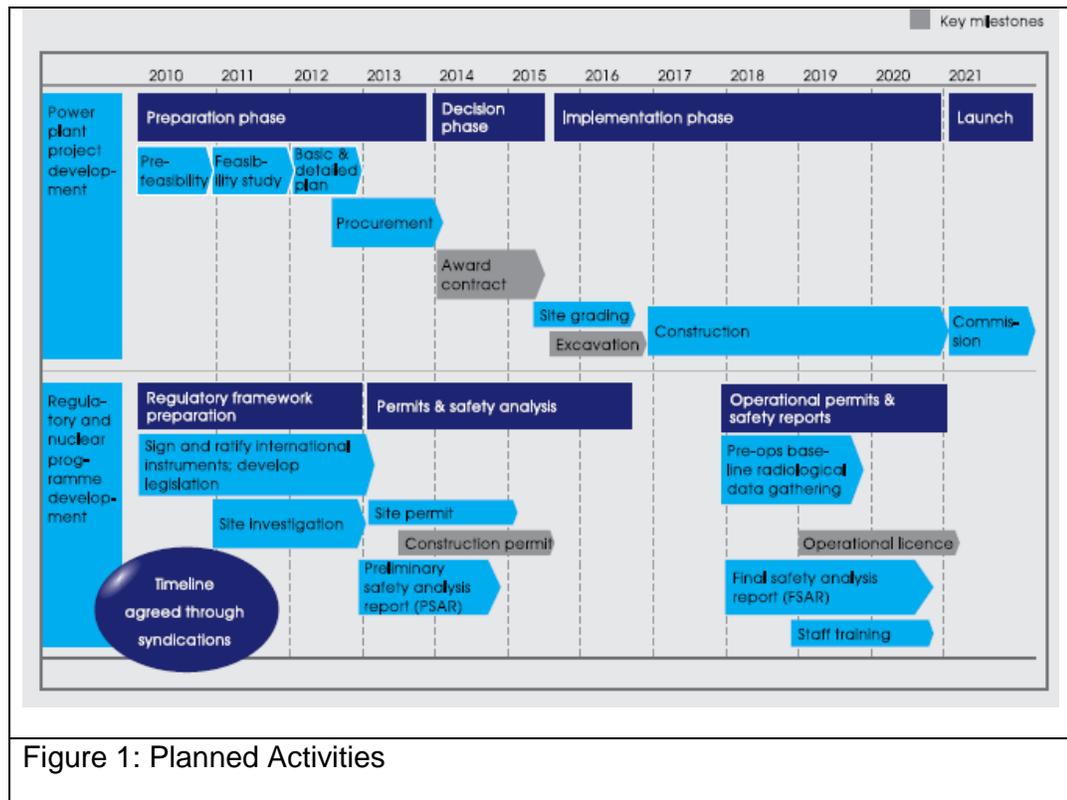


Figure 1: Planned Activities

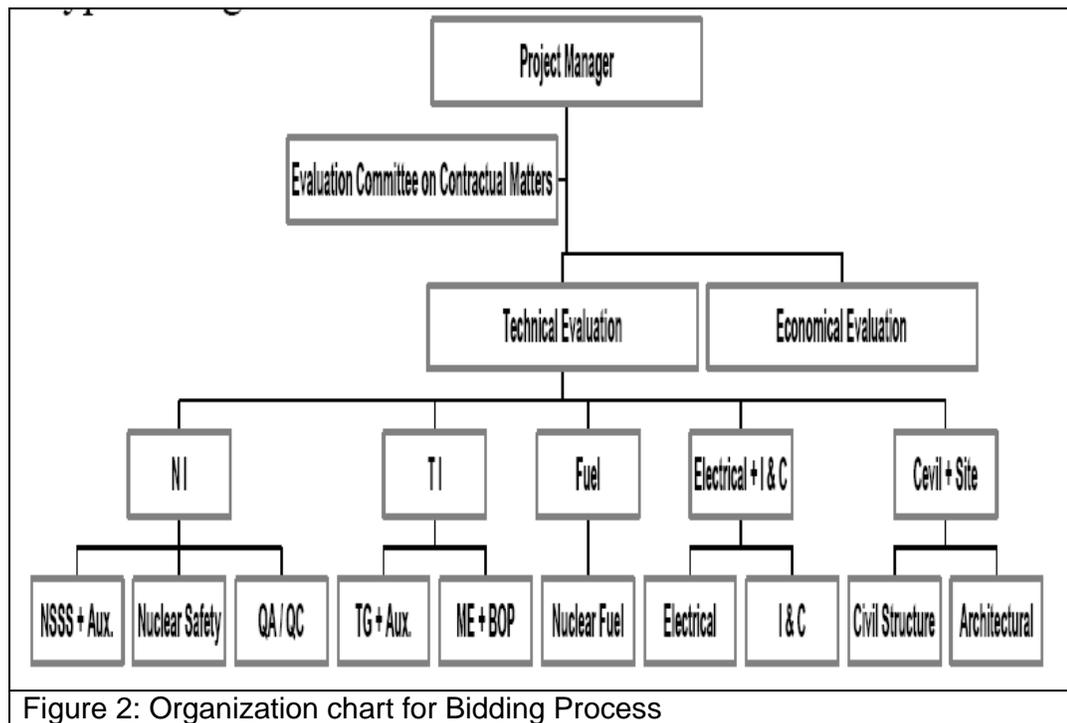
From Pre-feasibility to commission for NPP required at least 10 years. Based on present experience from other countries around the globe, NPPs can be operated within 40 to 60 years. Decommissioning of NPP require at least another 10 years. For that reason, NPP shall take considering for future 100 years. History for back 100 years and more are equally important.

Malaysian Nuclear Agency (Nuclear Malaysia) will be transformed to become Technical Services Organization (TSO) for NPP. Nuclear Malaysia shall prepare to support Regulatory and Operating Organization for the first Malaysia NPP. On the other hand, for the long term Nuclear Malaysia shall lead in future NPP technology. For the beginning, Planning and producing the various guidelines for every activity are crucial for Nuclear Malaysia. On the other hand, Human Capital Development shall be take care to fulfil requirement for Regulatory Body and Operation Organization.

METHODOLOGY

Nature of NPP project is understood for long term project exceeded hundred of year and always consistently committed by government in term of policy, finance and security obligation. Coordination by government for local agencies, institutes, universities, industries, and organizations involved also a crucial factor for smooth NPP project and benefit for country. During every activity, long term shall be considered including Bidding Process.

Jong Hwan Ahn (2010) suggests Organization chart for Bidding Process as shown at Figure 2. The size of this team for Bidding Process is around 25 to 40 professionals. They will be responsible for various studies carried out in the pre-project activities and represent the main core of the organization of the whole nuclear power program. Combination of experience and knowledge in conventional power plant project and nuclear reactor engineering and nuclear power systems are useful.



Technical matter consists of Nuclear Island (NI), Technical Island (TI), Fuel, Electrical, Instrumentation, Control, Civil and Sitting. Technical of NPP are available and well documented. Supplier of NPP and Fuel are also available with reasonable cost and time. Economical matter using conventional methods, and not take consideration of economic crisis such as stock markets crash, property bubbling, and others. Political, Military and Social matter are not highlight and not well documented.

For the successful of Bidding Process, lot of information are needed. International Atomic Energy Agency (IAEA) suggests Standard Input or information needed for Bid Preparation as shown at Table 1.

Table 1: Standard Input for Bid Preparation

Standard Input or information needed for Bid Preparation
Pre-investment study
Site-evaluation and qualification
Evaluation of NPP supply market
Establishment of management system
Legal framework
International convention and agreements
Regulatory requirement
Contractual approach (Super Turnkey or Normal turnkey)
Financial plan
Technology transfer and training requirement
Public acceptance
Owner's management organization

One of the requirements for Bid Preparation is Bid Documents. Bid Documents is very important document that need to be prepared by Operating Organization for interaction with Supplier. This document is one of the factors that will shape NPP for at least half of century. IAEA suggested the contents of Bid Documents as shown at Table 2.

Table 2: Contents of Bid Documents

Contents of Bid Documents
Vol.1: General information
Vol.2: General technical aspects
Vol.3: Technical description of nuclear island
Vol.4: Technical description of nuclear fuel and fuel cycle
Vol.5: Technical description of turbine-generator plant systems
Vol.6: Technical description of balance of plant
Vol.7: Technical description of electrical systems
Vol.8: Technical description of instrumentation and control
Vol.9: Technical description of civil works
Vol.10: Spare and wear parts, consumables and special tools
Vol.11: Scope of supply and services
Vol.12: Alternatives and options
Vol.13: Project schedule
Vol.14: Quality assurance programme
Vol.15: Training
Vol.16: National participation and technology transfer
Vol.17: Guarantees and warranties
Vol.18: Commercial conditions

The technical bid evaluation is a part of the overall bid evaluation, which comprises technical (including safety), economic, financial, contractual, political, organizational and other applicable aspects which have to be considered in the decision-making process of implementing the project and the selection of the supplier.

The technical bid evaluation starts with the receipt of the bids and ends with the final evaluation report. The most important activities during the bid evaluation phase suggested by IAEA are in the following Table 3.

Table 3: Activities during the bid evaluation

Activities during the bid evaluation
Receipt and opening of the bids
Preliminary bid evaluation and preparation of preliminary bid evaluation report
Detailed bid evaluation
Preparation of questionnaires
Negotiations
Preparation of input data for the economic bid evaluation including balance of-plant (BOP) cost estimate
Preparation of final evaluation report

RESULTS AND DISCUSSIONS

NPP shall be considered for long term project, and lot of study for technology, finance, politics, weather, social and others are needed. Interrelated factors shall be study and considered for lifetime of NPP and several decades after operation.

Cost of NPP must be count from planning up to decommissioning and better if included permanent storage for high level waste. During operation, major upgrading and refurbishment of systems are needed for several times due to aging, technology and safety requirement. And finally decommissioning and high level waste cost. High level waste shall be serviced forever if permanent storage in our country. Sometimes, economics crisis will occur such as stock market crash, property over-heating, high inflation rate and others uncertainty.

A lot of lessons can be learns from IAEA and Korean experience about technical matter of NPP. However, Malaysia shall more careful about other matters, such as economic, politics and social.

However, to take consideration of current scenario, forecasting of global economic, political, technology and weather need to be predicted and asses for the next hundreds of year. Local and global history for past hundreds year shall also considered.

Current decade is a decade of uncertainty in world economy, politic and weather. United States of America (USA) and Europe economies were decreased, on the other hand China economic increasing in fast rate with Brazil, Russia and India. Political shift also occur in West Asia and other part of world. Earthquake and Tsunami was also hit NPP in Japan.

Nuclear industry is a complexes industry that inter-connected in the supply-chain in global arena. Most critical technology is dominated by USA as a current leading world economy, political and military. By the year 2020 China is expected to replace USA as a leading economical power. After that it's interestingly to who are the leading of political and military power. Supply-chain of critical technology and fuel may be wills changed drastically.

The main step to be taken during bid preparation and evaluation include prepare for Guideline for Bidding Process (GBP), establishment of organization and Quality Assurance Program (QAP) for bidding. Rest of the process will follow the GBP and QAP for bidding. For the time being Nuclear Malaysia shall produce GBP to be used to support Regulatory Body or NPP Utility Organization. After establishment of bidding organization, QAP for bidding shall be produced for the whole guide bidding process.

CONCLUSION

Guidelines for Bidding Process, establishment of organization and Quality Assurance Program for bidding are main requirement for bidding process. Nuclear Malaysia as TSO shall be ready with GBP and QAP for bidding. Prediction and assessment for the next hundreds of year of global economic, political, technology and weather as well as conventional standard Input or information are needed for Bid Preparation.

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