

Thailand: Infrastructure Development and Challenges to Launch Nuclear Power Programme

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Abstract. In June 2007, the cabinet passed a resolution for Thailand's Power Development Plan (PDP 2007). It was mentioned in the plan that Thailand will have 2 x 1,000 MWe nuclear power plants in 2020 and another 2 x 1,000 MWe in 2021. The PDP 2007 was revised in March 2009 and it was agreed to change the nuclear power generation to only 1 x 1,000 MWe in 2020 and 2021 respectively due to the large excess capacity at present. Many activities related to development of infrastructures in order to support electricity generation using nuclear power are being executed.

Milestones for nuclear power program implementation has been developed using the IAEA document "Milestones in the Development of a National Infrastructure for Nuclear Power" with some amendment/additions to suit the country situation. According to the schedule, a lot of activities related to infrastructure establishment, feasibility study, utility preparation and public education & participation are being performed. Within the year 2011, various issues such as legal and regulatory systems and international commitment, industrial and commercial infrastructure, technology transfer and human resource development, safety and environmental protection, public information and public acceptance, preparation of the nuclear power utility establishment, etc. must be solved out and undertaken to assure the cabinet to make final decision to go nuclear.

There are many challenges for Thailand embarking of the nuclear power programme. It is essential to plan for the establishment of a regulatory body at the national level to support and regulate the nuclear power plant industry. Currently, the application for a license and the monitoring of a power plant are administered by the authorities of various agencies under different ministries; hence the process is very time-consuming and overlaps with one another. The approach that the regulatory body and the authorities to issue licenses relevant to the nuclear power plant operation are merged into one independent body is under consideration. The human resources development (HRD) is also a key process and is time consuming.

1. THAILAND'S POWER DEVELOPMENT PLAN 2007-2021 (PDP 2007), THE NUCLEAR POWER INFRASTRUCTURE PREPARATION COMMITTEE (NPIPC), AND RELATED NEPC AND CABINET RESOLUTIONS

At the cabinet meeting No. 4/2550 on 19 June 2007, a resolution was passed approving Thailand's Power Development Plan 2007-2021 (PDP 2007), according to the resolution of the National Energy Policy Council (NEPC).

The gist of the PDP 2007 Rev 2 includes, among others, the designation of the option to generate electricity from nuclear power at the amount of 1,000 MWe in 2020 and another 1,000 MWe in 2021 (revised in March 2009) so as to be one among the fuel procurement options for power generation in the long term, which will contribute to adequate and secure procurement of electricity of the country. In this regard, the NEPC has assigned the Electricity Generating Authority of Thailand (EGAT) to be the focal agency to undertake the feasibility study, planning, design and preparation for the plant construction.

The NEPC, at its meeting on 2 March 2007, passed a resolution approving the appointment of the Nuclear Power Infrastructure Preparation Committee (NPIPC), with representatives from concerned agencies as members and the Director General of the Energy Policy and Planning Office as member and secretary. The NPIPC has the powers and duties, among others, to develop and recommend the

implementation plans, measures and guidelines on the preparation of the following issues: the legal and regulatory systems and international commitments; human resources; and the development and promotion of nuclear power deployment for electricity generation, including the public information to create accurate knowledge and understanding of a nuclear power plant, which will eventually lead to the public acceptance.

The NPIPC had developed a preliminary draft of the Nuclear Power Infrastructure Establishment Plan (NPIEP) and presented to the NEPC on 18 October 2007. The following resolutions were passed by the NEPC:

- Approving in principle the preliminary NPIEP and assigning the NPIPC to undertake a detailed study in order to develop the complete plan for further submission to the NEPC
- Granting consent to the establishment of the Nuclear Power Program Development Office (NPPDO) as an agency under the Ministry of Energy
- Approving the implementation of the Project on Creation of the Public Knowledge, Understanding and Participation with regard to Nuclear Power, by organizing at least eight seminars within six months
- Approving the implementation plan for the first three years (2008-2010), by assigning the NPIPC to further develop the plan in detail
- Approving the budgetary framework for the implementation during the first three years (2008-2010), totaling 1,800 million Baht (about US\$ 53 million), to be used for the establishment of NPPDO and implementation according to the plans on: Legal and Regulatory Systems and International Commitments; Industrial Infrastructure and Commerce; Technology Transfer and Human Resources Development; Safety and Environmental Protection; Public Information and Public Acceptance; and Nuclear Power Utility Planning, by establishing the budget as part of the budget of the Ministry of Energy, and the Ministry of Energy is trusted with further deliberation on the budget procurement
- Agreeing that, for the regulation at the initial stage, the existing various laws related to atomic energy for peace shall be temporarily applied; then the Ministry of Energy and the Ministry of Science and Technology are assigned to develop the bill to be specifically enforced on the regulation of standards and safety related to nuclear power, which shall cover all concerned issues

The above-mentioned resolutions of the NEPC were later approved by the cabinet on 30 October 2007.

2. THE NPIPC WORK APPROACHES AND THE ROLES OF THE IAEA

The NPIPC has followed the following major approaches in executing its duties.

2.1. For the feasibility study and preparedness for the deployment of nuclear power for electricity generation, implementation of the following has been undertaken in parallel

- the planning for nuclear power infrastructure
- the planning for nuclear power utility

The outcome of the NPIPC work execution is the development of the Nuclear Power Infrastructure Establishment Plan (NPIEP).

In this regard, the guidelines, criteria, standards and implementation procedures of the IAEA, as shown in numerous reference documents, have been used as the guidelines to start the work with. In addition, cooperation and assistance from IAEA experts have been requested as Thailand is also an IAEA member.

2.2. The NPIPC has appointed the following seven (7) Sub-committees to assist with the study on pertinent key issues

- The Sub-committee on the Legal and Regulatory Systems and International Commitments
- The Sub-committee on the Industrial Infrastructure and Commerce
- The Sub-committee on the Technology Development and Transfer and Human Resources Development
- The Sub-committee on Nuclear Safety and Environmental Protection
- The Sub-committee on Public Information and Public Acceptance
- The Nuclear Power Utility Planning Sub-committee
- Under this Sub-committee, three working groups have been appointed to assist with the duty execution, namely
- The Working Group on Institutional Structure Preparation, chaired by the Deputy Permanent Secretary of Science and Technology
- The Working Group on Nuclear Power Utility Technical Aspects;
- The Working Group on the Feasibility Study of Nuclear Power Plant
- The Sub-committee on the Drafting of the Nuclear Power Infrastructure Establishment Plan

3. PRINCIPLES AND RECOMMENDATIONS OF THE INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

The major preliminary infrastructure required for the implementation plan development with regard to the nuclear power plant construction and operation includes the following:

- National laws on nuclear power
- Nuclear Regulatory Body (NRB)
- Physical facilities
- Knowledge base and human resources
- Guidance and standards related with infrastructure issues

The key principles for nuclear power utility control involve the followings:

- Safety
- Security
- Safeguards

4. NPIEP MILESTONES FOR NUCLEAR POWER PROGRAM IMPLEMENTATION

Based on the study of the IAEA document on the “Milestones in the Development of a National Infrastructure for Nuclear Power,” the NPIEP Milestones for Nuclear Power Program Implementation has been developed with some amendments/additions to suit the situations in Thailand, which can be divided into the following.

4.1. Phase 0.1: Preliminary Phase, with an implementation duration of one year (2007-2008). The following activities have been undertaken

- The appointment of the NPIPC and associated seven Sub-committees
- The deliberation on key issues and milestones of the Nuclear Power Program
- The development of the NPIE

4.2. Phase 1: Pre-project Activity Phase, with an implementation duration of three years (2008-2011). The following activities have to be undertaken

- Approve the NPIEP
- Set up the Nuclear Power Program Development Office (NPPDO)
- Commence the work on infrastructure establishment to accommodate the Nuclear Power Program (NPP)
- Survey potential sites for the nuclear power plant construction
- Finalize the NPP feasibility study
- Create public knowledge, understanding and participation

4.3. Phase 2: Program Implementation Phase, with an implementation duration of three years (2011-2014). The following activities have to be undertaken

- Commence the implementation of the NPIEP and stipulated Milestones
- Complete the Nuclear Regulatory Body establishment
- Enact legislation and international protocols
- Select suitable sites for bids
- Select technology and qualified suppliers
- Prepare to call for bids

4.4. Phase 3: Construction Phase, with an implementation duration of six years (2014-2020). The following activities have to be undertaken

- Complete the implementation of the NPIEP
- Complete the bidding process
- Commence designing & engineering work
- Manufacture components and related equipment
- Commence the construction and equipment installation
- Carry out test runs and inspection of plant systems
- Issue the NPP commissioning license

4.5. Phase 4: Operation Phase, from 2020 onwards. The following activities have to be undertaken: Commence commercial operation

Operation & maintenance

Planning for generating capacity expansion in the future

Planning for the development of related industries and technologies

5. SUMMARY OF NUCLEAR POWER INFRASTRUCTURE ESTABLISHMENT PLAN (NPIEP)

5.1. Legal and Regulatory Systems and International Commitments

The Plan for the establishment of Legal and Regulatory Systems and International Commitments related to the use of nuclear power for power generation has been developed. Recommendations have been made on the organizational structure of the regulatory body and the amendment of related laws and regulations to facilitate the nuclear power program implementation. Also recommended is the guidelines on the review of the Atomic Energy for Peace Act, B.E. 2504 (1961), to be up-to-date and efficient and to be in conformity with the international covenants and standards, as stipulated by the International Atomic Energy Agency (IAEA), e.g. by requiring that the national laws on nuclear power and on the powers and duties of the nuclear regulatory body be established. For the operation of a nuclear power plant, the government must establish and maintain laws (including international protocols) on nuclear safety regulation and on continuous safety control by the regulatory body, and laws on other key aspects, e.g. nuclear security; radioactive materials and atomic energy; civil liability for nuclear damage; radioactive waste & spent fuel management and decommissioning of a nuclear power plant; commitments to the Treaty on the Non-Proliferation of Nuclear Weapon and additional

protocols; compliance to the commitments under various treaties and international agreements; environmental protection; early notification of a nuclear accident; foreign investment; and nuclear power plant security.

5.2. Industrial and Commercial Infrastructure

For a country that does not have its own nuclear technology and thermal power plant technology, a nuclear power project may have to start with a construction engagement using the turn-key approach or engagement with partial participation, depending on the technological preparedness and the capacity to manage a complex project. In the case of Thailand, there has been no development of the heavy industry and the machinery/equipment industry related to a power plant, except for the development, to some extent, of the construction work and construction materials. However, the Electricity Generating Authority of Thailand (EGAT), the designated utility operator, has had considerable expertise and experiences in the construction of thermal power plants for more than 50 years. EGAT can handle the designing and construction of thermal power plants and has the capability to manage complex projects. Therefore, it can be assumed that, for the construction of the initial nuclear power plants, engagement using the turn-key approach for the whole project may be chosen. On the other hand, conditions may be stipulated that locally produced construction materials be used, such as structural steel, concrete, certain types of pipes, electric wires, transformers of certain capacities, insulators, air-conditioners, etc. provided that these materials or equipment meet the designated standards. Alternatively, construction engagement with partial local participation may be chosen, for example, for the parts concerning the construction work and civil, mechanical and electrical engineering that are similar to a thermal power plant using steam from ordinary technology. As for components related to nuclear technology, participation may not be feasible at the initial stage of the nuclear power plant (NPP), but may be possible at a later stage if support is given and the human resources development & technology transfer program is implemented in a proper direction.

5.3. Technology Transfer/Development and Human Resource Development

With regard to technology transfer for the nuclear power plant industry development of the country, it is deemed appropriate to clearly designate as “the policy on nuclear power plant industry development,” which may be indicated in the bid documents as a requirement to have the technology of some parts transferred, or to set forth the construction of more nuclear power plants in the future in the case that Thailand’s potential has to be improved, which will require further planning of technology development after the study is undertaken and appropriate technology designated.

In order to build up adequate manpower with the required capacity and ability to enable implementation pursuant to the project timeframe, it is necessary to set a definite planning. At the initial stage, the number of required personnel for the continuous construction of nuclear power plants was estimated at 800-1,000 persons per plant. The human resources development will be carried out via the educational system and additional training, both domestic and overseas, covering the fundamental subjects related to nuclear power (to build up engineers, scientists and personnel in other related fields), the specialized subjects (in both theory and practice via cooperation between the project owners and academic institutions), and on-the-job training (for the personnel to experience the real operation).

5.4 Safety and Environmental Protection

This comprises 8 main plans and 3 supplementary plans, as follows.

5.4.1. Main Plans

- Nuclear Safety Plan: to study and compile the guidelines on technical operation of the IAEA with regard to the evaluation of the safety aspect, in particular, the development of the Safety Analysis Report (SAR); the study on safety measures and operation of a nuclear power plant;

including the establishment of an inspecting agency to inspect and assess the nuclear safety and radiation, the establishment of a monitoring agency to oversee the spent fuel and radioactive waste management, and the establishment of an independent regulatory body, i.e. the Nuclear Regulatory Body, to regulate the nuclear safety and to protect the environment.

- **Management Plan:** to study and analyze the security and safeguards requirements with regard to the development of safety control technology and the environmental protection of a nuclear power plant; to foster the recognition of spent fuel and radioactive waste intermediate and final handling needs; and to assess the requirements of technical/expert personnel in the fields of environment and safety.
- **Radiation Protection Plan:** to minimize the people's exposure to radiation, by creating the capacity to evaluate the risks from the use of atomic radiation and undertaking a study on the long-term impact on the population, with reference to relevant international agencies. The activities to be undertaken under this plan are, among others, the study on the hazards and risks presented by the nuclear power plant operation, and the creation of recognition, awareness and knowledge of the guidelines on the protection against the atomic radiation, as prescribed by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).
- **Human Resources Development Plan:** to gather and develop manpower with knowledge and capability to implement the nuclear power program, including the human resources development via the educational system and additional training, both domestic and overseas. Under the Plan for Safety and Environmental Protection, emphasis will be placed on manpower development in terms of knowledge and skills needed to forge ahead the nuclear power program, which involves manpower development in the fields of nuclear safety technology, radiation and environmental impact resulting from the nuclear power program implementation.
- **Environmental Protection Plan:** to study and develop the guidelines on safety and environmental impact assessment (EIA) of the nuclear power program, by studying and compiling information related to the standards of environment impact consideration and analysis to be in conformity with the IAEA criteria/guidelines and other related international standards on safety and environment.
- **Emergency Planning:** to develop an emergency plan on the protection against and remedy for public hazards resulting from the development of an electricity generation project using nuclear power, involving the notification and extinguishment of the emergency, the control of the severity level of the emergency, the rehabilitation and remedy after the emergency, and the provision of first aid in the case of emergency. Also taken into account will be the communication with and involvement of the local and national government and the coordination among concerned agencies at the community, regional and national levels.
- **Nuclear Fuel Cycle Plan:** to study/consider the necessity to arrange for fuel storage and regulations for spent fuel management, and to study/consider a temporary storage of spent fuel, by gathering information about spent fuel management technology used by nuclear power plants in different countries and surveying for a suitable site, if needed.
- **Radioactive Waste Management Plan:** to study the handling of radioactive waste from a nuclear power plant, by studying the methods, planning and surveying for a suitable site for radioactive waste storage; to examine the current capability to manage radioactive waste; and to review options for ultimate disposal of high level radioactive waste, by gathering information about radioactive waste management technology used by nuclear power plants in differing countries and surveying for a suitable site, if needed.

5.4.2. Supplementary Plans

- Plan on the National Position: to create knowledge, understanding and awareness of the public regarding electricity generation using nuclear power, and to provide the public with knowledge and understanding of nuclear power regarding the safety from radiation and environmental management.
- Plan on the Site and Supporting Facilities: to plan for the study, survey and consideration of no less than five (5) potential sites for the nuclear power plant construction, based on the IAEA criteria as well as related standards and issues, i.e. the social issues (public acceptance and participation), economics, natural resources and environment, etc.
- Plan on Legislative Framework: to amend the law on environment and safety to cover the impacts resulting from the development of a nuclear power project, involving, among others, planning of the environmental quality management, establishment of environmental quality standards, determination of pollution control standards from emission sources, and law enforcement and penalties.

5.5. Public Information and Public Acceptance

The nuclear power program development will be efficiently carried out if the public participation can be achieved. It is, therefore, necessary to expedite the public information work to provide the public with relevant information and to foster accurate knowledge and understanding, through unified and cooperative efforts. As for negative news and information about nuclear power plants, they are still influential and have created public excitement as well as fear. Therefore, it is necessary to expeditiously give the explanation and dissolve concerns of the people. Moreover, among the academia and mass media, there are both supportive and opposing views; hence, communication must be extensive to get access to target groups, using the proactive approach.

As for the policy on public information, implementation guidelines on public information will be set up step by step so as to foster among the general public the knowledge, understanding, acceptance, cooperation, support and trust with regard to the nuclear power program, and implementation must be carried out on a continuous basis. In so doing, there is a need to mobilize the knowledge resources, human resources and organizations dealing with nuclear power to launch the public information in a harmonious and unified manner. Promotion and support should be made to use every potential media channel with a view to achieving the public acceptance of the nuclear power program.

5.6. Preparation of the Nuclear Power Utility Establishment

A nuclear power plant project involves a lot of complexities and has more implementation processes than those for an ordinary thermal power plant project. These processes will have to be carried out one after another, with a definite timescale. In order that the nuclear power project implementation would be efficient and comply with the given project timeframe, there is a need to devise definite planning.

It is also essential to plan for the establishment of a regulatory body at the national level to support and regulate the nuclear power plant industry. Currently, the application for a license and the monitoring of a power plant are administered by the authorities of various agencies under different ministries; hence the process is very time-consuming and overlaps with one another. The approach that the regulatory body and the authorities to issue licenses relevant to the nuclear power plant operation are merged into one independent body is under consideration.

The feasibility study of the nuclear power program will begin with the selection of suitable nuclear technology. Issues to be taken under consideration include: safety standards and operation experience;

waste management; technical aspects; supply of fuel, equipment and related services; and approach to technology development in order to reduce overseas dependency (self-sufficiency and self-reliance). Then, survey and selection candidate sites will be carried out, with due consideration of safety aspects and human & environmental effects; simultaneously, deliberation can be carried out on the appropriateness in terms of economic and social aspects. Technology and site will be the key indicators of the overall project costs, which comprise capital investment costs, fuel costs and operation & maintenance costs, including the costs for infrastructure development, plant decommissioning and radioactive waste management, etc.

6. FUTURE ACTION PLANS

6.1. Legal and Regulatory Systems and International Commitments

- Establish/amend comprehensive nuclear laws
- Expand existing nuclear regulatory body (NRB)
- Develop human resources for NRB
- Sign the required treaties and conventional laws

Draft Action Plan during 2008-2020: see Table 1.

Table 1. Draft Action Plan for the first three years (2008-2010)

Activities	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1. Study and appraise treaties, international agreements, international laws, and international standards relating to a nuclear power plant in order to elicit their essential elements which are necessary to the drafting of the Thai Legislation on a nuclear power plant		←→											
2. Draft comprehensive nuclear laws		←→											
3. Expand existing NRB		←→											
4. Start to develop human resources for NRB		←→											
5. Sign the required treaties and conventional laws)				←→									
6. License for construction permit													
7. License for commission permit													

6.2. Industrial and Commercial Infrastructure

A significant change in the structure of Thailand's economic system began around 1985 when the economic system began to divert from being dependent on agricultural products and food to the modern industry and services. Such a change was reflected in the export structure. Before 1985, the value of agricultural product export (including fishery) had been higher than the export of industrial products. In 1985, the value of the industrial product export was first higher than the agricultural product export.

At the initial stage, the industrial product export comprised mostly the products that were labor intensive, such as clothes, shoes, artificial flowers and jewelry since the newly industrialized countries (NIC) in Asia had moved their production bases to Thailand and other countries in Southeast Asia. The NIC have, instead, shifted to the development of export of products using higher technology. Later, when Thailand's advantage of the labor-intensive industrial production for export was challenged by lower labor costs of such countries as China, Indonesia and Vietnam, it was necessary for Thailand to shift to the industrial development using medium to high levels of technology, for example, computer components, electrical appliances, electrical circuits, automobiles and spare parts. The changing export structure has brought about the change in the Thai industrial structure. However, the industrial growth so far has been quantitative; most of goods production has added value only at the initial level and the production is made to order, having the advantage in terms of low labor cost but still depending on import of raw materials, capital and technology. According to the study and analysis of the Office of the National Economic and Social Development Board (NESDB) in 2006, using Thailand Competitiveness Matrix in the quantitative analysis of the competitiveness of each field of the industries, the present industries can be categorized into three groups as follows:

6.2.1. The High Potential Group

This group has high competitiveness and is, therefore, interesting because its production and trading potential are quite higher than other industries and its market share is also high i.e. the automobiles, petrochemicals and plastic, chemicals, electronics, rubber products, etc industries.

6.2.2. The Group that Needs Development

The production & trading potential and the world market share of this group is moderate i.e. furniture, beverage, pharmacy, textile/fashion, electrical appliances, etc industries.

6.2.3. The Group that Needs Improvement

The production & trading potential and the world market share of this group is low i.e. machinery, metal, ship/train/airplane components, non-metal, paper, tobacco, etc. industries.

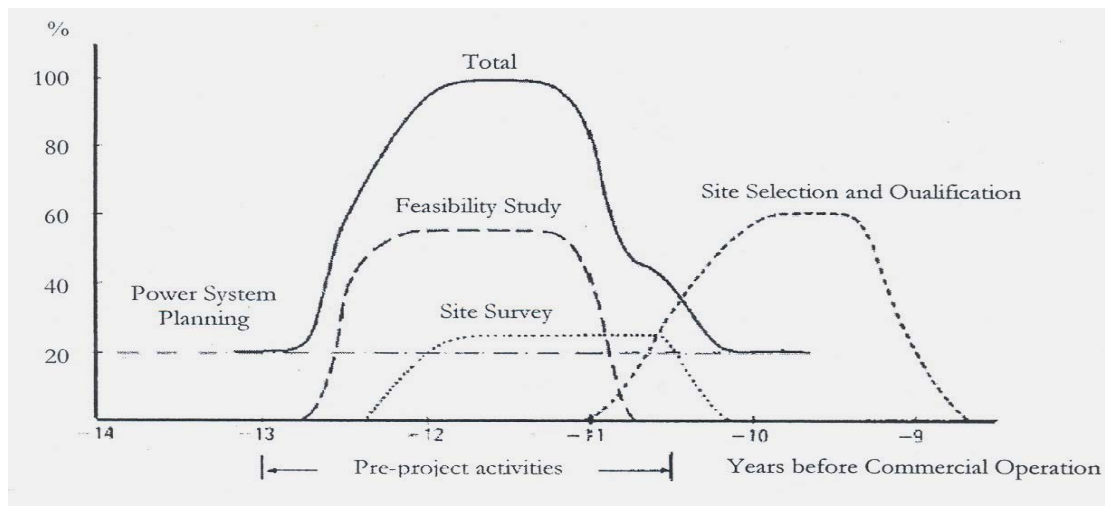
As for the preparedness of the industrial infrastructure to accommodate the investment in a nuclear power plant in Thailand, it is necessary to develop and strengthen the domestic metal industry, which is the upstream industry, to accommodate the development of other industries related to the power plant. However, at present, there is no upstream metal industry (iron smelting) in Thailand. In the year 2005, the cabinet approved the policy on the promotion and support of the upstream metal production. Two private companies have shown interest, i.e. G-Steel and Sahaviriya Groups.

6.3. Technology Transfer/Development and Human Resources Development

Preparedness in terms of human resources is considered vital to a nuclear power plant (NPP) project. In order to build up adequate manpower with the required capacity and ability to enable the implementation pursuant to the project timeframe, it is necessary to set a clear plan for human resources development for the NPP project. Therefore, this Strategic Plan for the Technology Transfer and Human Resources Development has been developed based on the Manpower Development for Nuclear Power framework of the International Atomic Energy Agency (IAEA) to be the guidelines for

human resources development and transfer/development of nuclear technology in the future. Focus will; however, be placed on the Pre-project phase.

For the first NPP project, the pre-project activities will commence when serious consideration is given to the nuclear power option and will complete when a final decision is made to start the project (“GO NUCLEAR”). The work will involve: 1) the power system planning, 2) the project feasibility study and 3) project site survey. During the pre-project, the planning on human resources for the work in other phases in the future should be carried out concurrently because the human resources development (HRD) is a key process and is time consuming.



*Fig 1: Proportion of HR Deployment for the Pre-project Activities
(Note: The personnel required for other phases are yet to be developed)*

Future action to develop human resources for the Pre-project: See Figure 1.

The number of personnel required for each work is classified into the levels of graduates, technicians and general staff (excluding administration, finance, management and general labor work, as follows.

- Personnel for nuclear power program planning: Graduate level approximately: 5-10 persons (engineering: 4-8; economics: 1-2)
- Personnel for Pre-project: for the Pre-project phase of a 600-1,300-MWe nuclear power plant project, Graduate/technician level approximately: 31-43 persons
- Monitor & liaise with related agencies/experts: power plant engineering (1)
- Power system planning electrical engineering (2-3); economics (1-2); technicians (computer program) (1-2)
- Feasibility study – engineering (7-12); economics (2); laws (1)
- Site survey– engineering, geology; hydrology; meteorology; ecology and other related fields (5-7)

6.4. Safety and Environmental Protection

The development of the implementation guidelines on the safety and environmental protection is based on the guidelines of the IAEA and the guidelines on the development of Environmental Impact Assessment (EIA) report of the Office of Natural Resources and Environmental Policy and Planning. The future activities to be pursued, summarizing as follows.

- The amendment to the environmental and safety laws

- The development of an EIA report on the development of an NPP project, covering the selection methodology of potential project sites, project details, existing surrounding conditions, environmental impact assessment and determination of environmental measures
- The collaboration with the Utility to study and evaluation of the potential of the prospective sites for the development of a nuclear power plant (NPP) project. Consideration will cover four major issues concerning the social, economic and natural resources & environmental aspects, i.e. physical resources, biological resources, value of the deployment by humans and value to the quality of life
- The human resources development to equip the personnel with knowledge and expertise in the nuclear technology, nuclear safety, environmental impact, public health services provision as well as emergency operations
- The building-up of the institutional preparedness in relation to safety and environment
- The development of a national plan on the protection against and remedy for the public hazards and the emergency plan accommodating the development of an NPP project
- The development of technology
- The creation of knowledge, understanding and recognition among the general public of the power generation using nuclear power, covering both positive and negative impacts, and the preparedness of the general public for the protection and reduction of adverse impacts resulting from the project operation

6.5. Public Information and Public Acceptance

6.5.1. Target Groups: Comprise

- Academic institutions
- Social organizations
- Political organizations
- Economic organizations
- Media organizations
- Religious organizations
- Public sector organizations
- Woman and housewife groups
- General public

6.5.2. Public Communication Strategies

- Design strategic approaches to reach individual target groups, which are appropriate and correspond with the news receiving behavior of each target group
- Create the networks of alliances to disseminate knowledge and facts, and to induce the target groups to accept, cooperate and support the project
- Liaise with the government media, both person media and public media, to publicize the facts to the people in order to foster their understanding and acceptance of the project
- Coordinate with academic institutions to disseminate and incorporate subjects on nuclear power into the curriculums

- Provide training for the PR presenters on electrical power and nuclear power to ensure their accurate knowledge and understanding of the issues
- Establish the Nuclear Power Plant Exhibition Centers and the Nuclear Call Centers
- Select the media types and media activities that effectively attract individual target groups

6.5.3. Media

- Person media
- Printed media
- Audio-visual media
- Events and Activities
- Information Technology (IT) media

6.5.4. Public Communication Plans

- Plan for attitude survey and research
- Plan for the production of PR materials
- Plan for the promotion and dissemination
- Plan for special activities
- Plan for the overall administration

6.5.5. Expected Outcomes

- The general public and target groups will have better understanding of nuclear power, which will lead to their acceptance of the nuclear power plant project
- The agencies and personnel dealing with nuclear power will forge ahead in a synergy to materialize the nuclear power plant construction
- The misunderstanding and fear of nuclear power will be reduced
- Coordination and cooperation will be better
- The nuclear power plant construction can be completed as scheduled

6.6. Preparation of the Nuclear Power Utility Planning

6.6.1. Preparation of organizational structure

According to the nuclear power project schedule, the pre-project activities will be carried out during 2008-2010. These activities include infrastructure establishment, utility preparation, and public education and participation. Electricity Authority of Thailand (EGAT), a government owned utility under the Ministry of Energy, will be mainly responsible for the utility preparation works, i.e. survey and evaluation of the potential sites, project feasibility study, initial environmental examination and human resources development for utility. The nuclear power project will be implemented during 2011-2013, the construction is to be started in 2014, and Thailand's first nuclear power plant is to be completed for commercial operation in 2020.

6.6.2. Nuclear Power Plant Feasibility Study (Pre-project activities Study) which is one of the Pre-Project Activities (Power system planning, Feasibility study, and Site Survey)

In conclusion, there are many challenges for Thailand embarking of the nuclear power programme. It is essential to plan for the establishment of a regulatory body at the national level to support and regulate the nuclear power plant industry. Currently, the application for a license and the monitoring of a power plant are administered by the authorities of various agencies under different ministries; hence the process is very time-consuming and overlaps with one another. The approach that the

regulatory body and the authorities to issue licenses relevant to the nuclear power plant operation are merged into one independent body is under consideration. The human resources development (HRD) is also a key process and is time consuming. Other infrastructure developments i.e. industrial and commercial infrastructure, preparation of technology transfer and development, public understanding and acceptance are also essential and needed to be vigorously carried out within the next coming year.

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