

POWER DEVELOPMENT

EGAT had formulated a national power development plan for the period of 2007 – 2021, known as PDP 2007, within the framework of the Ministry of Energy's policies. The PDP 2007 plan, which was approved by the National Energy Policy Council (NEPC) and the Cabinet in June 2007, has been used as a guideline for planning the construction of EGAT's new power plants, power purchase from independent power producers (IPPs), small power producers (SPPs) and neighboring countries, as well as transmission system development to accommodate those new power capacities.

In late 2007, the Ministry of Energy by the Energy Policy and Planning Office (EPPO) had successfully implemented power purchase programs, including the request for proposals for power purchase from SPPs using co-generation system or renewable resources and the new round solicitation and selection of new IPP projects. In addition, power purchase from neighboring countries has also progressed further with the signing of power purchase agreements (PPAs) and memorandums of understanding on tariff (Tariff MOUs) being achieved between EGAT and developers of those power projects in Lao PDR during the year.

Following the progress of the above-mentioned power purchase programs coupled with the updated estimates of gas supplies, and the revised load forecast, EGAT and the Ministry of Energy have revised the PDP 2007 plan to reflect the most up-to-date economic situations and incorporate the government's key policies on the energy sector. This latest PDP called "PDP 2007: Revision 1" was submitted to seek approval from NEPC on December 7, 2007. Key projects are as follows:

Power Projects under Construction

As part of new power capacities included in the new PDP 2007: Revision 1 are four 700 MW combined cycle power projects currently under construction by EGAT as follows:

Project	Location (Province)	Operation Schedule
1. Chana combined cycle power plant	Songkhla	2008
2. South Bangkok combined cycle block 3	Samut Prakan	2009
3. Bang Pakong combined cycle block 5	Chachoengsao	2009
4. North Bangkok combined cycle block 1	Nonthaburi	2010

Construction of Chana power plant project in southern Songkhla province came to completion at the end of 2007. The power plant started its first commissioning in December 2007. Its commercial operation will commence in May 2008.

In implementing each of its four power projects, EGAT has strongly encouraged public participation through all stages of the projects both before and during the project construction. Endorsed by the Cabinet, a tripartite committee has been set up and chaired by the Governor of the province where



each project is located. Members of the committee comprising representatives from all concerned government agencies, communities, and EGAT will oversee and monitor the development of each project to ensure complete compliance with the project's environmental and social action plan.

Renewable Energy Development Projects

The government previously implemented a national renewable portfolio standard (RPS) strategy in order to increase the use of renewable energy for power generation, requiring that 5 percent of new power capacities be derived from renewable energy. EGAT was granted approval by the Cabinet in October 2007 for the development of a number of renewable energy power projects, totaling 81.7 MW, including:

- A 2 MW Wind turbine power project with 2 wind turbine generators of 1 MW each to be installed at the upper reservoir site of Lam Takhong hydropower plant in Nakhon Ratchasima province
- A 1 MW Photovoltaic (PV) power project with a solar weighted tracking system developed by EGAT to be installed at Sirindhorn dam in Ubon Ratchathani province
- Six mini-hydropower projects totaling 78.7 MW to be installed downstream of the irrigation dams of the Royal Irrigation Department and due for completion in 2011, including:

Project	Location (Province)	Number of Unit(s)	Total Capacity (MW)
• Pasak Jolasid Dam	Lopburi	1	6.7
• Khun Dan Prakan Chon Dam	Nakhon Nayok	1	10.0
• Mae Klong Dam	Kanchanaburi	2	12.0
• Chao Phraya Dam	Chainat	2	12.0
• Naresuan Dam	Phitsanulok	1	8.0
• Quae Noi Dam	Phitsanulok	2	30.0

During 2007, EGAT had also installed two sets of solar cells power system at the Energy for Environment Center, in the compound of Sirindhorn International Environmental Park, Phetchaburi province. The investment cost of this 45 kW project totaling 18.88 million baht was subsidized by the Energy Conservation Promotion Fund of the Ministry of Energy.

Renovation Projects for Old Hydropower Plants

Renovation of the generators at five small-sized hydropower plants which had been in service for over 30 years will be implemented successively in order to extend service life of those plants and increase their operational efficiency and availability while reducing maintenance cost in the long run. During 2007, the first generating unit of Ubol Ratana dam was closed down to undergo renovation. The renovation of these hydropower plants with a total investment cost of 1,837.16 million baht will be completed in 2010.

Power Plant	Location (Province)	Number of Unit(s)	Total Capacity (MW)
• Ubol Ratana	Khon Kaen	3	25.2
• Nam Pung	Sakon Nakhon	2	6.0
• Chulabhorn	Chaiyaphum	2	40.0
• Sirindhorn	Ubon Ratchathani	3	36.0
• Kaeng Krachan	Phetchaburi	1	17.1

Transmission System Projects

EGAT has planned and developed new transmission system projects to ensure continuity of future power supply to meet the increasing demands of industrial, business and residential sectors in all parts of the country. In addition, interconnection system projects have also been developed to accommodate more power import from neighboring countries. These transmission system projects will strengthen reliability of the power supply system, reduce the partial outage or voltage drop problems of the inland power system, and thus help minimize the economic loss of the country. Major on-going projects are summarized as follows:

1. Transmission System Expansion for the Greater Bangkok Area Phase 2 Project

This project is an extension of the Transmission System Expansion for the Greater Bangkok Area Phase 1 Project to cope with the growing demand in the area and increase the system reliability by upgrading the existing 230 kV transmission lines into the new 500 kV lines. Approved by the Cabinet in August 2006, this 9,170 million baht project will be completed during 2008 - 2010.

2. 500 kV Transmission Line Project for Receiving Power from Nam Ngum 2 Hydroelectric Project

This project involves the construction of 500 kV transmission lines from Udon Thani 3 substation to the Thai - Lao border at Nong Khai province totaling 80 km in length to receive the power to be purchased from Laos' 615 MW Nam Ngum 2 Hydroelectric Power Project. This 3,215 million baht transmission system project was approved by the Government in August 2006 and will be due for operation in 2010.

3. Transmission System Expansion Project, Phase 11 (TS 11)

This is a successive scheme from the previous Phase 10 project, comprising a package of transmission system expansion projects in all provincial areas across the country except the Greater Bangkok to strengthen system reliability and support the expansion of PEA's distribution systems. The project involves the construction of transmission lines totaling 1,778.8 circuit-kilometers, 6 new substations, additional transformers of 4,500 MVA capacity, and voltage support equipment totaling 1,560 MVAR. The project covering a total investment cost of 23,000 million baht was approved by the Cabinet in October 2007. Its operational schedules are planned for 2010 - 2011.



4. Transmission System Line Project for Receiving Power from Nam Ngum 3 and Nam Theun 1 Hydroelectric Projects

This project involves the construction of two 500 kV transmission lines on double-circuit steel towers for receiving electricity imported from Nam Ngum 3 project of 440 MW and Nam Theun 1 project of 510 MW in Laos. The project includes a 500 kV transmission line linking Na Bong at the Thai-Lao border with two substations, namely Udon Thani 3 and Nam Phong 2 over a distance of 132 km and another 500 kV line of 222 km length linking three substations, namely Nam Phong 2, Chaiyaphum 2, and Tha Tako substations. The whole project, which covers the construction of transmission lines totaling 708 circuit-kilometers in length and a new substation, was approved by the Cabinet in December 2007. The 17,159.8 million baht project is scheduled for operation in 2012.

Other Projects

Nuclear Power Projects

Four nuclear power projects of 1,000 MW each have been incorporated in the present national long-term power development plan, with the first two projects planned for operation in 2020 and the other two in 2021. The nuclear power option is part of the government's energy policies to diversify energy sources for power generation, reduce the presently high dependence on natural gas, boost the country's energy security and reduce greenhouse gas emissions which is a major cause of the global warming.

Since this will be the first nuclear power projects to be implemented in Thailand, preparatory works associated with legal and regulatory framework, industrial and commercial infrastructure, technology development and transfer, human resources development, nuclear safety and environmental protection, as well as public information and public acceptance, must be undertaken to establish necessary and sustainable infrastructure to ensure the secure and efficient development, management and operation of the nuclear power projects.

In April 2007, the government by the National Energy Policy Council (NEPC) set up a Nuclear Power Infrastructure Preparation Committee (NPIPC) which comprises representatives of several related organizations to study and prepare a Nuclear Power Infrastructure Establishment Plan (NPIEP) covering both nuclear power infrastructure planning and nuclear power utility planning. A number of Sub-committees have been appointed to study, draft and propose action plans and guidelines on all related issues.



On October 30, 2007, the Government approved NPIP's Nuclear Power Infrastructure Establishment Plan and a 3-Year Action Plan (2008 - 2010) for the pre-project activity phase. In December, 2007, the Cabinet also endorsed the establishment of the Nuclear Power Program Development Office (NPPDO) as an entity under the Ministry of Energy to administer, coordinate, and facilitate the implementation of all preparatory works. Main activities during the 3-year pre-project phase focus on infrastructure preparations, project feasibility study, safety and environmental issues, site selection, public information and public acceptance creation, and etc.

As the utility responsible for all four nuclear power projects, EGAT has actively participated in the Committee's and all Subcommittees' works, with its main responsibility for nuclear power utility planning works which include design and planning of utility structure, technology selection, safety program, fuel and waste management plan, site selection and environmental impact study, energy economics and financing plan, plant design and construction plan, commissioning and decommissioning plans, public information and public participation, and etc.

Hutgyi Hydroelectric Development Project

This project is an economic development cooperation between the governments of Thailand and the Union of Myanmar under an MOU signed in 2005 for the development of hydroelectric projects in the Thanlwin River Basin in Myanmar to sell electricity from those projects to Thailand.

In 2006, EGAT entered into agreement with Sinohydro Corporation from the People's Republic of China for the joint development of Hutgyi hydroelectric project. The Environment Research Institute Chulalongkorn University was engaged to conduct an environmental impact assessment of the project. In early 2007, a team of EGAT geologists had conducted site surveys and explorations in Karen State to compile geologic, hydrologic and geotechnic data for analyses and testing to be used for the engineering design of the dam structure. Advanced technology used to support the explorations included the satellite-navigated GPS, electronic geological field books using Total Station and Echo Sounder systems, and etc. During the year, EGAT has also engaged the Faculty of Engineering, Kasetsart University to conduct a hydrological study of the Thanlwin River.

Research and Development

EGAT has continuously pursued and supported research and development activities with a view to improving efficiency and reducing costs in electricity generation and transmission. It has also stepped up R & D efforts in the development of alternative energies which are friendly to community and the environment. In 2007, a total of 19 R & D projects have been funded by EGAT consisting of 7 projects undertaken by EGAT and 12 projects to be conducted by academic and research institutes at a combined cost of 418.81 million baht. Major R & D projects include the following:

Repair Service Capability Improvement Project

The project is aimed at improving the capability of EGAT maintenance crew in repairing gas turbines, machining and fabricating gas turbine components. This will help eliminate the needs for overseas repair service, thus leading to cost reduction in long term maintenance. The project will be completed in 2008 and the investment cost will be recouped within 3 years.

Development of 1 MW Photovoltaic (PV) Power Project with Solar Weighted Tracking System

The project involves the installation of a 1 MW demonstration solar cell system equipped with an advanced solar weighted tracking system in the compound of Sirindhorn Dam, Ubon Ratchathani province. The solar panel structure mounted on the solar tracking weighted system which can follow the sun's directions all day will increase electricity output at least 10 percent more than the conventional fix-mounted solar cell system. The project to be implemented in 2008 will serve as a demonstration station to provide base test data, both technical and economic data, for the decision-making of large-scale PV power project development in the future.

50 kW Prototype Wind Turbine Development Project

This project aims at developing a prototype of 50 kW wind turbine which is suitable for Thailand's low wind velocity. The significance of the project resides in the use of over 70% locally made content in all processes from design, installation, to testing. The project will also study the production cost for developing wind turbines on commercial scale in the future.

Utilization of Additive to Oil Palm Empty Fruit Bunch Used as Residual Fuel for Electricity Generation

This research project is to address the problems in the sintering and agglomeration process when burning palm empty fruit bunch. The project will study the use of locally available additives and appropriate burning methods for oil palm empty fruit bunches. Results of the research will also be applied to other biomass fuels of the same nature.

