

B. ENERGY

Government focal point (s): Ministry of Natural Resources and Environment

Responding ministry/office(s): Ministry of Energy

Thailand's Policy and Implementation on Energy

Since 1992, the Thai Government has led a policy of sustainable energy sector promotion. Significant achievements have been made, among other things the establishment of policies and legislation to promote sustainable energy, and the formation of a Ministry of Energy to facilitate the development of the energy sector.

With the advent of economic recovery after the 1997 economic crisis, Thailand's energy consumption has remarkably increased. The GDP growth rate has continuously increased, reflected by the increasing growth rate of the industrial output index. The industrial sectors which have a high growth rate include the construction material sector and the automobile and transportation equipment sector. Particularly, automobile and motorcycle manufacturing for commercial purpose has continuously increased since early 2002.

Thus, the Government has set up the policy aimed at conserving and developing energy as well as promoting the efficient use of energy in balance with the country's environment and natural resources. Efforts will be made to reduce dependency on energy sources from foreign countries. Towards this end, the following policies will be pursued:

1. Promote the combined use of energy by further developing the use and exploitation of Thailand's natural gas, which is a domestic resource, as the country's major source of energy.
2. Promote the efficient procurement and use of alternative energy sources by expediting the survey, development and procurement of alternative energy sources as well as by promoting research and development of innovative energy sources for the purpose of energy conservation.
3. Emphasize energy management to increase the competitiveness of Thailand's production sector and to enhance the stability of energy prices through appropriate monetary, fiscal and managerial measures.

Under such policies, the Government's strategy on energy since August 2003 has been established involving an ambitious target for both energy efficiency and renewable energy development. The strategy aims to reduce Thailand's ratio of energy consumption growth rate to the GDP growth rate, from the current level of 1.4:1 to 1:1 by 2007. Also, in order to have alternative energy replacing non-renewable energy from fossil fuel, the Government aspires to increase the share of renewable energy from 0.5% of the commercial primary energy in 2002 to 8% by 2011. More importantly, in accordance with the 1997 Constitution, the energy strategy will be affected by the Thai Government's decentralization policy. This implies that powers as well as finance will be delegated to provincial and local authorities, which eventually will undertake and be responsible for the actual planning and implementation.

As it is projected that energy demand will keep increasing, efforts have been made to explore and develop other potential energy sources to accommodate the increasing demand. Renewable energy, energy which is inexhaustible, and alternative energy are considered

potential options, which will help reduce not only the country's dependency on imported energy but also risks of volatility of imported fuel prices. Several public agencies have carried out, without cease, researches into various renewable energy and alternative energy sources.

Renewable energy is mostly derived from natural resources and hence considered clean and environmentally friendly. However, there exist some hindrances to the development of renewable energy and the costs of harnessing renewable energy resources are still high compared with those of using commercial energy, particularly, the development of solar and wind energy which require the use of high cost technology. Renewable energy that has high potential to be used in place of fossil energy includes, for example, hydropower, biogas and biomass energy, solar energy and geothermal energy. Studies and development on these energy sources have continuously been undertaken by several agencies, both at the local level initiated by local intellect and at the government level. At present, the development of renewable/alternative energy has become a focus of interest and wider utilization has been promoted to replace conventional energy consumption in parallel with the efforts to stimulate people to use energy efficiently and economically.

In Thailand, there has been the development of biogas technology using biogas generated from animal manure, especially that of pigs and cows, as fuel in power generation and in cooking. Development has also been undertaken on power generation from landfill biogas. The major financial resource is the Energy Conservation Promotion Fund (ENCON Fund) of the government. Several biogas projects have been supported by the ENCON Fund, such as the biogas from animal manure for power generation in livestock farms, R&D on the feasibility of biogas generation from wastewater treatment systems in factories, and the development of a biogas map providing information on pig farms and dairy farms nationwide in order to facilitate the planning of biogas utilization in the future.

As for biomass, or biomass energy, it is a kind of fuel derived from organic substances, such as agricultural residues like woodchips, bagasse and paddy husks, or animal manure from livestock farms, including wastes from agricultural product processing and wastewater from factories. Biomass, which are distributed across the country, can be an important energy resource. Available data on biomass resources include firewood, bagasse and paddy husks. Other potential resources include agricultural and industrial residues e.g. palm outer-covering fiber and shells, and empty bunches of palm; nonetheless, the data compilation is yet to be made.

Thailand is an agricultural country with a huge agricultural output, such as rice, sugarcane, rubber sheets, palm oil and cassava. Part of the harvest is exported each year, thereby generating billions of baht revenues for the country. However, in processing these agricultural products, a large amount of residues is also generated. Part of these residues has been used as fuel in some industries. For instance, paddy husks are burned to produce steam for turbine operation in rice mills; bagasse and palm residues are used to produce steam and electricity for on-site manufacturing process; and rubber wood chips are burned to produce hot air for rubber wood seasoning.

Moreover, the remaining biomass can be used for power generation. The use of agricultural products, such as cassava and molasses, for ethanol production has been given particular attention since ethanol, which is 99.5% pure alcohol by volume, can replace the use of Methyl Tertiary Butyl Ether (MTBE), a fuel additive, which takes a long time to degrade. Each year Thailand spends more than 2 billion baht on MTBE import. Therefore, the use of

domestically produced ethanol can contribute to foreign currency saving as well as mitigation of pollution problems resulting from fossil fuel combustion. Efforts to use ethanol as alternative fuel actually commenced in 1977, but the cost of ethanol production then was much higher than oil prices. Commercial production was, therefore, not materialized. However, at present, given the continually increasing oil prices, ethanol is considered a viable alternative fuel for the transportation sector.

The annual production of cassava in Thailand is estimated at 18 million tons while only about 4 million tons are used for domestic consumption and the rest will be exported. To increase added value of cassava, about 2 million tons per year can be used for ethanol production of up to 1 million litres per day. To date, at least eight private ventures have expressed interest in ethanol production, with a combined production capacity of 1.5 million litres per day. Raw materials to be used in the production are cassava roots and molasses.

Furthermore, Gasohol is an alternative fuel for vehicles. It is a mixture of ethanol and regular gasoline at the ratio 1:9. The properties of derived gasohol are the same as Octane 95 gasoline. More critically, the use of gasohol will not only reduce oil consumption and air pollution from vehicle exhaust but also boost farmers' income through the selling of their agricultural products, i.e. sugarcane and cassava. At present, 1 million litres per day of Gasohol are sold mostly in Bangkok. All government vehicles that can use 95-Octane gasoline must use Gasohol. The target is that before 1st January 2007 all of 95-Octane gasoline, accounting for 40 million litres of Gasohol or 4 million litres of ethyl alcohol per day, will be sold at 4,000 stations around the country.

In order to support and promote the production and use of ethanol and gasohol, the government has approved in principle the exemption of excise tax imposed on the ex-plant ethanol and on the ethanol mixed with gasoline, the deduction of contribution rates to the Oil Fund and to the ENCON Fund for gasohol; and the pricing of gasohol to be cheaper than that of Octane 95 gasoline within a range of not exceeding one baht per litre. The government has also approved several supportive measures. For example, a policy will be established for government agencies and state enterprises to give priority to gasohol for their vehicle fleets. Promotion and support will be made to enhance preparedness of the automobile and oil refining industries to accommodate the production and use of fuel ethanol, by provision of tax privileges, for instance. Besides, potential SME practitioners and farmer organizations or entities will be encouraged to establish ethanol producing plants so that the production of ethanol from agricultural products could be widely distributed across the country. Such measures as provision of financial assistance, in the form of concessional loan or soft loan, and provision of technical assistance from the government agencies will also be introduced for this purpose. 53 Small Power Producers (SPP) have now been granted subsidies to help cover biomass power generating cost. The renewable inputs are mostly from rice husk and wastes from palm oil industry. Moreover, to reinforce such efforts, the government has actively been involved in the tasks aimed at improving public acceptance by demonstrating good practices as well as showing financial benefits local communities can secure from operating biomass power plants.

Additionally, all kinds of vegetable oil including leftover oil from food industries can be used as diesel substitute in slow diesel engines such as water pumping or boat engines. However the oil has to go through chemical processes to become ester, called Biodiesel or B100, which is usable in all diesel engines. To make the Biodiesel more prevailing, the government sets target that 8.5 million litres per day of B100 will be available in 2012. In terms of energy plantation, palm oil has been considered the most economical product to produce

Biodiesel. Basing on financial evaluation, palm oil plantation yields higher return than any other kinds of cash crops. In this context, turning present suitable farmland into palm oil plantation would be financially viable.

Thus far, several institutes have undertaken studies and development of the quality of biodiesel and "blended oil" (a mixture of diesel and crude plant oil or that of diesel and refined plant oil without any chemical process) compared with the specified diesel standards. It has been reported that blended oil has advantages over diesel in that it contains lower sulfur content and helps with lubrication; however, the quality of different bulks of blended oil varies although it is sold at the same distribution station. Research is being carried out on biodiesel production from crude coconut oil ("cocodiesel") and on the impact of cocodiesel utilization on the environment.

Similar to the promotion and support to ethanol and gasohol, ester can be mixed with diesel, at a ratio not greater than 1:9, and the excise tax and the contribution to the Oil Fund are exempted for the portion of ester produced from plant oil and mixed with diesel. In terms of a long-term measure, the government will continue, through use of the ENCON Fund, to support research and development to improve biodiesel efficiency as well as research on other oil plants to diversify sources of production; moreover, the standards for engine adjustment will be established to enable automobiles to run on biodiesel. Most importantly, since purchasing a car is a high investment for everyone, the efforts to promote biofuel will be strengthen and focus far more on consumers' confidence in using biodiesel.

The use of solar energy for power generation through solar cells or photovoltaic (PV) cells, has also been promoted by the government. So far, about 5 megawatts of PV power generation systems have been installed in Thailand; most of them are in remote areas beyond the grid systems. Unfortunately, solar cells still have to be imported. Government supports have also been given to demonstration projects on solar energy utilization and integrated systems of PV/hydropower and PV/wind energy.

Several government agencies under the Ministry of Energy have been undertaking studies and development of the PV technology. For example, the Department of Alternative Energy Development and Efficiency (DEDP) has studied and explored the potential of solar energy utilization. Solar cell battery-charging stations have been established in various rural villages that do not have access to the national grid system and for Border Patrol Police Schools that are located outside the grid system. Several demonstration projects have been carried out, for example, demonstration of renewable energy utilization in the areas of six major Royal Initiative Projects such as the installation of PV power generation systems and the installation of PV-pumping systems for rural village water supply. Furthermore, The Electricity Generating Authority of Thailand (EGAT) has developed several projects to demonstrate power generation using the PV technology, PV power generation without use of batteries, and rooftop PV grid-connected systems. Development has also been undertaken on the integrated use of solar/wind energy for power generation at Phromthep Cape in Phuket Province, and the integrated use of solar/hydro energy at Klong Chong Klum in Sakaew Province.

The Energy Policy and Planning Office (EPPO) is the government agency responsible for monitoring the ENCON Fund allocation for renewable energy projects. Grants have been given to encourage R&D on solar energy. Examples of funded projects are: (1) the development of solar radiation measuring station network for Thailand; (2) the demonstration project of electricity generation and distribution system using solar cells in Mae Hong Sorn

Province in northern Thailand, most of whose areas are mountainous with scattered population; and (3) the establishment of "Solar Energy Park" to serve as the center for demonstration and information dissemination on solar energy. Besides, the Thailand Research Fund (TRF), an independent organization under the Office of the Prime Minister, is another institute undertaking R&D and facilitating information on solar cells. In 2001, TRF approved a research project on the production of silicon from paddy husks, which can be eventually used for solar cell production, thereby promoting the development of solar cells using indigenous resources.

In addition, the Energy Conservation Promotion Act has entered into force since 3 April 1992 with a view to promoting energy conservation discipline and promoting energy conservation investment in factories and buildings. This Act is an innovative policy instrument, blending incentives with mandatory regulations to facilitate the implementation of mandated energy efficiency measures. The Energy Conservation Promotion Fund (ENCON Fund) was established under the Act to provide financial support to government agencies, state enterprises, non-government organizations, individuals, and businesses that wish to implement measures to increase efficiency in energy utilization. At the same time, a punishment clause is stipulated in the Act for owners of any designated factory or building who fail to comply with the standards, criteria and procedures as provided by related ministerial regulations issued under the Act. The role of the public sector is to establish and utilize government mechanisms to encourage and promote energy conservation implementation by consumers, including development and utilization of renewable energy which is environmentally friendly. The target is to reduce energy consumption in industries more than 10% of the energy demand today by 2009. In addition, by the end of 2021, 361 km. of underground system and 3,000 km. of dual rail road tracks will be constructed. These are anticipated to save more than 2,540 billion baht of energy costs within 12 years.

Even though Thailand relies heavily on imported energy, the energy security of the country has been maintained through a diversity of types and sources of energy. Fossil energy still plays a major role, especially petroleum products and natural gas. Renewable/alternative energy will be the main energy resource next to fossil energy. Biomass, which has been mostly used as fuel in rural households and industries, will play a greater role as fuel in power generation and as an energy source for bio-liquid fuel production for vehicles. Most of the renewable energy types have proved to be environmentally friendly. Therefore, promotion of renewable energy technology research and development is considered to be of great importance and will continue to be supported by the government.

Close cooperation among various agencies/institutions dealing with energy plays a critical role in achieving the targets of the Energy Conservation Program in Thailand. More importantly, consumers need to be educated on the importance and necessity to conserve energy as they are energy end-users. Their awareness and participation are, therefore, crucial for achieving the success of the existing energy efficiency and conservation programs and will provide a strong foundation for future projects.

Activities on the public relations program under the umbrella of the "÷ 2" campaign will continue so as to stimulate people to be more conscious of energy saving, which can significantly help reduce the country's dependency on imported energy, and hence save foreign currency while the security of energy supply is still maintained. Besides, the severity of environmental problems, a matter of the global concern, will be decreased.

Last but not least, Since the Ministry of Energy has been established, following the bureaucratic reform of the Thai government in October 2002, various energy-related agencies that used to be scattered under the auspices of different ministries have now been transferred to be under the Ministry of Energy. With more streamlined administrative structure, it is expected that national energy policy and planning, and the management and development of energy-related programs and activities in Thailand will be more efficient and effective than ever.