

THAILAND

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

Thailand has adopted the aspirational goal expressed by APEC leaders in 2007 of reducing the energy intensity of GDP 25% by 2030 (with base year 2005) and also in line with the ASEAN goal agreed to by ASEAN Energy Ministers to improve energy intensity by at least 8% by 2015 compared to 2005.

1.2. Sectoral Energy Efficiency Improvement Goals

Thailand has set goals for reducing its energy consumption in the industrial sector by 3,190 ktoe or 4.4%, the transportation sector by 3,413 ktoe or 4.7%, and the residential sector by 1,217 ktoe or 1.7% by 2011.

1.2.1. Industrial Sector

Thailand has established Energy Efficiency (hereafter EE) Improvement Program for the industrial sector to reduce energy demand and promote the efficient use of energy. Several major measures have been introduced, such as a) promotion of energy management, b) revolving funds for EEs (low-interest funds for EE investments), c) tax incentives, d) technical assistance, e) standards and regulations, f) collaboration with major private corporations (firm commitment and top-down approach), and g) promotion of the energy service company (ESCO) business. Additional measures are: a) speeding up industry structural reform, b) EE awareness programs and campaigns, c) knowledge and information dissemination, d) capacity building programs, and e) competitions for best practices in energy conservation.

The strategy is to focus on high energy intensive industries, such as the food, non-metallic and chemical industries. The accumulated achievement in terms of energy saving for the industrial sector in Thailand from 2005 to 2010 (8 months) is equivalent to 3,178 ktoe. Compared with the 2011 target of 3,190 ktoe saving, almost 100% of the target has been achieved. A new target is yet to be set under the 20-year Energy Efficiency Plan (2011-2030) which is now being developed by the Ministry of Energy.

1.2.2. Transport Sector

Thailand has established various energy efficiency measures in the transport sector for improving an end-use energy efficiency by better management and logistics such as: 1) promotion of gasohol to replace gasoline consumption by at least 10% (currently gasohol E10, E20 and E85 are available in the market); 2) promotion of biodiesel production (eight-year tax holidays and exemptions of import duties from major equipment); 3) natural gas for vehicles, or the use of Compressed Natural Gas (CNG), targeting to replace 14.6% of oil consumption in 2014 (with expected NG demand to increase from 131 MMSCFD in 2009 to 317 MMSCFD in 2014); and 4) establishment of tax measures to promote energy-saving vehicles (e.g. ECO cars and FFVs). PTT and the Ministry of Energy have put together a fund of THB 9,000 million, or USD 265 million to provide low-interest loans for conversion costs from LPG to NGV-engines for taxi and fleet corporations.

1.2.3. Residential

Thailand has developed several measures to enhance the energy efficiency of households. Those measures are: 1) Minimum Energy Performance Standards (MEPS) for equipment (target 50, actual 11), 2) High Energy Performance Standards (HEPS) for equipment (target 54, actual 8), for example for air conditioners, refrigerators, ballasts, fluorescent lamps and compact fluorescent lamps, 3) energy labelling program for appliances and houses, 4) promotion of energy efficiency in home design, and 5) public awareness campaigns.

1.2.4. Other Sectors

Factories and commercial buildings which have a peak demand of ≥ 1000 kW or consume ≥ 20 million MJ per year in energy become “designated facilities” by law. They have the obligations to appoint Persons Responsible for Energy (PRE) and implement the Energy Management System according to the guideline prescribed by DEDE. By implementing the Energy Management System for all designated buildings and factories, a reduction of energy consumption of around 5%-10% is expected.

For the Power Sector, there are Demand-Side Management (DSM) and Number 5 labelling programs.

1.3. Action Plans for Promoting Energy Efficiency

Thailand has the following strategic approach for promoting energy efficiency.

a) Objectives

The present government under Prime Minister Abhisit Vejjajiva’s administration has set policy to encourage energy conservation and efficiency in the household, industrial, service and transportation sectors through campaigns fostering energy-saving discipline and conscience and promoting effective energy use; providing incentives to induce private sector investment in opting for energy-saving appliances; setting incentive measures for the household sector to reduce electricity consumption during the peak period; supporting research and development and setting standards for electrical appliances and energy-saving buildings; and supporting the development of public mass transportation and railway systems to improve energy efficiency which will help defer the economy’s investment in energy procurement.

b) Applicable Sectors

All sectors, especially industry, transport and household

c) Outline

Thailand is a net energy importing economy, having to import about 60% of the total energy demand. Therefore, it is vulnerable to energy price volatility, especially oil prices. In addition, domestic fossil energy resources are limited and will soon be depleted, if new resources cannot be developed in time. So energy efficiency improvement is one crucial policy measure to enhance energy security of the economy in the long run.

In the industrial sector, key measures include: speeding up EE improvement—revolving funds/tax incentives/investment promotion measures via BOI; promotion of Energy Services Company (ESCO) business; supportive measures for SMEs, by sending experts to visit SME facilities and assist in energy auditing/giving advice on efficient energy management; and provision of grants for equipment replacement by 9 standard (energy-efficient) equipment. In addition, the Department of Industrial Works (DIW), Ministry of Industry, has been operating the “Energy Savings for Small and Medium-Sized Enterprises (SMEs)” program during the past three years with around 20% energy savings in the forms of electricity and heat which is translated into the GHG emission reductions of around 100 tonnes CO₂-e per enterprise, annually. Since there are approximately 60 000 SMEs in Thailand, 10 000 SMEs with the highest energy consumption could be targeted which would reduce around 1M tonnes CO₂-e per year. As the next step, there could be several possible modalities to scale-up and build on DIW’s program, including engaging ESCOs to promote investment in SME energy efficiency projects, with financing through financial intermediary banks and with DIW providing technical support. Further discussion is needed to design the most suitable modality for the proposed concept.

In the transport sector, almost a quarter of the economy’s passenger-km takes place in the Bangkok Metropolitan Region (BMR). Therefore, any improvement in transport energy efficiency of the BMR will be important to the effort in transport energy reduction. In 2003,

approximately 46% of total daily person trips in the BMR were made by private modes; the second most important mode is public bus with a 37% share. Mass Rapid Transit (MRT) accounted for only 3% of total daily trips in 2003, but its share is expected to grow to 15% by 2015 if the planned MRT network (approximately 200 kilometres) is substantially completed and functioning well.

The key measures introduced are the improvement of public transport and logistics systems, including:

- 1) Passenger transportation: speeding up expansion of rail (mass rapid-transit trains) in Bangkok and its vicinity, providing 'Park & Ride' areas and facilitating passengers by providing feeder transport to the central part of a city, and the development of energy-saving vehicles. Thailand's Board of Investment (BOI) has announced new incentives for the manufacturing of low-cost, fuel efficient automobiles, or the so-called 'ECO Cars'.
- 2) Goods transportation: promoting the use of rail system and waterways; establishing Inland Container Depots (ICD); and improvement of logistics management to reduce unloaded truck travelling.
- 3) Bus Rapid Transit (BRT) could also contribute significantly to the improvement of the speed and reliability of bus services, as well as bus transport energy efficiency. The Bangkok Metropolitan Administration (BMA) has recently promoted the development of several BRT routes with an initial route of 15 kilometres being now in operation. The BRT master plan covers 14 routes with the initial 6 routes (138 kilometres, USD 400 million) for the first phase.
- 4) Although each MRT and BRT can offer better alternatives to BMR transport, integration of various modes, including the following, remains the key to the efficient urban transport development—improving reliability, reducing travel time, and ensuring better air quality. It is crucial to emphasise not only system integration among MRTs and with BRTs, but also coordination with existing bus systems.

In the household sector, key measures are: promotion of the use of high-efficiency equipment; establishment of Minimum Energy Performance Standards (MEPS) for 11 products; energy efficiency labelling; establishment of building code and building material standards; and public awareness campaigns.

d) Financial resources and budget allocation

Government budget and ENCON Fund budget: approximately about THB 4,000 million/year

e) Method for monitoring and measuring effects of action plans

Methods for monitoring include energy consumption reporting, submission of energy conservation targets and plans of designated facilities, and analysis of energy consumption against energy benchmarks of individual sectors.

The outcomes of monitoring involve the evaluation of the overall achievement of individual projects and the strategic plan implementation after a specified time frame, the result of which will be used for improving and developing the strategic plan for another time frame. The main method used for monitoring and evaluation of the action plans is PMQA Method on the following activities: database creation, EE program evaluation, surveys, auditing, statistics (data gathering) benchmarking, diagnostics, end-use information, monitoring, trends analysis, potentials, and others. Several tools have been used together in order to do the monitoring. Those tools are databases, program evaluation, benchmarking, and information surveys.

The Department of Alternative Energy Development and Efficiency (DEDE) plays the major role in monitoring and reporting tasks for the industrial sector. Energy Policy and Planning Office (EPPO) monitors residential, transportation, and government sectors. The outputs by

monitoring are compiled in the annual government report, annual report of Energy Conservation Promotion Fund, and annual organisation report. Financial resources used for monitoring EE projects are allocated from ENCON Fund.

f) Expected results

Decreasing energy consumption by 10.8% or 7,820 ktoe of the total final energy consumption in 2011 (which is also the target of the Energy Efficiency Improvement Program at the end of ENCON Program, Phase 3, 2008–11).

g) Future tasks

Thailand plans to further boost energy efficiency improvement. Currently, a 20-year Energy Efficiency Plan (2011-2030) is being developed. The tentative target is to reduce energy consumption by 33,400 ktoe in the year 2030. Compared with the 2005 Base Year, the country's energy intensity will be reduced by 25% by 2030.

1.4. Institutional Structure

The following departments/entities under the Ministry of Energy of the Royal Thai Government deal with energy efficiency improvement:

- Energy Policy and Planning Office (EPPO) (policy maker) recommends economy-wide energy conservation policies, management and development plans; establishes energy conservation measures and the framework of energy conservation promotion budget allocation; and coordinates, follows up on and evaluates the implementation outcome of the policies, management and development plans.
- Department of Alternative Energy Development and Efficiency (DEDE) (regulator/implementer) promotes, supports and monitors energy conservation activities; undertakes research and development for energy efficiency improvement; establishes regulations and standards and disseminates technologies related to production, processing, transportation and energy use efficiency; and follows up on and evaluates the implementation of energy efficiency improvement.
- Electricity Generating Authority of Thailand (EGAT) owns and operates various types of power generating plants located at 38 sites together with transmission and main distribution systems economy-wide. It has a unit called the DSM Office to promote energy conservation, especially in electrical appliances through standard and labelling schemes. EGAT is also a significant player in encouraging energy efficiency in major industries via ESCO programs.
- PTT Public Company Limited (PTT) is an integrated energy and petrochemical company, conducting its business as the economy's energy company and being listed on the Thai stock market. PTT also puts great emphasis on energy conservation and alternative fuels by conducting research and development together with supporting energy efficiency and alternative energy policies of the government.

Besides, the Energy Conservation Center of Thailand (ECCT) was established in 1987 pursuant to a cabinet resolution as an agency to promote energy conservation activities in the economy; it provides technical expertise and services in energy conservation by closely working with DEDE.

a) Name of organisation

Central Institutions: The Energy Policy and Planning Office (EPPO) and the Department of Alternative Energy Development and Efficiency (DEDE) of the Ministry of Energy.

b) Status of organisation

EPPO—policymaker; DEDE—regulator/implementer

c) Roles and responsibilities

EPPO recommends economy-wide energy conservation policies, management and development plans; establishes energy conservation measures and the framework of energy conservation promotion budget allocation; R& D on EE policy/management-related issues; and coordinates, follows up on and evaluates the implementation outcome of the policies, management and development plans.

DEDE promotes, supports and monitors energy conservation activities; undertakes R&D for energy efficiency improvement; establishes regulations, standards and disseminate technologies related to production, processing, transportation, and energy use efficiency; and follows up on and evaluates the implementation of energy efficiency improvement.

d) Covered sectors

All sectors: industry (including agriculture), transport, residential, commercial, power, government, etc.

e) Established date

EPPO was established in 1992 (formerly, National Energy Policy Office (NEPO) under the Office of the Prime Minister). DEDE was established in 1953 (formerly, Department of Energy Development and Promotion (DEDP) under the Ministry of Science, Technology and Environment).

f) Number of staff members

EPPO—approximately 7 senior persons (responsible for EE); DEDE—approximately 136 persons (responsible for EE); in addition, Thailand has a regional or local institutional structure for energy efficiency improvements.

Regional Institutional Structure

a) Name

Regional Energy Offices 1-12 under the Ministry of Energy

b) Status of organisation

Regulator/implementer/information service

c) Roles and responsibilities

Among others, responsible for energy planning at the provincial level, safety standard inspection of gas stations and LPG retailers as well as promotion and dissemination of information about efficient use of energy, including renewable energy, in line with the government policy and measures.

d) Covered sectors

Industry (including agriculture), transport, residential, commercial, power, government, and others

e) Established date

October 2008

f) Number of staff members

225 government officials, and 404 employees

g) Future tasks

Work along with other local authorities in energy matters and strengthen sustainable development of local communities.

In addition, the present government aspires to have the Local Administration Organizations (LAOs) act as focal points in creating and disseminating “energy-saving culture” via such target groups as children and juveniles, women (mostly housewives), and the aged, under the “Community Energy Volunteers” mechanism. Workshops, meetings, and seminars are regularly organised by LAOs to disseminate government policy, targets, and action plans as well as to obtain feedback on the implementation of the plans and recommendations to improve future action plans.

1.5. Information Dissemination, Awareness-raising and Capacity-building

a) Information collection and dissemination

Relevant information and public relations activities implemented by EPPO under the “Divide by Two ($\div 2$)” campaign as well as those carried out by DEDE and EGAT can be easily accessed by the general public and various media and have been used to reach every target group. Also, the information can be accessed via the website of the respective agencies.

b) Awareness-raising

Examples of these activities are: production of series of television commercials on energy saving methods and benefits to be gained; dissemination of energy conservation issues through various types of media—newspapers, magazines, energy talks via TV programs, etc.; energy mobile units undertaken by Regional Energy Offices; energy camps for students, plays and cultural shows based on energy conservation themes and the establishment of energy information centres to disseminate materials, posters, and other printed matter on issues related to energy conservation and renewable energy.

c) Capacity-building

The implementation of the *Strategic Management Program* under the ENCON Program includes:

- 1) Policy research and study to provide recommendations, options or situation overviews, comprising several dimensions, from the energy supply/demand to the economic, social and environmental impacts, to be an element for decision-making pertaining to the improvement of the Energy Efficiency Improvement Program or Renewable Energy Development Program so that the programs would be appropriate and correspond with the changing situations. The study outcomes could serve as a guiding tool for setting the work priorities and budget allocation.
- 2) Monitoring and management to ensure efficient and effective implementation of the Energy Conservation Program.
- 3) Special tasks to support and enhance the implementation that is of particular importance or urgency.

Additional capacity-building measures and policies aimed at the community include:

- 1) Development of curriculum, teaching/training materials, aiming to integrate the study of energy conservation and environment into the learning process so that energy conservation consciousness can be fostered among the young generation
- 2) Short-term projects/activities (e.g., school recycling banks, energy conservation competitions), aiming to increase participants’ knowledge and understanding of energy conservation and to stimulate improvement in their energy consumption behaviour so that they could expand/share their experience and knowledge with their peer groups
- 3) Short-term HRD and technical visits abroad
- 4) Undergraduate and post-graduate scholarships—local and abroad

- 5) Provision of research funds to encourage students in public and private universities to seriously consider research on energy management, and energy efficiency and renewable energy technologies
- 6) Public awareness campaigns on energy saving.

1.6. Research and Development in Energy Efficiency and Conservation

Although there is currently no specific policy on energy efficiency research, the Thai government, via the ENCON Fund, has continuously supported research and development (R&D) work as part of the Energy Conservation Program of the economy. Each year, a budget of THB >100 million (USD 3 million) is allocated for funding R&D on energy conservation technologies, which can be accessed by academic institutions, research institutions of the public sector and those of the private sector that are non-profit-making. In the Fiscal Year 2010, a total of THB 175 million has been allocated for EPPO (80 million) and DEDE (95 million) for R&D on EE projects. In addition, there are research funds of about THB 5 million each year for postgraduate and Ph.D. levels. The R&D work under the Energy Conservation Program has to demonstrate its practical application in line with the short-term measures designed for EE improvements.

2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1. Government Laws, Decrees, Acts

a) Name

The Energy Conservation Promotion Act, B.E. 2535 (1992), as amended to No. 2, B.E. 2550 (2007)

b) Purpose

To enforce energy conservation, particularly in designated factories and buildings

c) Applicable sectors

Economy-wide (industry, commercial and government building sectors)

d) Outline

The NEPC is responsible for the promotion of energy conservation pursuant to the provisions specified in the ENCON Act and the management of the ENCON Fund. To assist the NEPC, the Energy Conservation Promotion Fund Committee has been established to be responsible for the management of the ENCON Fund and ensure that the allocations are made in compliance with the regulations stipulated in the Act. The Act stipulates duties of owners of designated factories/buildings with regard to energy conservation in their facilities and promotes the use of energy-efficient machinery or equipment as well as materials contributing to energy conservation. The Act also contains penalty clauses for those who violate or fail to comply with the Ministerial Regulations, issued under this Act.

e) Financial resources and budget allocation

The Energy Conservation Promotion Fund (ENCON Fund) has been established under the ENCON Act to serve as working capital, grants or subsidies for implementing in energy conservation programs in both public and private sectors, including energy efficiency improvement, renewable and alternative energy development, R&D projects, human resources development, public education and campaigns on energy conservation, and for the expenses for management and monitoring of the Energy Conservation Program. In FY 2010, THB 2,034 million has been allocated for the EE Improvement Program.

f) Expected results

Under the ENCON Program, Phase 3 (2008-2011), the target is to reduce energy consumption by 10.8% in 2011, compared with the BAU case.

2.2. Regulatory Measures**2.2.1. Minimum Energy Performance Standards and Labelling**

Thailand has Minimum Energy Performance Standards (MEPS) for eleven types of equipment – air-conditioners, refrigerators, magnetic ballast, fluorescent lamps, compact fluorescent lamps, household electric fans, electric water heaters, electric rice cookers, electric kettles, LPG cooking stoves, and motors. Applicable sectors include residential (households and commercial for appliances, lighting and equipment).

In addition, the government introduced the Energy Efficiency Labelling No. 5 Programme (for further information, refer to Section 2.3. on voluntary measures).

2.2.2. Building Energy Codes**a) Name**

Royal Decree on Designated Buildings, B.E. 2538 (1995), effective since 12 December 1995, and Royal Decree on Designated Factories, B.E. 2540 (1997), effective since 17 July 1997

b) Purpose

To improve energy efficiency of the design and construction of the new and existing buildings/factories

c) Applicable sectors

Industry and commercial, including government buildings

d) Outline

Under the ENCON Act (1992), the following two major regulations have been enacted:

- Royal Decree on Designated Buildings, B.E. 2538 (1995), effective since 12 December 1995, stipulating the characteristics of “designated” buildings (energy consumption ≥ 1000 kW or ≥ 20 million megajoules of electrical energy equivalent, or those authorised to install one or more transformers with a total capacity of 1175 kVA). Under this Royal Decree, three Ministerial Regulations on designated buildings have been issued, effective 12 December 1995, prescribing a) the standards, criteria, and procedures for energy conservation in designated buildings; b) the forms and schedule for submission of information on energy consumption and conservation; and c) the criteria, procedures and schedule for owners of designated buildings to establish and submit energy conservation targets and plans.
- Royal Decree on Designated Factories, B.E. 2540 (1997), effective since 17 July 1997, stipulating the characteristics of ‘designated’ factories (those with one or more transformers installed, with a total capacity of ≥ 1000 kW or ≥ 1175 kVA, or those consuming ≥ 20 million MJ of electrical energy equivalent). Under this Royal Decree, two Ministerial Regulations on designated factories have been issued, effective 17 July 1997, prescribing a) the forms and schedule for submission of information on energy production, consumption and conservation, including the criteria on and methods of recording information on energy consumption and installation or modification of machinery or equipment that affects the level of energy consumption and conservation; and b) the criteria, procedures and schedule for owners of designated factories to establish and submit energy conservation targets and plans.

In addition, under the latest revision of the ENCON Act in 2007, five Ministerial Regulations have been issued, namely a) Ministerial Regulation Prescribing Qualifications, Duties and

Number of Personnel Responsible for Energy B.E. 2552; b) Ministerial Regulation Prescribing Standards, Criteria, and Energy Management Procedures in Designated Factories and Buildings B.E. 2552; c) Ministerial Regulation Prescribing the type or size of building and standards, criteria and procedures for designing buildings for energy conservation B.E. 2552; d) Ministerial Regulation Prescribing Qualifications of a Person Applying for Energy Conservation Management Inspection and Certification Permit, and Criteria, Methods and Conditions for Applying, Approving and Renewing the Permit; and e) Ministerial Regulation Prescribing Machinery, Equipment and Material for Energy Conservation.

e) Financial resources and budget allocation

Financed by the ENCON Fund, the budget is based on the annual action plan and subject to approval by the ENCON Fund Committee.

f) Expected results

Around 5-10% energy saving is expected from the compulsory program in energy management implementation of designated facilities while another energy saving potential of at least 10% can be attained in newly constructed buildings, compared with those constructed by former building designing method.

2.3. Voluntary Measures

Thailand established the Energy Efficiency Labelling No. 5 Programme on a voluntary basis with the purpose to inform consumers that No. 5 labelled appliances/equipment are highly energy efficient and hence will reduce their electricity bills. This will also enhance competition among manufacturers to further improve the energy efficiency of their products. This program applies to the industrial, commercial and residential sectors and has been in operation since 1993. Concerning financial resources and budget allocation, financing comes from various sources, such as: GEF grants and the Australian Government (1993–2000); concessional loans from JBIC (OECD) (1994–2002); reimbursement through the Automatic Electricity Tariff Adjustment Mechanism (Ft) (1993–2000); and since 2000 through the reimbursement of the Base Tariff (in EGAT's annual budgeting).

The program's main purpose is to provide consumers with better awareness of the importance of the energy efficiency of appliances and equipment when making a buying decision, and thus will help gradually remove low energy-efficient products from the market.

2.4. Financial Measures Taken by the Government

Various measures have been introduced to boost energy efficiency improvement in the industrial sector, including tax incentives, revolving funds (soft loans), Demand Side Management by Bidding Mechanism, and investment promotion via the Board of Investment (BOI), to encourage energy efficiency improvement. These measures are sought to help achieve the energy saving target as follows (source: DEDE, Thailand, January 2010).

2.4.1. Tax Scheme

a) Name

Tax incentives (monitored by DEDE)

b) Purpose

To induce operators' decision-making to invest in the purchase of energy-efficient equipment/machinery

c) Applicable sectors

Various sectors

d) Outline

Investment in the purchase of energy-efficient equipment/machinery can be reclaimed through corporate tax deduction via three methods:

- 1) Cost-based: allow 1.25 times the actual investment capital for tax deduction calculation, which will lessen the tax burden, by phasing the amount of eligible tax deduction over a period of five years
- 2) Performance-based: 100% of the savings value from energy saving projects would become a tax deduction through income tax for the project owners, but not exceeding THB 2 million
- 3) BOI: A privilege from the Board of Investment for investors who invest in EE and RE business by receiving the waiver of income and import tax for a maximum of eight years.

e) Financial resources and budget allocation

ENCON Fund

f) Expected results

During Phase 1 (2006–07), the introduction of 193 approved projects resulted in a total investment of THB 4,836 million in EE improvement. For Phase 2 (2008–09) in performance-based scheme, 100 approved projects resulted in a total investment of THB 776 million in EE investment with energy saving around THB 455 million per year. The cost-based program which ended in December 2010 is now under consideration by the Ministry of Finance to extend the program for a few more years.. For tax privilege program from BOI, 56 projects have been approved for the incentive (as of December 2010) with a total investment of more than THB 13 billion.

2.4.2. Low-Interest Loans

a) Name

Revolving funds or soft loans (monitored by DEDE)

b) Purpose

This measure is provided to stimulate and expedite energy efficiency investment in large buildings and factories.

c) Applicable sectors

Buildings and factories

d) Outline

Provide loans with 0% interest rate and 7-year final maturity to local commercial banks as an incentive to encourage the banks to lend money to RE/EE projects, including ESCO companies, at a maximum interest rate of 4%.

The maximum loan size is THB 50 million (USD 1.5 million) per project. The banks will manage all aspects of loans and report the project status to DEDE. DEDE will 1) ensure that the projects are genuinely energy-saving projects, not simply equipment replacement; 2) monitor the performance of the banks to ensure that they meet their targets in terms of projects, lending and repayment; and 3) evaluate the program to measure energy savings.

e) Financial resources and budget allocation

Launched in January 2003, with an initial budget of THB 2 billion (about USD 58.8 million) allocated from the ENCON Fund. Up to the present, almost THB 6 billion has been allocated to be soft loans.

f) Expected results

Since its introduction in 2003, the Fund has recruited 11 public and commercial participating banks and extended some USD 200 million loans via the banks in support of approximately 300 projects with about THB 7 billion (USD 206 million) aggregated project costs. The Fund has been successful in familiarising the participating banks with RE/EE business.

In addition, the Thai Government introduced the following loan scheme for households.

a) Name

Household Energy Credits

b) Purpose

To assist the general public who are interested in changing to use energy efficiency household electrical appliances, including the No. 5 energy-saving equipment and those items identified by the Ministry of Energy.

c) Applicable sectors

Residential (households)

d) Outline

Loans were provided via local financial institutions, without any interest rate (0%). A maximum loan for each household was THB 10,000, except for those who want to change to use energy-efficient air-conditioners for which the loan was at a maximum of THB 20,000. Program duration was May 2008 to September 2009.

e) Financial resources and budget allocation

Sponsored by the ENCON Fund with a budget of THB 1,000 million

f) Expected results

Approximate annual energy saving of 50 ktoe by 2011

2.4.3. Subsidies and Budgetary Measure**a) Name**

DSM by Bidding Mechanism (monitored by EPPO)—a new initiative in 2007

b) Purpose

The initiative's main purpose is to provide financial support to encourage business operators to invest in higher energy efficiency machines and equipment. In addition, Demand Side Management by Bidding Mechanism, or DSM Bidding, offers financial support to private sector operators to encourage investment in improving the energy efficiency of their companies by replacing or retrofitting existing machines or equipment, thus reducing energy consumption.

c) Applicable sectors

Private industrial and commercial sectors

d) Outline

In accordance with the initiative, subsidies are granted based on actual energy saving achieved in a year resulting from such investment. The subsidy is defined as “annual energy saving x subsidy rate (as bid by each company)”. With this bidding mechanism, proposals with lower weighted subsidy rate will be subsidised first. The weighted subsidy rate takes into account not only the bid rate but also the lifetime of such investment, i.e. how long the investment will result in energy saving.

The maximum subsidy rate set for each energy type is as shown in the table below.

Table 1: Subsidy rates

Energy Type	Maximum Subsidy Rate
Electricity	THB 1/kWh
Heat from liquid and gas fuels (fuel oil, LPG, natural gas, etc.)	THB 75/MMBtu
Heat from solid fuels (coal, wood, rice husks, sawdust, bagasses and other agricultural waste) Heat from by-product fuels (derived from the production process), e.g. black liquor, distillery slop	THB 15/MMBtu

e) Financial resources and budgetary allocation

THB 1,037.5 million was allocated from the ENCON Fund.

Project duration was three years, via 8 bidding rounds (20 December 2007 – 1 June 2010)

f) Expected results

This scheme is expected to reduce energy consumption by 149 ktoe/year, covering the industrial and commercial sectors. Upon completion of the 8th bidding round on 1 June 2010, a total of 271 facilities have participated in the project, accounting for a total investment capital of THB 4.47 billion and total energy saving of 128.83 ktoe/year (86% of the target), but with total funding from the ENCON Fund of THB 551.65 million (53% of the budget).

In addition to the above-mentioned measures, the government introduced the University Building Energy Efficiency Program. Specifically, the Khon Kaen University was offered financial support from designated bank to support energy auditing and investment in EE of its 360 buildings and one hospital. If the EE investment proves successful, there will be a great potential to replicate it at other university compounds and public buildings. As the next step, possible modalities for a pilot project at KK University, including a partnership with private ESCOs under a benefit-sharing arrangement, with debt financing from the financial intermediary banks. Further discussions are needed to design the most suitable modality for the proposed concept.

2.4.4. Other Incentives

In 2008, the Thai Government introduced a new initiative, the ESCO Venture Capital (monitored by DEDE). The ESCO Fund has been established as a source of venture capital for the investors to jointly invest between public and private operators in energy efficiency and renewable energy projects through various channels—venture capital, equity investment, equipment leasing, carbon market, technical assistance and credit guarantee facility. The Fund was launched in October 2008, with an initial capital of THB 500 million (about USD 14.7 million) targeted for potential investors; and as a pilot venture capital initiative to address the issue of lack of equity capital for small developers. The Fund provides equity capital up to 50% of total equity; and in the case of very small projects, provides its support through equipment leasing. The Fund has outsourced the identification and appraisal of projects to two entities, playing the role as Fund Managers (THB 250 million each for ECFT and E for E¹). As of August 2010, the Fund has approved as many as 33 projects, with total co-investment of around THB 328 million from the ESCO Fund, including, for instance, solar firms, biomass power plants, gasification projects and lighting devices.

In addition, Thailand has a number of other supportive measures for SMEs and the residential sector (monitored by various organisations) which provide grants for SMEs for the replacement of existing production processes and technologies by proven high-efficiency ones.

¹Energy Conservation Foundation of Thailand and Energy for Environment Foundation.

Some examples of energy efficiency improvement due to these measures include technological upgrades in the tobacco curing process, ceramic shuttle kilns, and Chinese sausage dryers.

2.5. Energy Pricing

The oil market in Thailand has been liberalised; thus, the pricing of crude oil and all petroleum products except LPG are based on international prices and the market mechanism.

LPG retail prices have been floated since 1 November 2001, while the wholesale prices are still under regulation. The government has planned to remove LPG subsidies, but the energy price crisis in 2008 caused the implementation to be delayed. Instead, the ex-refinery price of LPG has been capped at USD 332 per tonne since March 2008 to alleviate the burden on consumers, especially in the household sector.

For naturally monopolistic businesses like electricity and natural gas, the government set the pricing policy and framework to be fair for both energy service providers and consumers, whereas the regulation of electricity tariffs and natural gas pricing and throughput fees are under the authority of the Energy Regulatory Commission (ERC) to ensure compliance with the government policy and framework.

Although a free and fair energy market is promoted, if the market mechanism fails to work properly, the government must step in to correct it in order to protect consumers. Normally, energy pricing principles in Thailand (whether involving oil, natural gas or electricity) are to reflect actual costs of supply and efficiency of operators. This will cause consumers to be more cautious in the use of energy. However, in certain cases like LPG as mentioned above, where the ex-refinery price has been capped, the use of LPG gets distorted, particularly toward greater use of LPG for transport. Therefore, LPG pricing is now under review by the government to reflect the actual supply costs and to avoid its distorted use.

2.6. Other Efforts for Energy Efficiency Improvements

2.6.1. Cooperation with Non-Government Organisations

Stand-alone PEA Renewable Energy and Energy Efficiency Project

PEA (Provincial Electricity Authority) is collaborating with the Forest Industry Organization (FIO) to invest in a pilot biomass power generation project using biomass residuals from FIO plantations as fuel source with a potential to scale up to about 100 sites (with an approximate total capacity of 100 MW) in the next five years, and associated transmission lines and substations. PEA also has a plan to improve energy efficiency of street lighting on highways throughout the economy with private participation of ESCO.

In addition, PEA has a Master Plan for Energy Conservation which focuses on: a) energy conservation projects for public and street lighting, b) energy efficiency for PEA buildings (air conditioning and lighting), and c) consulting services in energy management for PEA customers. PEA estimates a reduction in energy consumption of at least 300 GWh per year, equivalent to THB 750 million. The financing structure of the EE activities includes the following items: a) PPP scheme to finance EE street lighting, b) turn-key method for building retrofitting, and c) normal EE consultancy services for PEA customers. To implement this Master Plan, PEA has established a subsidiary (100% owned) named PEA ENCOM International. However, PEA informed that its wholly owned subsidiary, PEA ENCOM International, will be the entity to invest in the above-mentioned EE projects and not the PEA mother company.

2.6.2. Cooperation through Bilateral, Regional and Multilateral Schemes

Thailand has established close relationships in EE in the areas of capacity building and technical assistance with neighbouring economies, such as Lao PDR, Cambodia, Myanmar, Malaysia, and Viet Nam. Regarding multilateral and regional cooperation, Thailand, as

ASEAN Chair in 2008, led ASEAN toward the leaders' aspiring goal of achieving 8% of EE improvement by 2015. Thailand also chaired the ASEAN Plan of Action for Energy Cooperation (APAEC) Drafting Committee in preparing the APAEC 2010-2015 detailing the EE strategies and actions for ASEAN member states.

2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements

There is financial support from designated banks to support energy audit and investment in EE in university compounds, hospitals and public buildings through the ENCON Fund. Other EE programs also involve joint studies, R&D and promotional activities to enhance efficient use of energy in transportation, industrial and household sectors as well as capacity building and development of personnel dealing with EE improvement projects/activities through academic conferences, seminars, training, and technical visits, including scholarship granting to pursue further study at the bachelor, master and Ph.D. levels, through the ENCON Fund.

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