

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.

The previous government under Prime Minister Abhisit Vejjajiva's administration promoted serious and continuous energy conservation and efficiency, focusing the transportation, industrial, service & household sectors, by setting energy efficiency standards of electrical appliances & buildings and supporting development of mass public transportation and rail systems.

A long-term master plan for energy efficiency improvement, called the 20-year Energy Efficiency Development Plan (EEDP 2011-2030), was developed by the Ministry of Energy, aiming to reduce energy intensity (EI) of the economy by 25% in 2030, using 2005 as the base year, i.e. Thailand has to reduce energy consumption by approximately 30,000 ktoe in the year 2030. The EEDP was approved by the cabinet on 3 May 2011.

The present government under Prime Minister Yingluck Shinawatra's administration, as per the Policy Statement delivered by the PM on 23 August 2011, continues to promote and drive energy conservation focusing on the same three economic sectors and clearly specified a target of EI reduction by 25% within 20 years (i.e. 2030). The use of high energy-efficiency equipment and buildings will be promoted, while Clean Development Mechanism (CDM) will be used to reduce greenhouse gas emissions and to tackle global warming. Consumer awareness of economical and efficient use of energy will be raised systematically and continuously.

Later, at the APEC Summit on 11 November 2011 in Hawaii, the USA, it was agreed to further reduce EI of the region by at least 45% by 2035, compared with the 2005 base year. Given this resolution, Thailand will have to reduce the economy's EI by at least 26.5%, compared with the 2005 base year, or at least 35,900 ktoe.

Therefore, in order to respond to both the present government policy and to the new target declared by APEC Leaders, the target of Thailand's 20-year EEDP has been adjusted, i.e. to achieve the reduction of EI by 25% in 2030, compared with that in 2010, accounting for energy consumption reduction of about 38,200 ktoe.

1.2. Sectoral Energy Efficiency Improvement Goals

According to the revised 20-year EEDP (2011-2030), the energy efficiency improvement targets are as follows:

| Economic Sector | Revised EE Target in 2030 (ktoe) | Share (%) |
|---|----------------------------------|----------------------|
| Industry | 16,100 | 42 |
| Transportation | 15,100 | 40 |
| Commercial & Residential - Large commercial building - Small commercial building & residential | 3,600 3,400 | 9 9 |
| Total | 38,200 | 100.0 |

1.3. Action Plans for Promoting Energy Efficiency

On 19 March 2013, the Cabinet approved the resolution of the National Energy Policy Council (NEPC) on the Action Plan of the 20-year EEDP with some additional revision such as sustainable transport development projects of the Ministry of Transport, the projects under the National Economic and Social Development Board and clear-cut short term projects. In implementing EEDP Action Plans, key success factors driven towards the energy efficiency implementation would be divided into 2 levels, master plan for the overall implementation of energy conservation in all economic sectors and sectoral plans in all sectors of business, residential, transport and industry.

In terms of the master plans, an emphasis would be on short term, medium term and long term target in implementing industrial, commercial building, residential and transport sectors. Below are strategies to promote energy efficiency;

- 1. Both mandatory and supportive/promotional measures** will be used.
 - Major mandatory measures -- the enforcement of Industrial Product Standards Act B.E. 2511 (1968) Minimum Energy Performance Standards (MEPS), and determination of the Energy Efficiency Resource Standards (EERS), or the minimum standards for large energy businesses to implement energy conservation measures encouraging their customers to use energy efficiently.
 - Supportive/promotional measures of incentive provision to encourage voluntary energy-performance labeling for highly energy-efficient equipment/appliances, buildings and vehicles; promote traveling by mass transit systems and goods transportation via highly energy-efficient logistics systems; providing subsidies for the amount of energy saved and/or reduction of peak load that can be verified for SMEs, under the Standard Offer Program (SOP) scheme, which requires no bidding.
- 2. Introduce measures creating a wide impact** in terms of awareness raising and behavioral change, including market transformation, e.g. the linkage between energy conservation and global warming alleviation. Energy prices will be set to reflect actual costs and tax measures will be applied to send the right signal to consumers so that they would change energy consumption behavior.
- 3. Boost the private sector role** in the public-private partnership in Energy Efficiency (EE) promotion and implementation.
- 4. Delegate EE implementation** to agencies which are well equipped to act.
- 5. Use those with expertise and ESCO companies** as important tools. Development of professionals in energy conservation will be supported, including persons responsible for energy (PRE) management & operation, verification & monitoring, consultancy & engineering services provision, and the planning.
- 6. Promote technology development and Innovations** to increase self-reliance and access to high-efficiency technology. R&D will be promoted to improve energy efficiency and reduce technological costs.

a) Objectives

Given the highly volatile oil prices, Thailand plans to further boost energy efficiency improvement in order to reduce dependency on imported oil and to reduce impact of energy price volatility. The 20-year Energy Efficiency Development Plan (2011-2030) has been developed, with two main objectives:

1. To **set the energy conservation targets** in the short term, medium term and long term, both at the national level and by energy-intensive economic sectors, i.e. transportation, industry, commercial and residential sectors.
2. To **lay down strategies, guidelines, measures and work plans promoting energy conservation** to serve as the framework for concerned agencies in formulating their respective action plans.

The milestones of the 20-year EEDP Action Plan have been adjusted, divided into four phases, as detailed in v. below.

b) Applicable Sectors

All sectors, especially industry, transport and household

c) Outline

i. Industrial Sector

Since the industrial sector has been shared for the highest percentage under EEDP, the focus has to be given to this particular sector as priority. As such some programs, apart from the cross-sectors measures being implemented under EEDP, are needed to be specifically undertaken for industry sector such as 1) Enforcement of Minimum Energy Performance Standard (MEPS) for the production process, 2) Develop benchmarking system based on energy used per unit of products for major sub-sectors in industry, 3) Promote R&D on high energy-efficiency equipment/appliances with large markets and manufacturing bases in Thailand

Besides the additional measures mentioned above, the other main measures are needed to be carried on under the existing scheme which are 1) energy management program for designated factories, 2) EE financing, 3) tax incentives, 4) technical assistance, 5) capacity building programs 6) collaboration with major private corporations (firm commitment and top-down approach), and 7) promotion of the energy service company (ESCO) business

ii. 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 229 MMSCFD (averaged Jan-Nov) in 2011 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.

iii. 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, electric fans, chillers, glazing panes, rice cookers, electric water heaters and electric posts, 3) energy labelling program for household appliances and office equipment, 4) promotion of energy efficiency in home design, and 5) public awareness campaigns.

iv Commercial Building

To promote energy efficiency in buildings, several measures and programs are being implemented such as 1) promoting Building Energy Code (BEC), 2) energy management program for designated buildings, 3) energy efficiency labelling for buildings, 4) capacity building programs, 5) EE financing, and 6) promotion ESCO

v. The 20-Year EEDP Milestones

| Phase | Target Group | EE Target (at end of Phase) | Project/Work Plan |
|------------------------------------|--|---|---|
| Immediate Term 2011-2012 | <ul style="list-style-type: none"> o Flood victims | | <ul style="list-style-type: none"> o Soft loans/Subsidy/ ESCO services o Change to high efficiency equipment/appliances |
| Short Term 2011-2016 | <ul style="list-style-type: none"> o Existing buildings/houses o Old industrial facilities o Transport (transportation efficiency) o Public services o Street lighting-billboards | ~ Energy saving 576 ktoe ~ CO ₂ reduction: 27 Mtons | <ul style="list-style-type: none"> o Continue implementing projects proven successful (eg. ESCO/EM/Building) o Promote high EE equipment, via tax and monetary measures o Strictly enforce the laws imposed on designated buildings/factories o Push through the Voluntary Agreement to enhance EE cooperation o Speed up capability building awareness creation and change in energy consumption behavior |
| Medium Term 2011-2022 | <ul style="list-style-type: none"> o Transportation sector o Commercial buildings (newly constructed) o Industrial sector | ~ Energy saving 21,068 ktoe ~ CO ₂ reduction: 72 Mtons | <ul style="list-style-type: none"> o Enforce MEPS, HEPs labeling for equipment/machinery o Develop SEC Using Energy Foot Print in order to reduce energy use and CO₂ o Enforce energy conservation and CO₂ reduction in new buildings o Promote EE improvement in the production process |
| Long Term 2011-2030 | <ul style="list-style-type: none"> o Power generation sector o Transportation sector (Technology) o Industrial sector (Structural level) | ~ Energy saving 38,200 ktoe ~ CO ₂ reduction: 140 Mtons | <ul style="list-style-type: none"> o Structural reform to keep equilibrium between energy and economics o Structural reform of transport, eg using high EE transport systems o Improve EE of power plants and distribution systems |

d) Financial resources and budget allocation

Government budget and ENCON Fund budget: approximately about THB 4,000 million per 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 organisation annual report. Financial resources used for monitoring EE projects are allocated from ENCON Fund.

f) Expected results

In 2030, the accumulated final energy savings will be no less than 38,200 ktoe, which is worth THB 707 billion.

Also, the avoided CO₂ emissions will be about 140 M tons.

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), established in 1987 pursuant to a cabinet resolution as an agency to promote energy conservation activities in the economy, has provided technical expertise and services in energy conservation by working closely with DEDE.

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 energy saving PR campaign, generally known as "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

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 sectors that are non-profit-making. In the Fiscal Year 2011, a total of THB 107.8 million has been allocated for EPPO (100 million) and DEDE (7.8 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 (1992) 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 (1992) 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 2011, THB 1,286 million has been allocated for the EE Improvement Program.

f) Expected results

Under the newly developed 20-year EEDP (2011-2030), the target is to reduce energy intensity of the economy by 25% in 2030, compared with the 2010 base year.

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 for air-conditioners, refrigerators, double-capped fluorescent lamps, self-ballasted lamps, single-capped fluorescent lamps, LPG cooking stoves, and 3 phase motors, fibreglass insulation, diesel engines, microwave and rice cookers, which are responsible by Thai Industrial Standards Institute (TISI), Ministry of Industry.

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. Compulsory Energy Management Program for Designated Buildings and Factories

Buildings and factories with energy consumption $\times 1000$ kW or $\times 20$ million megajoules of electrical energy equivalent, or those authorised to install one or more transformers with a total capacity of 1175 kVA, have to implement the energy management system in their facility according to the guideline under the Ministerial Regulation Prescribing Standards, Criteria and Energy Management Procedures in Designated Factories and Buildings, B.E. 2552 (2009). An energy management report which is preliminarily audited by a certified energy auditor has to be submitted to the Department of Alternative Energy Development and Efficiency (DEDE) within March of each year, starting from year 2010. The improvement of energy efficiency is expected to increase by around 5-10% from the implementation of this energy management system.

2.2.3 Building Energy Code (BEC)

A mandatory energy code has been set under the Ministerial Regulation Prescribing the Type or Size of Building and Standards, Criteria and Procedures for Designing Buildings for Energy Conservation, B.E. 2552 (2009), with the purpose to improve energy efficiency of the design and construction of new buildings which occupy area over 2,000 sq.m.. The code was set for major energy systems in the building, such as building envelope, lighting, air-conditioning and heating, by promoting the concept of EE design as well as the utilization of high-efficient equipment and materials. Under the regulation, all new buildings have to comply with the codes before getting the construction permission. By implementing this program, it is expected to save energy around 10-20% from the code compliance buildings compared with the conventional design.

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 $\times 1000$ kW or $\times 20$ 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 $\times 1000$ kW or $\times 1175$ kVA, or those consuming $\times 20$ 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.

In 2007, Thailand established another Energy Efficiency Labelling for non-appliances on voluntary basis which is responsible by DEDE. At present, there are seven products which have been labeled including LPG cooking stoves, glazing panes, 3-phase motors, variable speed drive (vfd), glass wool insulation, diesel engines and gasoline engines.

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.

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 as well as the promotion on EE business

c) Applicable sectors

Various sectors

d) Outline

Two schemes of tax incentives are offered as follows:

- 1) Investment in the purchase of energy-efficient equipment/machinery can be claimed for the additional 25% of purchasing cost for the deduction amount for the tax calculation in that year.
- 2) A privilege from the Board of Investment (BOI) 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

The tax incentive based on purchasing of EE equipment is being under consideration of extending period from the termination of program in December 2012 while the incentive from BOI is still in service for the investors in EE business.

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. Now, the revolving fund program has terminated the injection of government budget into the program since 2012 while encouraging more participation from commercial banks to offer loans for EE projects through the market mechanism with some technical assistance provided by DEDE.

2.4.3. Co-investment program

a) Name

ESCO Fund (monitored by DEDE)

b) Purpose

To encourage the investment for EE and RE projects with high technical potential in energy saving but facing limitation to access financing

c) Applicable sectors

Buildings, factories and ESCOs

d) Outline

A co-investment program between public and private utilizing project-financing scheme to share risk with private developers. Government budget has been allocated as the seed funding for selected non-profit organizations called "fund managers" with the responsibility to seek for and manage investment in EE and RE projects which cover good technical potential and economic return. A seven-years investment period in several project types such as equity investment, venture capital, equipment leasing, creation of carbon credit market, and credit guarantee facility will be co-invested by fund managers for the max. of THB 50 million per project with appropriate criteria while having the supervision and monitoring by Investment Committee.

e) Financial resources and budget allocation

Launched in year 2008 as the first phase, with an initial budget of THB 500 million allocated from the ENCON Fund to be financial support for project investment within the two- years window of investment. In addition to that, the second and third phase has been launched for another THB 500 million per phase for project implementation in 2010 and 2013 accordingly.

f) Expected results

The implementation of ESCO Fund phase I and II has been resulting in the encouraging of EE and RE investment up to 101 projects with total investment around THB 5 billion. The co-investment from ESCO Fund was shared by 16% which generated total energy saving up to THB 1.1 billion per year

a) Name

Household Energy Credits

b) Purpose

To assist the general public who are interested in changing the use of 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

2.4.4. Subsidies and Budgetary Measure

a) Name

DSM by Bidding Mechanism (monitored by EPPO) a new initiative in 2007 and launched in 2008

b) Purpose

The initiative's main purpose is to provide financial support to encourage business operators to invest in higher energy efficient 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

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 bided 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 1,137 million was allocated from the ENCON Fund.

Project duration: 2008-2012, via eight bidding rounds (2008-2010)

f) Results

The implementation of 216 proposals from 132 companies has been completed. The actual energy saving is 121.09 ktoe per year, accounting for 162.76% of the target of 74.40 ktoe per year.

2.5. Other Efforts for Energy Efficiency Improvements

2.5.1. 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.

2.5.2. 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 leadership goal of achieving 8% of EE improvement by 2015. Energy efficiency support and cooperation from the government of Japan has also been actively implemented.

2.5.3. 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.