

# 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 then 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 (%)
<b>Industry</b>	<b>16,100</b>	<b>42</b>
<b>Transportation</b>	<b>15,100</b>	<b>40</b>
<b>Commercial &amp; Residential</b>		
- Large commercial building	<b>3,600</b>	<b>9</b>
- Small commercial building & residential	<b>3,400</b>	<b>9</b>
<b>Total</b>	<b>38,200</b>	<b>100.0</b>

### **1.3. Action Plans for Promoting Energy Efficiency**

Thailand has the following strategic approach for promoting energy efficiency.

1. **Both mandatory and supportive/promotional measures** will be used.
  - Major mandatory measures -- the enforcement of the Energy Conservation Promotion Act, 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 – 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 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 (5 years) and long term (20 years), 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.

However, in compliance with the policy of the new government coupled with the flood crisis in many areas in the economy during the last quarter of 2011, and following the resolution of the National Energy Policy Council (NEPC) on 30 November 2011, the milestones of the 20-year EEDP Action Plan have been adjusted, divided into four phases, as detailed in c) below.

**b) Applicable Sectors**

All sectors, especially industry, transport and household

**c) Outline**

**i. 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 still be carried on, such as a) promotion of energy management, b) EE loan program, 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.

**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, 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.

**iv. Other Sectors**

Factories and commercial buildings which have a peak demand of  $\geq 1000$  kW or consume  $\geq 20$  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.

v. The 20-Year EEDP Milestones

Phase	Target Group	EE Target (at end of Phase)	Project/Work Plan
<b>Immediate Term</b> 2011-2012	<ul style="list-style-type: none"> <li>Flood victims</li> </ul>		<ul style="list-style-type: none"> <li>Soft loans/subsidy/ ESCO services</li> <li>Change to high efficiency equipment/appliances</li> </ul>
<b>Short Term</b> 2011-2016	<ul style="list-style-type: none"> <li>Existing buildings/houses</li> <li>Old industrial facilities</li> <li>Transport (transportation efficiency)</li> <li>Public services</li> <li>Street lighting-billboards</li> </ul>	<ul style="list-style-type: none"> <li>Energy saving 5% 11ktoe</li> <li>CO<sub>2</sub> reduction 11 27 Mtons</li> </ul>	<ul style="list-style-type: none"> <li>Continue implementing projects proven successful (eg ESCO/DSM Bidding)</li> <li>Promote high EE equipment, via tax and monetary measures</li> <li>Strictly enforce the laws imposed on designated buildings/factories</li> <li>Push through the Voluntary Agreement to enhance EE cooperation</li> <li>Speed up capability building awareness creation and change in energy consumption behavior</li> </ul>
<b>Medium Term</b> 2011-2022	<ul style="list-style-type: none"> <li>Transportation sector</li> <li>Commercial buildings (newly constructed)</li> <li>Industrial sector</li> </ul>	<ul style="list-style-type: none"> <li>Energy saving 1 21,058 ktoe</li> <li>CO<sub>2</sub> reduction 11 72 Mtons</li> </ul>	<ul style="list-style-type: none"> <li>Enforce MEPs, HEPs, labeling for equipment/machinery</li> <li>Develop EEC using Energy Foot Print in order to reduce energy use and CO<sub>2</sub></li> <li>Enforce energy conservation and CO<sub>2</sub> reduction in new buildings</li> <li>Promote EE improvement in the production process</li> </ul>
<b>Long Term</b> 2011-2030	<ul style="list-style-type: none"> <li>Power generation sector</li> <li>Transportation sector (Technology)</li> <li>Industrial sector (Structural level)</li> </ul>	<ul style="list-style-type: none"> <li>Energy saving 1 38,200 ktoe</li> <li>CO<sub>2</sub> reduction 11 130 Mtons</li> </ul>	<ul style="list-style-type: none"> <li>Structural reform to keep equilibrium between energy and economics</li> <li>Structural reform of transport, eg using high EE transport systems</li> <li>Improve EE of power plants and distribution systems</li> </ul>

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

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

Also, the avoided CO<sub>2</sub> emissions will be about 130 M tons.

**g) Future tasks**

Thailand plans to further boost energy efficiency improvement. Currently, a 20-year Energy Efficiency Plan (2011-2030) has been developed. The target is to reduce energy consumption by 38,200 ktoe in the year 2030. Compared with the 2010 Base Year, the country's energy intensity will be reduced by 25% by 2030.

Presently, a detailed Action Plan of the 20-year EEDP is being developed, taking into account the new policy directive of the present government, via consultations with all stakeholders, i.e. experts and concerned public/private agencies, including public hearings in all regions of the economy. The completion of the Action Plan as well as its endorsement by the National Energy Policy Council and the cabinet, is expected within Q1/2012, hence the implementation of the Action Plan can commence by Q2/2012.

**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.

**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 5 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
- Regional Center 1-10 under DEDE

**b) Status of organisation**

Regulator/implementer/information service

**c) Roles and responsibilities**

Regional Energy Office is responsible for energy policy coordination 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.

Regional Centre is responsible for technology transfer, RE and EE campaign and awareness creation.

**d) Covered sectors**

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

**e) Established date**

Regional Energy Office was established in October 2008

Regional Centre was established in December 2008

**f) Number of staff members**

The approximate numbers of staff of both authorities are 227 government officials and 486 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 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 sector 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.

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## **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 2011, THB 1,087 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.

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 seven types of equipment – air-conditioners, refrigerators, double-capped fluorescent lamps, self-ballasted lamps, single-capped fluorescent lamps, LPG cooking stoves, and 3 phase motors.

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

#### **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 as well as the promotion on EE business

###### **c) Applicable sectors**

Various sectors

###### **d) Outline**

e) 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)
- 3) ( Terminated)
- 4) 2) 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.

###### **f) Financial resources and budget allocation**

ENCON Fund

###### **g) Expected results**

During the year 2010 2011, more than 500 applications from the purchasing of EE equipment/machinery were submitted for tax deduction For tax privilege program from BOI, 87 projects have been approved for the incentive (as of December 2011) with a total investment of more than THB 21 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 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 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**

<b>Energy Type</b>	<b>Maximum Subsidy Rate</b>
<b>Electricity</b>	THB 1/kWh
<b>Heat from liquid and gas fuels</b> (fuel oil, LPG, natural gas, etc.)	THB 75/MMBtu
<b>Heat from solid fuels</b> (coal, wood, rice husks, sawdust, bagasses and other agricultural waste) <b>Heat from by-product fuels</b> (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 8 bidding rounds (2008-2010)

**f) Expected results**

This scheme is expected to reduce energy consumption by 74.40 ktoe/year, covering the industrial and commercial sectors. Upon completion of the 8<sup>th</sup> bidding round on 1 June 2010, a total of 271 proposals were submitted.. Of these, 260 proposals have been approved for implementation under this scheme, involving investment in energy efficiency improvement by the companies at more than THB 4 billion and the total amount of subsidies required from the ENCON Fund at about THB 540 million, which is only 52% of the budget. The expected total energy saving is 126.68 ktoe/year, accounting for 170% of the target.

As of September 2011, implementation of 77 proposals has been completed and the actual saving verified & measured. It is reported that the average saving achieved is 130% of the proposed saving.

#### **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 E<sup>1</sup>). 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. 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 and NGV, are based on international prices and the market mechanism.

##### Policy Purpose/Justification

LPG price subsidization is aimed to alleviate fuel cost burden of consumers, in general, caused by oil price crises in the past. Particularly, LPG price has been subsidized for a long time as it is mainly used in the household sector, i.e. to alleviate the household expense on cooking gas nationwide.

NGV price subsidization is aimed to induce consumers' use as alternative energy to reduce oil consumption. (NGV price increase, step by step, was expected, but it has never been realized so far.)

Due to LPG price fixing by the government, coupled with oil price hikes in the recent past, LPG use has been increasing in the industrial and transport sectors and as feedstock in the petrochemical industry, resulting in a huge burden of subsidies by the Oil Fund. As for the NGV price, which has been fixed since 2005, the price adjustment is required so as to reduce the cost burden of the trader (PTT). Therefore, the government is trying to reduce subsidies for LPG and NGV to have the prices better reflect actual costs so that consumers will be given an accurate signal of energy prices and hence more efficient use of energy.

However, in order to alleviate the pricing impact on specific groups in need, the following measures are pursued:

LPG price for household use remains fixed nationwide (until end-2012).

LPG price for the transportation sector will be increased as from 16 January 2012, at a rate of 0.75 Baht/kg (0.41 Baht/litre)/month, while the NGV price will be increased by 0.50 Baht/kg/month until December 2012.

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<sup>1</sup>Energy Conservation Foundation of Thailand and Energy for Environment Foundation.

As for the LPG price for the petrochemical industry, the contribution rate to the Oil Fund, at 1 Baht/kg, will be imposed as from 1 January 2012 onwards in order to reduce the Oil Fund burden of subsidization for imported LPG as the LPG demand growth rate in this sector is very high.

NGV price subsidy will be phased out. To alleviate the impact on public transport services – taxis, motor-tricycle taxis (tuk-tuks), fixed-route passenger vans of private operators – assistance will be provided in the form of price reduction via the use of Energy Credit Cards, scheduled to launch on 15 December 2011.

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.

### **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.

#### **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.

