Chapter 1

Background and Objective

September 2019

This chapter should be cited as

ERIA (2019), 'Background and Objective', in Motokura, M., Y. Kato and I. Kutani (eds.), *Cost Effectiveness of the Energy Efficiency and Conservation Policy in the Association of Southeast Asian Nations.* ERIA Research Project Report FY2018 no.13, Jakarta: ERIA, pp.1-55.

Chapter 1

Background and Objective

1.1. Background and Objective of the Study

The importance of energy efficiency and conservation (EE&C) is commonly discussed amongst policymakers. Countries are regarding this as one of the primary principles constituting energy policy, and various types of EE&C policies have been developed and adopted. However, in reality, expected EE&C investment is not necessarily executed due to high upfront costs and financing difficulties.

The first step to overcome these challenges is to understand the potential benefits of EE&C investment and financing. One incentive to invest in EE&C is that the resulting reduction in energy bills could pay off the capital expenditure. Policymakers might also become willing to allocate a budget for an EE&C financing programme if they understand that EE&C investment can bring greater benefits to a county than investment amount. Another necessary step is to learn about possible EE&C financing methods. Eliminating knowledge gaps amongst stakeholders, particularly policymakers and financing institutions, can facilitate finance and hence EE&C investment in a country.

In this context, this study will try to identify possible financing methods for EE&C investment and will analyse their costs and benefits. By sharing this information with policymakers in Association of Southeast Asian Nations (ASEAN) member countries, this study intends to help promote EE&C investment in the region.

This study takes the following steps:

(i) provides an overview of EE&C financing methods (section 1.2),
(ii) summarises current EE&C policies and financing status in ASEAN (section 1.3),
(iii) performs a cost–benefit analysis of EE&C financing (Chapter 2), and
(iv) delivers policy recommendations (Chapter 3).

1.1. Overview of Energy Efficiency and Conservation Financing Methods

The importance of energy saving is universally acknowledged; however, given the involvement of spending and investment, it is impossible to achieve energy saving without a smooth funding process. If the companies or individuals trying to implement energy-saving measures can do so with their own funds, there is nothing to worry about. If they cannot, favourable financing programmes can help support the implementation of energy-saving measures.

Typically, such funding is provided by governments, government agencies, and financial institutions. These funds are supplied in various ways, which can be classified largely into five different types (see Table 1.1) (PricewaterhouseCoopers, 2012).

Table 1.1: Typical Financing Mechanism

Type	Example	Repayment
(i) Tax incentive	Accelerated depreciation, tax deductions, and tax credits	No
(ii) Non-tax incentive	Grants and subsidies	No
(iii) Lending programme	Bank loans, low interest lending, collateral free lending, and loan guarantees	Yes
(iv) Performance contract	Guaranteed savings Shared savings	Yes
(v) Carbon finance	Clean Development Mechanism Joint implementation	Yes

Source: Created from PricewaterhouseCoopers (2012), *Assessment of Energy Efficiency Financing Mechanism*. January, India.

Tax Incentives

Tax incentives are intended to encourage investment in energy saving by decreasing the tax burdens associated with such investment, and hence by reducing the total amount of spending, including tax. Typically, with specific energy-saving equipment and energy-saving performance subject to predetermined tax incentives, only investment recognised as satisfying these requirements is entitled to receive incentives.

Since tax incentives can be applied just by modifying the existing taxation system, they are considered easier to implement than non-tax incentives, for which a new system must be built from scratch. However, the incentive provider must set a necessary standard for the incentive system at the beginning, carry out additional work such as receiving and examining applications for the tax incentive, and bear the cost. As a natural consequence, tax revenue from the incentive receiver will decrease in any of the three following cases:

(i) Accelerated depreciation. When a company invests in energy-saving equipment, the equipment must be depreciated following certain accounting rules. Accelerated depreciation is intended to reduce taxable income by depreciating the equipment earlier in its service life, allowing the company to save on corporate income tax for the first several years after the investment.

(ii) Tax deductions. Tax deductions involve deducting the amount equivalent to the investment in energy saving from taxable income. One advantage of tax deductions is decreased tax amounts as a result of reduced taxable income. In many cases, a ceiling is set on the amount of the deduction.

(iii) Tax credits. Tax credits involve deducting the amount of tax instead of reducing taxable income.

Thus, the relationship between tax incentives and the use of related tax should be studied and coordinated.

Non-Tax Incentives

Non-tax incentives are a way to provide more direct financial support. The fixed-amount or fixed-rate funds are provided without repayment obligation to eligible equipment or

investments. In some cases, payment is made depending on the amount or rate of energy actually saved. With the help of grants, activities aimed at the development and social implementation of new energy-saving technologies can be supported, including research and development and verification tests. Because there are no refunding obligations, these incentives play a significant role on the incentive receiver side.

Since there are no refunding obligations, the management of financing examination and refunding is not required for grants and subsidies. For this reason, the operation of grants and subsidies is easier than the operation of lending programmes from the viewpoint of the incentive provider. On the other hand, since the funds once supplied will not be refunded, it is important for the incentive provider to secure enough funds. At the same time, the government is typically protected from excessive financial burdens by setting a ceiling on each executed budget.

Lending Programmes

Lending programmes are a method for banks and non-banks such as leasing companies to provide charged financing. In some cases, lending programmes are implemented jointly by a financial institution and third-party entities capable of assessing and providing the energy-saving technologies involved. In addition to conventional financing methods, various types of new financing techniques are being developed, including revolving funds. It can be said that lending programmes are a sustainable financing method because the funds supplied will be refunded in all scenarios.

Potential issues with financing through lending programmes include interest and collateral. Although it encourages investment in energy saving, low interest rate financing has a disadvantage when it comes to the sustainability of financing mechanisms. The same applies to collateral conditions. Private commercial banks face limitations in reducing interest rates and easing collateral requirements. This is where the involvement of public financial institutions makes sense.

Performance Contracts

Performance contracts are a form of financing. To improve energy saving capability and reduce energy costs, energy service companies (ESCOs) are involved in revamping customers' equipment. In this case, customers choose the best contract arrangement with ESCOs from a variety of financing techniques such as guaranteed saving, in which the amount of energy to be saved is guaranteed; and shared saving, in which benefits from energy saving are equally shared between the two parties. Under performance contracts, customers will refund loans to financial institutions and will pay service charges to ESCOs using the proceeds obtained from the reduction in their energy costs.

Since ESCOs take various types of risks in performance contracts, the customer side has large benefits. For this reason, performance contracts incentivise investment in energy saving. For example, customers can avoid the risks of their investment in energy saving ending up a failure and of energy efficiency not improving as much as expected. Under performance contracts, customers do not need to make a large initial investment to revamp their equipment, and can also equalise the cost of energy saving.

Carbon Finance

The trading of carbon credits earned by greenhouse gas (GHG) reductions can provide the necessary funds for investing in energy saving in developing countries. Specifically, the Clean Development Mechanism and Joint Implementation defined in the Kyoto Protocol fall into this category. The requirements that must be met and methods for post-implementation monitoring are strictly defined in the Clean Development Mechanism and Joint Implementation, and appropriate procedures must be taken in line with a series of guidelines.

As described above, there are various types of EE&C financing. However, these financing mechanisms present several issues with respect to practical application and utilisation. These issues vary depending on the type of financing, which can be grouped largely into three types: (i) tax and non-tax incentives, (ii) lending programmes and performance contracts, and (iii) carbon finance (see Table 1.2).

Table 1.2: Types of Energy Efficiency and Conservation Financing

	Source of Funds	Repayment	Financing Method
(i)	Domestic government	No	Tax incentive Non-tax incentive
(ii)	Domestic government/private	Yes	Lending programme Performance contract
(iii)	Foreign	Yes	Carbon finance

Source: Author.

As there are no refunding obligations, this group has the following issues.

(i) There is the issue of free riders, that is, those who would have implemented investment in energy saving even without this system are subject to this financial support.
(ii) In the case of tax incentives, there is the risk of incentive receivers intentionally inflating the amount of investment for the purpose of receiving more tax deductions than necessary.
(iii) In the first place, the effects of tax deductions and tax credits are limited when tax rates are low.
(iv) The financial burden on the government budget is large, or these incentives are restricted by the government budget.
(v) Additional administrative costs will be required to build these systems and to receive and examine applications.

Due to refunding obligations, this group has the following issues:

(i) Given the lack of knowledge about energy saving on the lender side, it is difficult to assess achievements appropriately.
(ii) Since the effect of investment (energy cost reductions) is hard to recognise, it is difficult for the lender side to assess achievements appropriately.
(iii) Many loans in this group are smaller than traditional loans, making them less attractive to lenders.
(iv) The payout time of many loans in this group is longer than that of traditional loans,

making them less attractive to lenders.

(v) In some cases, energy saving projects do not have enough assets (land and buildings) that can serve as loan collateral. In this case, lenders find it difficult to manage project risks.

(vi) There are only a small number of ESCOs.

(vii) The financial strength of ESCOs is low, which limits the size of investment or makes fundraising difficult in shared saving.

Due to the use of funds available overseas, this group faces the following issues:

(i) Procedures for financing are so complex and strict that it takes a long time for the project to be set up.

(ii) The amount of energy actually saved must be monitored and verified. Furthermore, the procedure for this process is complex.

1.3. Current Energy Efficiency and Conservation Policy and Financing Programme in the Association of Southeast Asian Nations

This section will examine each country's energy conservation policies and activities in ASEAN and Japan. The survey results are summarised in Table 1.3.

Table 1.3: Evaluation of Energy Conservation Policy Infrastructure in the Association of Southeast Asian Nations and Japan

	Targets	Laws and regulation	Designated energy management factories	Energy manager	Standards and labelling	Financial support	Energy price subsidy
Brunei Darussalam	Yes	No	No	No	No	Yes	Yes
Cambodia	Yes	No	No	No	No	No	No
Indonesia	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lao PDR	Yes	No	No	No	No	No	No
Malaysia	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Myanmar	Yes	No	No	No	No	No	No
Philippines	Yes	Yes	No	No	Yes	Yes	No
Singapore	Yes	Yes	Yes	Yes	Yes	Yes	No

Thailand	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Viet Nam	Yes	Yes	Yes	Yes	Yes	No	Yes
Japan	Yes	Yes	Yes	Yes	Yes	Yes	No

Lao PDR = Lao People's Democratic Republic.

Source: Author.

1.3.1. Brunei Darussalam

Overview

The Brunei Darussalam Energy White Paper released in March 2014, the first paper of its kind, provided a roadmap for the country's energy conservation policies (Energy Department, 2013). In this roadmap, the country set the goal of reducing energy consumption relative to gross domestic product (GDP) to 45% below 2005 levels by 2035. The roadmap also included the reduction target for each sector: 18.5% in the commercial sector, 16.2% in the housing sector, 5.9% in the transportation sector, and 4.5% in the industrial sector. As measures for achieving these goals, the country set up seven major policies to implement specific actions, as follows:

(i) Appliance energy efficiency standards and labelling
   (a) Establish a legal framework for energy efficiency standards.
   (b) Set up minimum energy efficiency standards for air conditioners in the first phase, followed by refrigerators, lighting, and other appliances in the subsequent phases.
   (c) Design the types of energy efficiency indicators and rating scales to be adopted for each appliance.
   (d) Introduce energy labelling for selected electrical appliances.

(ii) Building regulation
   (a) Establish a legal framework for building energy efficiency.
   (b) Introduce energy-efficient or green building labels or certificates.
   (c) Demonstrate green buildings.

(iii) Energy management
   (a) Introduce an energy management process that is compatible with international standards, such as ISO (International Organization for

Standardization) 50001.

(b) Introduce energy audit policy for buildings and industries.

(c) Promote ESCOs.

(iv) Fuel economy regulation

(a) Evaluate the possibility of implementing fuel economy regulations.

(b) Promote the utilisation of hybrid and electric vehicles.

(v) Electricity tariff reform

(a) Expand the current progressive electricity tariff for the residential sector to other sectors when appropriate.

(b) Evaluate the feasibility of altering tariff structures to promote desired consumption behaviour.

(c) Conduct regular surveys to understand the optimum tariff schedule through understanding the relationships between household income and electricity usage.

(vi) Financial incentives

Introduce appropriate incentives for energy-efficient appliances and vehicles.

(viii) Awareness raising

Regulations

Specifically, the following actions are currently being taken or are under consideration.

(i) The guideline for energy-saving buildings in the non-residential sector introduced in May 2015.

The Ministry of Development, jointly with the Energy Department at the Prime Minister's Office, established a guideline for buildings that meet energy performance standards in the non-residential sector. At the same time, a regulatory agency responsible for such buildings was established. While the existing guideline for energy-saving buildings is applied to all government-owned buildings, it is applied to commercial buildings only on a voluntary basis. It is expected that the guideline will be applied to all types of buildings at the time of a future revision.

(ii) The introduction of prepaid power cards and prepaid power meters in January 2012.

To reduce electricity consumption for household and commercial use, an electricity bill prepayment system using prepaid cards called 'Power-card' was introduced. In addition, all power meters were replaced with prepaid power meters free of charge. At the same time, electricity charges were reviewed to reduce electricity consumption and give preferential treatment to low-income earners. The introduction of prepaid power meters is encouraging consumers to use electricity efficiently.

(iii) Progressive electricity tariff

Unit electricity price has decreased for low usage and increased for high usage. This tariff design resulted in reducing annual electricity consumption by 12%, on average, which was cumulatively worth $20 million during 2012–2016 (Ministry of Energy, Manpower and Industry, 2018).

(iv) Energy efficiency standard and labelling system

The Energy Department at the Prime Minister's Office, jointly with the Brunei National Energy Research Institute, is involved in the development of an energy performance standard and labelling system for home appliances. This initiative is intended to prevent inefficient home appliances from being imported in the future, through education on energy saving and by encouraging the public to purchase energy-saving products.

(v) Setting a fuel economy standard

The country has set a fuel economy standard for new vehicles with the goal of achieving 17.2 kilometres per litre by 2020 (equivalent to the target identified by the European Union [EU] for 2016) and 21.3 kilometres per litre by 2025 (equivalent to the EU's target for 2020). In addition, the tax rates on electric vehicles, fuel-efficient vehicles, and small cars were reduced to facilitate the popularisation of these vehicles. For example, while hybrid vehicles receive a 5% tax reduction, diesel-powered vehicles are subject to an extra 5% tax (Ministry of Energy, Manpower and Industry, 2018).

(vi) Introduction of monetary incentives

The application of tax exemptions, tax reductions, and rebates to energy-saving equipment and products is currently under consideration. Similar preferential treatment is also under consideration in the transportation sector. Possible monetary incentives for hybrid vehicles and fuel-efficient vehicles are especially attracting attention.

Table 1.4: Evaluation of Energy Efficiency and Conservation Regulations by Sector in Brunei Darussalam

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	B: In-house measures, mainly by the oil and gas industries, to improve operational efficiency and reduce greenhouse gas emissions	N/A
Commercial and Residential	A1: Control of the use of air conditioners – temperature setting and operation hours (government buildings) A2: Energy efficiency and conservation guidelines for non-residential buildings (government buildings as of May 2015) B1: Energy efficiency and conservation guidelines for non-residential buildings (commercial buildings) A: Project-based energy efficiency measures such as the increased use of energy-efficient streetlights (government) B: Green building rating system (planned)	A: Minimum energy performance standards and energy labelling for electrical appliances (residential): 1st phase – air conditioners (awaiting endorsement) 2nd phase – refrigerators (planned) 3rd phase – lighting and water heaters (planned)

	B: Energy awards B: Energy week B: Energy club (secondary/post-tertiary schools and colleges) B: Green building design and features for public houses under the National Housing Programme	
Transport	N/A	A: Fuel economy regulations for passenger cars (planned)

Source: The Energy Research Institute Network Secretariat (2016), Energy Efficiency Policy Update, March.

Organisation

The Ministry of Energy, Manpower and Industry, which was separated from the Energy Department at the Prime Minister's Office in 2018, is responsible for general energy policies, including energy conservation.

Financing Tool

There is no EE&C financing programme at present.

1.3.2. Cambodia

Overview

In May 2013, Cambodia, with the cooperation of the EU Energy Initiative Partnership Dialogue Facility, formulated a draft of the National Policy, Strategy and Action Plan on Energy Efficiency in Cambodia (NPSAP EEC). The country set the goal of reducing energy demand by 20% and slashing emissions by 3 million tonnes of carbon dioxide (t-CO_2) compared with business as usual (BAU) by 2035. In the draft of the NPSAP EEC, the country also referred to the frameworks for its energy conservation policies, action plans, and so forth.

In November 2013, the country released the Cambodia Climate Change Strategic Plan 2014–2023 (CCCSP). The CCCSP presents the direction and strategy of the climate change countermeasures to be taken in the 10 years between 2014 and 2023. The CCCSP refers to the

implementation of energy-saving measures as one of its most important strategies, along with the introduction of renewable energy.

In July 2014, the country announced its National Strategic Development Plan 2014–2018. In this plan, the main points of discussion relating to the energy field include expanded power supply capability and ensured energy security in the power sector. The plan also clearly refers to enhanced efficiency in energy consumption and the need to accomplish the CCCSP successfully.

Meanwhile, Cambodia submitted its Intended Nationally Determined Contributions in September 2015. On the condition that international support is provided, the country set the goal of reducing carbon dioxide (CO_2) emissions by 27% (3.1 million t-CO_2) compared with BAU by 2030. As specific approaches to accomplishing this goal, the country referred to the promotion of energy-saving sewing plants and buildings, and the popularisation of electric vehicles and hybrid vehicles.

Regulations

The regulations being implemented include the following:

(i) The NPSAP EEC

With the cooperation of the EU Energy Initiative Partnership Dialogue Facility, Cambodia formulated the NPSAP EEC and released it in May 2013. The NPSAP EEC consists of three parts:

(a) Energy Efficiency Policy of Cambodia (energy conservation goals, etc.);
(b) National Energy Efficiency Strategy (implementation systems and target sectors); and
(c) National Energy Efficiency Action Plan (specific action plans by sector).

As a priority target, the country set the goal of reducing CO_2 emissions by 27% (3.1 million t-CO_2) compared with BAU by 2030. The target sectors include not only typical sectors like the industrial, equipment, and building sectors, but also the power and biomass sectors operating in rural areas in the context of low electrification rates and high biomass energy consumption. The energy conservation policies by sector proposed in the NPSAP EEC

include the training of qualified energy managers, the implementation of a labelling policy, database building, and consumer education, which are covered by most energy conservation policies.

(ii) The CCCSP

Cambodia formulated the CCCSP under international auspices, and the Ministry of Environment of Cambodia announced it in November 2013. The CCCSP is the strategy for climate change countermeasures approved by the Government of Cambodia. To cope with climate change, the CCCSP is designed to contribute actively to global climate change countermeasures by promoting low-carbon schemes and technologies; enhancing systems and coordination frameworks; and improving competence, knowledge, and awareness. The CCCSP refers to energy saving as a measure for accomplishing its goals.

Cambodia has implemented the following energy conservation policies in the past:

(i) An official notice from the Prime Minister on reducing electricity consumption in the public sector (2008). A guideline was presented for reducing electricity consumption in public facilities.

(ii) Reducing GHG emissions through improved energy efficiency in the industrial sector. Cambodia is currently building frameworks for energy conservation policies with assistance from the United Nations Industrial Development Organization.

(iii) Designing an energy audit system for buildings. Cambodian engineers received on the job training through partnership with other ASEAN countries. The audit system is being designed by gathering information about energy management systems, understanding the status of energy use, and training engineers through partnership with qualified energy managers from Japan. Other events include workshops for qualified energy managers and observation tours.

Table 1.5: Energy Efficiency and Conservation Regulations by Sector in Cambodia

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	A1: Reducing greenhouse gas emissions through improved energy efficiency in the industrial sector A2: Surveying the potential for energy saving and providing help for the development of a framework for the energy saving policy with support from the United Nations Industrial Development Organization	
Commercial and Residential	A1: Designing, gathering information, and developing human resources for an energy audit system for buildings Finding a way to develop the system with support from other countries A2: Circulars from the Prime Minister to curb power consumption at public facilities The implementation of guidelines to reduce the amount of power consumed at public facilities	
Transport		

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

The Ministry of Mines and Energy is responsible for the formulation of energy policies and strategies including energy saving; the development of power development plans; and the establishment of electric power technology, safety, and environmental standards.

Financing Tool

There is no EE&C financing programme at present.

1.3.3. Indonesia

Overview

In 2006, Indonesia's Minister of Energy and Mineral Resources issued a decree mandating the promotion and popularisation of energy saving based on Presidential Decree No. 5/2006. Since then, the country has reinforced actions to promote energy efficiency.

Indonesia launched the National Energy Conservation Masterplan (RIKEN) in 2005. RIKEN set the goal of improving GDP-specific energy consumption by 1% each year until 2025, and reducing energy–GDP elasticity to 1 or less by the same year. According to RIKEN, the potential for energy saving in each sector in the period from when this masterplan was formulated to 2025 is estimated at 17% in the industrial sector, 15% in business, 20% in transportation, and 15% in household.

The Energy Law No. 30/2007 is one of the most important laws related to energy conservation in Indonesia. This law is intended to devise and implement development plans with the objectives of developing and promoting renewable energy sources, improving energy use efficiency, and integrating energy conservation measures.

Regulations

The following are examples of regulations related to EE&C:

(i) Energy Conservation Regulation (2009)

(a) This is a regulation for the implementation of specific energy conservation measures that the Energy Law calls for, including the designated energy management factory system, the qualified energy manager certification system, and the labelling system. Regarding the designated energy management factory system, one of the systems described above, its subject is factories with an annual energy consumption to 6,000 tonnes or more of crude oil equivalent. These factories are mandated to submit regular reports concerning energy conservation goal setting, planning, and energy management.

(ii) Labelling system

In addition to the items listed below, there is a plan to mandate the affixing of energy efficiency labels on home appliances such as refrigerators and television sets. Some regulations concerning labelling are:

(a) Ministry of Energy and Mineral Resources Regulation No. 06/2011 on Energy Efficiency Rating for CFL (2011). This regulation initiated energy efficiency labelling for compact fluorescent lamps (CFLs), and classified the energy performance standard for CFLs by illuminance per watt into four-level ratings (the brightest per watt is given a four-star rating).

(b) MEPS and Labelling for Air Conditioning (Ministerial Regulation No. 07/2015) (International Energy Agency, 2017). This regulation stipulates the minimum energy performance standard (MEPS) and labelling system for air conditioners.

(c) National Standard Competency for Energy Manager on Building and Industry (Ministerial Regulation No. 41/2015). This regulation stipulates the standards for competency criteria, training contents, and certification tests that are needed for training in the qualified energy manager certification system (International Energy Agency, 2016).

Table 1.6: Energy Efficiency and Conservation Regulations by Sector in Indonesia

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	A1: Energy users that consume more than 6,000 tonnes of oil equivalent annually bear the following obligations: A2: To appoint an energy manager; A3: To formulate an energy saving programme; A4: To inspect energy regularly; A5: To put recommendations from energy inspections into practice; A6: To create an annual report on the actual situation of energy saving	A1: Standards must be in accordance with performance specifications for energy equipment and methods to carry them out. B1: The efficiency of energy equipment is labelled by their manufacturers and importers in accordance with regulations on labelling. Labelling for fluorescent lights was issued in 2014. B2: Minimum energy performance standard and labelling for air

	under the jurisdiction of the ministers and heads of states, provinces, and cities; and A7: To inspect energy.	conditioning
Commercial and Residential		(Same as above)
Transport		

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

The organisation responsible for the formulation and execution of energy policies in Indonesia is the Ministry of Energy and Mineral Resources, within which the Director of General New Energy, Renewable and Energy Conservation is responsible for energy conservation policies.

Financing Tool (Ministry of Energy and Mineral Resources, 2018)

There is a tax benefit policy for equipment that contributes to energy conservation. The tax benefit will be provided after the entity has achieved energy conservation for 2 years (ex-post rather than ex-ante provision). Indonesia is planning to add a 2% surcharge on electricity bills to collect funds to support the programme.

In addition, there is a public–private partnership project for street lighting using ESCOs. Local governments will finance ESCO companies.

1.3.4. The Lao People's Democratic Republic

Overview

In the National Energy Efficiency and Conservation Policy towards 2030, the Lao People's Democratic Republic (PDR) set the goal of reducing national energy demand by 10% in 2030 compared with BAU. At the same time, the country intends to reduce GHG emissions by lowering the level of energy consumption by around 1%, on average, each year compared with BAU. As the initial phase of this initiative, the Lao People's Democratic Republic will achieve the

following goals by 2020:

(i) follow up EE&C policy and develop an EE&C promotion plan, financial mechanism, rules, and principle on energy management in four main sectors (industry, residential, building and office, and transportation);
(ii) develop a database, MEPS, labelling and standards programme, capacity building, and supporting tools and guidelines; and
(iii) develop and demonstrate pilot activities in focused sectors and awareness raising.

In addition, a prime ministerial decree on EE&C was issued to define more details of the implementation rules and measures for the main designated entities.

Regulations

The Lao PDR has implemented the following energy conservation projects in the past:

(i) Demand side management and energy efficiency project by the World Bank and Global Environment Facility

Energy-saving measures for buildings of public institutions have been taken, including the replacement of 400,000 incandescent light bulbs with CFLs, the replacement of building lights at 50 government organisations, the replacement of 100 window air conditioning units with ceiling-embedded air conditioners, and the advertisement of energy saving through mass media.

(ii) Capacity building programme

To enable government officers and business executives to learn energy-saving diagnosis and management, many training programmes, workshops, and seminars are held with assistance from the ASEAN Centre for Energy, Japan, Thailand, and others.

Table 1.7: Energy Efficiency and Conservation Regulations by Sector in the Lao People's Democratic Republic

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	B1: The energy-saving diagnosis has been implemented for beer and cement plants with support from Japan and others. B2: New proposal for further improvement of energy efficiency systems for beer plants	The Electricity Act stipulates that the responsible ministries and agencies establish, approve, and test the quality of domestically produced or imported electric equipment to secure the safety and energy saving capability of electric machinery and equipment. Specific energy efficiency standards, however, have not been established. The issue is still being discussed and planned.
Commercial and Residential	A1: The Government of the Lao People's Democratic Republic promotes energy saving for lighting equipment. A2: A plan to reduce the energy consumption of government institutions by 10% between 2006 and 2007 was implemented. B1: With the support of the World Bank, energy-saving measures were implemented in the buildings of public institutions. B2: With support from Japan, including the dispatch of experts (The Energy Conservation Center, Japan), some hotels are implementing energy-saving activities.	There are fire protection standards and planning control, but no construction standard related to energy saving capability has been developed. The country once asked Japan (the Ministry of Land, Infrastructure, Transport and Tourism) for support for the establishment of a construction standards system. Energy efficiency standards and labelling systems have not yet been established for electric appliances, etc., but a plan for a labelling system is being discussed based on international cooperation.
Transport	A1: The Government of the Lao People's Democratic Republic	Details are unknown.

	announced that it would stop the import of used cars from February 2012. A2: The government encouraged the increased use of public transport financed by the Japan International Cooperation Agency, Japan.	

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

The Ministry of Energy and Mines is responsible for energy policy, strategic directions, and the administration of energy and mining sections. Under this ministry, the Department of Energy Management is in charge of formulating energy conservation policies, and the Institute of Renewable Energy Promotion is responsible for implementing and promoting energy-saving measures.

Financing Tool

There is no EE&C financing policy at present.

1.3.5. Malaysia

Overview

Malaysia's energy conservation policies have been implemented under the National Energy Efficiency Programme, which was launched in 1991. As part of this master plan, the development and promotion of systems, equipment, and buildings have been pursued to improve energy efficiency. In 1998, Pusat Tenaga Malaysia was established as a nonprofit independent corporation to implement the Government of Malaysia's energy conservation policies.

The strategy for the promotion of energy-saving measures is stipulated in the 5-Year Malaysia Plans. The current 11th 5-Year Malaysia Plan, 2016–2020, set the goal of reducing CO_2 emissions relative to GDP to 40% below 2005 levels by 2020. To achieve this goal, demand side management (DSM) and the promotion of low-carbon mobility are described as necessary

energy-saving measures. In addition, the following activities are described in this plan:

(i) increasing the percentage of government green procurement to 20%;
(ii) promoting the qualification of environmentally friendly buildings, and enhancing the assessment system; and
(iii) expanding the MyHIJAU labelling programme.

The National Energy Efficiency Action Plan (NEEAP) and the Green Technology Master Plan (GTMP) are implemented as longer-term strategies. The NEEAP, which was approved in a cabinet meeting in 2016, lays out energy conservation strategies for 2016–2025. The major points of the NEEAP are as follows:

(i) promotion of 5-star rated appliances,
(ii) MEPS,
(iii) energy audits and energy management in buildings and industries,
(iv) promotion of co-generation,
(v) energy audits and energy management in buildings, and
(vi) energy-efficient building design.

On the other hand, the GTMP lays out energy conservation strategies covering all energy fields for 2017–2030. Concerning energy-saving measures, the GTMP set the goal of reducing electricity intensity to 15% by 2030.

Regulations

The following regulations pertain to energy conservation:

(i) The Electricity Supply (Amendment) 2001 – Act A1116 empowers the minister to promote the efficient use of electricity (sections 23A, B, and C); determine efficiency standards; and mandate that installation and equipment meet efficiency requirements.
(ii) The Efficient Management of Electrical Energy Regulations 2008 mandate that any installations that receive electrical energy from a licensee or supply authority with a total electricity consumption equal to or exceeding 3 million kilowatt-hours (kWh) over any period of 6 consecutive months must appoint a registered electrical energy manager.

(iii) The Amendment of Electrical Supply Regulations 1994 (May 2013) enables the enforcement of the MEPS on electrical appliances and lighting equipment (incandescent, CFL, and light-emitting diode light). Because of these regulations, five new products – air conditioners, electric fans, refrigerators, television sets, and washing machines – were added in 2018 to the list of products subject to the labelling system. These products are also subject to the MEPS.

(iv) The MS1525: Code of Practice for Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings (introduced in 2001 and updated in 2008) is mandatory under the Uniform Building By-Laws.

Table 1.8: Energy Efficiency and Conservation Regulations by Sector in Malaysia

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	B1: Energy efficiency rules B2: Malaysian Industry and Energy Saving Improvement Project (completed), Global Environment Facility, United Nations Development Programme Support Project B3: Energy Saving Improvement Program of Malaysia (started in 2008)	

Commercial and Residential	B1: 'ESCO' (energy service companies) business B2: Energy audit and replacement of lighting with light-emitting diode lights in government buildings B3: Energy-efficient buildings: zero-energy buildings, low-energy office buildings, Energy Committee headquarters building B4: Phase out incandescent lights by 2014. B5: National Energy Saving Consciousness Campaign – SWITCH! B6: Basic Investigation to Realize Green Township Vision in Malaysia, Japan–Malaysia Cooperation B7: Limit air conditioner temperatures in government and municipal offices to 24 degrees. B8: Energy saving programme at major government hospitals B9: Green procurement by public sector	A1: Five models are covered (voluntary) A2: Energy saving guideline for buildings (voluntary) A3: Green Buildings Index (voluntary) A4: Low-carbon city framework and assessment system (voluntary) B1: Seven products are covered (voluntary)
Transport		

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

The Economic Planning Unit, one of the organisations under the direct control of the Prime Minister's Department, which is the supreme decision-making body in the country, has jurisdiction over all of Malaysia's energy policies.

Under the Economic Planning Unit, the Ministry of Energy, Science, Technology, Environment and Climate Change is responsible for developing and promoting energy conservation and renewable energy, and formulating electricity supply policies and strategies.

Financing Tool

In Malaysia, a financial support tool called the Energy Audit Conditional Grant was introduced under the 11th Malaysia Plan between 2016 and 2018. Its purpose is to provide subsidies for energy-saving diagnoses with the objective of supporting ESCOs. Its subject is the commercial and industrial sectors, and the amount of the grant is up to RM55,000 for the commercial sector, and RM95,000 for the industrial sector. As a result, the following implementation and electricity savings were achieved from July 2017 to June 2018:

(i) Industry (72 cases): electricity savings of 26,553,845 kWh, with $4.7 million financed by the government.
(ii) Commercial (50 buildings): electricity savings of 16,907,289 kWh, with $1.9 million financed by the government.

1.3.6. Myanmar

Overview

In Myanmar, the Energy Efficiency and Conservation Policy, Strategy and Roadmap was formulated in 2015 and approved in a cabinet meeting in 2016. In this roadmap, the country set the goal of reducing energy consumption by 12% by 2020, 16% by 2025, and 20% by 2030 relative to 2012 levels. The roadmap also presented energy consumption for each sector (Ministry of Industry, 2018).

Table 1.9: Energy Efficiency Policy Targets in Myanmar (%)

Sector	EE policy target by 2020	EE policy target by 2025	EE policy target by 2030
Industry	3.5	5.3	6.6
Commercial/public	2.0	3.0	4.0
Residential	5.4	6.8	7.8
Other	0.7	1.0	1.4
Total	11.7	16.1	19.8
EE policy targets	12.0	16.0	20.0

EE = energy efficiency.
Source: Ministry of Industry (2018), 'Activities and Implementations of Energy Efficiency and Conservation Activities in Myanmar', *著: The 1st Meeting of ERIA Research Project FY2018, Working Group on 'Cost Effectiveness of EE&C Policy'*.

Specific actions to be taken for energy saving are structured on the following three pillars: (i) the application of energy management factories and buildings, (ii) the setting of efficiency standards for home appliances, and (iii) social awareness-raising campaigns on the need for energy-saving measures. At the same time, a draft of the Energy Efficiency and Conservation Law was formulated based on this roadmap.

Other than the above, Myanmar, in its Intended Nationally Determined Contributions submitted in 2015, presented the goal of reducing electricity demand to 20% below the baseline in 2030.

Regulations

According to the draft of the Energy Efficiency and Conservation Law, the following regulations are under consideration:

(i) regulation on energy management systems for factories and buildings,
(ii) regulation on energy managers and energy auditor systems,
(iii) regulation on MEPS and labelling,
(iv) regulation on transportation, and
(v) other supplementary regulations (i.e. energy conservation guidelines and financing mechanisms).

Of these regulations in the draft, the following are those whose details are known:

(i) MEPS

Based on the ASEAN-SHINE Programme, Regional Harmonised Standard, the setting of a standard for air conditioners is being studied as a first step. After the MEPS for air conditioners is stipulated, an effective compliance mechanism consisting of monitoring, verification, and enforcement will be established. It is expected that the setting of a standard for lighting systems will be studied after that for air conditioners.

(ii) Setting standards and labelling

These measures will be put in place by the following steps: (a) a tentative rating standard and MEPS values will be set, (b) these will be explained to stakeholders to see how they react, (c) a trial will be implemented, and (d) based on the trial results, these measures will be officially established. The implementation of these measures

is intended to start on a voluntary basis, before shifting to implementation on a mandatory basis a few years later.

The following are a few examples of the energy-saving measures currently implemented:

(i) In Myanmar, firewood is burned in cooking furnaces, which gives rise to concerns about environmental issues such as deforestation. In response to this situation, the United Nations Development Programme and Food and Agriculture Organization have been offering high-efficiency cooking furnaces free of charge or at low prices since 2004.

(ii) Most of the streetlights in the city of Yangon have been replaced with low-voltage lights.

(iii) Energy efficiency and energy conservation are the most important points of examination for obtaining building permits.

(iv) Energy-saving diagnoses have been implemented in accordance with a request from the Ministry of Energy.

Table 1.10: Energy Efficiency and Conservation Regulations by Sector in Myanmar

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	B: Participating in the ASEAN–Japan Promotion of Energy Efficiency and Conservation	None
Commercial and Residential	B1: The Ministry of Energy implements energy-saving diagnoses upon request. B2: Promoting the widespread use of high-efficiency cooking furnaces with support from international institutions	A: Minimum energy performance standards for air conditioners are being planned.
Transport	None	None

ASEAN = Association of Southeast Asian Nations.

Source: Author.

Organisation

Within the Government of Myanmar, the Energy Efficiency and Conservation Department, which was established in the Ministry of Industry in 2014, is responsible for energy conservation.

Financing tool

There is no EE&C financing policy at present.

1.3.7. Philippines

Overview

The entire picture of the Philippines' energy policies including energy conservation is summarised in the Philippine Energy Plan formulated by the Department of Energy (Department of Energy, 2017). The latest version of this plan is the Philippine Energy Plan 2017–2040. In the Philippines, energy conservation measures are positioned as part of the policy to promote a low-carbon future.

The National Energy Efficiency and Conservation Program, which was launched in 2004, lays out the principles of the specific energy conservation policies. The programme is a comprehensive policy that covers six sectors – commercial and government buildings, industrial, household, electric power, transportation, and agricultural – and consists of the following nine programmes:

(i) the Social Mobilization and Information, Education and Communication Campaign;
(ii) the Energy Efficiency Standards and Labeling Program;
(iii) the Government Energy Management Program;
(iv) Energy Management Services and Energy Audits;
(v) the Voluntary Agreement Program;
(vi) the Recognition Award Program;
(vii) the Fuel Economy Run Program;
(viii) regional support projects to promote energy conservation, including
    (a) Road Transport Patrol (fuel conservation and efficiency in road traffic) and
    (b) Power Patrol (controlling electricity consumption and demand side management); and

(ix) foreign assistance and technical support.

Meanwhile, the Energy Efficiency and Conservation Roadmap 2017–2040 sets the goal for reducing energy consumption. While a BAU forecast predicts that energy consumption will increase by 80% between 2017 and 2040, cumulative energy consumption since 2005 will decrease by 24%. The roadmap describes the measures needed to achieve this goal separately in three timespans for the transportation, industrial, residential, commercial, and agricultural sectors: short-term (2017–2020), medium-term (2021–2030), and long-term (2031–2040).

Table 1.11: Energy Efficiency Targets in the Philippines

Sector	Annual energy saved by 2040 (kilotonnes of oil equivalent)	Implied annual savings (%)	Total savings by 2040 (%)
Transport	4,500	1.90	-25
Industry	3,000	1.30	-15
Residential	1,000	1.20	-20
Commercial	1,200	1.90	-25
Agriculture	300	0.90	-10
Total	10,000	1.60	-24

Source: Department of Energy (2017), *Energy Efficiency and Conservation Roadmap 2017–2040*. https://www.doe.gov.ph/sites/default/files/pdf/energy_efficiency/ee_roadmap_book_2017-2040.pdf (accessed 14 June 2019).

Regulations

The following are major regulations relating to energy conservation:

(i) Demand Side Management (Department Circular No. DC2014-08-0014）

To cope with a tight electric power supply and demand, this ministerial order aims to mandate all electricity consumers (especially in the household, industrial, and business sectors) – excluding socially important facilities such as hospitals, military facilities, and airports – to implement DSM and other energy-saving measures required to reduce electricity consumption. This ministerial order is also aimed at mandating electric power suppliers to provide full support to consumers in implementing DSM.

(ii) Energy Consumption Monitoring (Department of Energy [DOE] Circular No. 93-03-05)

This regulation asks all companies and facilities in the industrial, commercial, and transportation sectors to submit quarterly or annual reports on the status of their energy consumption. Those with an annual energy consumption equivalent to 1,000 kilolitres or more of fuel oil must submit quarterly reports, and those with an annual energy consumption equivalent to 2,000 kilolitres or more must also submit annual reports with more detailed descriptions.

(iii) Minimum energy efficiency

Minimum energy efficiency standards are set for eight types of equipment: CFLs, freezers, refrigerator freezers, refrigerators, electric motors, air conditioners with an outdoor unit, and window air conditioners.

(iv) Labelling system

An energy label must be affixed to the following 11 product items including those currently under consideration: electronic ballasts, fluorescent ballasts, CFLs, industrial fans, fluorescent lamps, refrigerating machines, electric motors, air conditioners with an outdoor unit, window air conditioners, refrigerators, and refrigerator freezers.

(v) Government Energy Management Program (2004)

This energy conservation programme for government-owned buildings and vehicles sets the goal of reducing electricity and fuel consumption by 10%.

(vi) Energy conservation guidelines for buildings

These guidelines are stipulated based on the Guidelines for Energy Conservation Design of Buildings and Utility Systems as a referral code to the National Building Code, which was formulated in 1994. These guidelines are applicable to the building of external walls, air conditioners, hot water supply equipment, lighting systems, power receiving and transforming facilities, and entire buildings. These specifications were prepared as guidelines and intended for use on a voluntary basis.

(vii) Certification and evaluation programme for green buildings

This is a voluntary certification and evaluation system operated by the Philippine Green Building Council. Certification under the Building for Ecologically Responsive Design Excellence system, including the processes from the planning phase to construction, requires verification by third-party institutions. In this sense, this

programme is considered highly reliable amongst green building certification and evaluation programmes in the Philippines.

(viii) Energy conservation officer system

To implement the government's plans for energy conservation and energy efficiency improvements, the head of each government organisation must appoint his or her executive officers as energy conservation officers. These officers must prepare energy conservation visions, plans, and implementation plans, amongst other things; make assessment schemes for energy efficiency improvements; and manualise the results for submission to the Government of the Philippines.

Table 1.12: Energy Efficiency and Conservation Regulations by Sector in the Philippines

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	A1: Regulation began in 2014 in accordance with the Ministerial Order about DSM Programs. A2: In accordance with the Energy Management System (DOE Circular No. 93-03-05), the following were asked to submit reports on the status of energy consumption to the DOE on a voluntary basis: (i) Companies and facilities with an annual energy consumption equivalent to 1,000 kL or more of fuel oil are asked to submit quarterly energy consumption reports. (ii) Companies and facilities with an annual energy consumption equivalent to 2,000 kL or more of fuel oil are asked to submit quarterly energy consumption reports as well as annual reports	

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
	with more detailed descriptions. B1: Energy audits and certification programmes – energy audits and energy conservation advisory services by the DOE B2: Philippine Industrial Energy Efficiency Project – energy conservation through the standardisation of energy management based on ISO50001	
Commercial and Residential	A1: Regulation began in 2014 in accordance with the Ministerial Order about DSM Programs. A2: Requests for reports on the status of energy consumption in accordance with the Energy Management System (see the description above) B1: Asian Development Bank-supported project – phase-out incandescent light bulbs by January 2010 B2: ESCO Certification Program in 2008 – four companies have been certified so far.	A1: Eight product items are subject to the minimum energy performance standard. B1: Eleven product items are subject to the energy labelling system.
Transport	B1: Various programmes intended to promote fuel efficiency are underway in accordance with the National Energy Efficiency and Conservation Program.	

DOE = Department of Energy, DSM = demand side management, ESCO = energy service company, ISO = International Organization for Standardization, kL = kilolitres.

Source: Author.

Organisation

The DOE has jurisdiction over the Philippines' overall energy policies. The Energy Efficiency and Conservation Division under the Energy Utilization Management Bureau of the DOE is responsible for overall energy conservation activities in the country.

Financing Tool

Two types of tools – lending programmes and tax incentives – are identified.

(i) Lending programmes

Since direct funding is not the role of the DOE, the following public and private banks have offered loans for energy saving investment in accordance with the DOE's policy: (a) Development Bank of the Philippines (state-owned), (b) Land Bank of the Philippines (state-owned), (c) Bank of the Philippine Islands (private), and (d) Banco De Oro (private). Competition amongst financing institutions is believed to provide better loan conditions for borrowers.

Although the difference is small, state-owned banks lend at a lower interest rate than private banks. Although the screening of state bank loans is stricter than that implemented by private banks, state banks' collateral requirements are less strict than those of private banks to help finance EE&C investment in the public sector where the timing of repayment (budget execution is rigid in the public sector) and available assets as collateral are unfavourable for private banks in general.

Besides the above-mentioned banks, the Philippine National Oil Company-Renewable Corporation provides a benefit-sharing type ESCO service to public buildings.

(ii) Tax incentives

Climate action incentives are provided to the manufacturing industry (steel, cement, and paper) by the Board of Investment. Eligible investments include the replacement of air conditioners, motors, fans, and pumps with more efficient equipment.

1.3.8. Singapore

After ratifying the Kyoto Protocol in 2006, in March 2008 Singapore announced the National Climate Change Strategy to take various countermeasures against the issue of global warming, including energy conservation on its land. In accordance with the energy conservation

strategies presented in the National Climate Change Strategy, the country set up the Energy Efficient Singapore Program to implement a series of energy conservation measures, in which multiple relevant ministries and agencies participate under the initiative of the National Environmental Agency.

In 2012, the Energy Conservation Act was enforced. Under this act, large companies stepped up the level of energy management, strategies for promoting energy conservation in individual industrial fields were formulated, and responsible ministries and agencies were named.

Regulations

In Singapore, a number of energy conservation-related regulations, initiatives, and measures have been implemented, as shown below.

(i) Energy Conservation Act (June 2012)

This act is aimed at implementing the energy conservation measures, which would have involved multiple laws and government offices, under a single law and in a more collaborative and cross-sectional manner. Details of some major regulations are as follows:

(a) Regular reporting system: Companies in the industrial and transportation sectors that consume 15 gigawatt-hours per year or more of electric power or 54 terajoules per year or more of fuel and steam are mandated to report the amounts of energy consumed and GHGs emitted, and to prepare their energy efficiency improvement plans.

(b) Certified energy manager system: Companies are mandated to appoint certified energy managers from their employees, and the number of such managers must be proportional to the scale of their business. The certified energy managers must be certified through the energy manager qualification system, and receive appropriate job performance training. The Singapore Certified Energy Manager Programme is implemented as an energy manager qualification system.

Apart from the responsibilities that large companies must fulfill, the Energy Efficiency National Partnership was established so that companies will participate voluntarily. This programme was launched in April 2010 by the National Environment Agency (NEA), in which companies interested in energy efficiency participate on a voluntary

basis.

(ii) Labelling system

In 2008, the NEA stipulated the Environmental Protection and Management (Energy Conservation) Regulations, mandating that home appliances conform to the labelling system. In 2011, a MEPS was defined for air conditioners and electric refrigerators; and electric clothes dryers, television sets, and lighting equipment were later added to the list one after another. In 1992, the Singapore Green Labeling Scheme was initiated as a voluntary environmental labelling system, and the energy efficiency certification standard was applied to some of the products subject to the scheme.

(iii) Regulations on buildings

The Green Mark, a rating certification system for environment-conscious buildings, was introduced in 2005. The assessment criteria for the Green Mark include energy use efficiency, water use efficiency, site and project development and management, indoor environment quality and environmental protection, and creativity. Since 2008, new buildings and large-scale renovation of existing buildings with a total floor area of 2,000 square metres (m^2) or more are required to meet the Green Mark certification standard.

The following are recent energy conservation-related developments:

(i) Public Sector Sustainability Plan 2017–2020 (June 2017)

Under this initiative, the public sector will take the lead in implementing various energy-saving measures. Government green procurement of electronic equipment and paper products, food waste recycling on the part of the public sector, and the like are subject to this initiative.

(iii) Carbon tax (February 2018)

The Government of Singapore announced a carbon tax of S$5 per tonne of GHG, with collection slated to start in 2020. The government set a fixed carbon tax without introducing a different tax basis for each industrial sector. The tax amount will be kept unchanged until 2023 when it will be increased to S$10, reaching S$15 per tonne of GHG by 2030. The carbon tax will apply to 30–40 business locations, such as electric power

plants, refineries, and petrochemical plants, which emit GHGs at a rate of 25,000 tonnes of CO_2 equivalent per year or more. Total GHG emissions from these operations account for 80% of the country's total GHG emissions.

(iv) Super low energy programme (September 2019)

This programme is a certification system intended for non-residential buildings with high energy efficiency. To achieve certification through this system a building must improve energy efficiency by at least 60% compared with the green building criteria established in 2005.

Table 1.13: Energy Efficiency and Conservation Regulations by Sector in Singapore

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	A1: As an effort to put in place mandatory energy management practices, the Energy Conservation Act came into effect in April 2013. Energy-intensive companies (those consuming at least 15 gigawatt-hours of electricity or 54 terajoules of fuel or steam per year) are required to appoint an energy manager, submit an annual report stating their energy usage and greenhouse gas emissions, and develop an energy efficiency improvement plan. Currently, 170 companies are subject to this regulation. B1: Promotion of cogeneration and tri-generation (the integrated production of electricity, heat, and chilled water) in the power generation sector B2: Implementation of the Energy Efficiency National Partnership	A: Minimum energy performance standards for home electric appliances B) Mandatory energy labelling schemes for home electric appliances

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
	Program, a voluntary partnership programme to support companies in their energy efficiency efforts through learning activities, energy efficiency-related resources, incentives, and recognition. B3: Industry-led initiatives – a collective target to improve the energy intensity of the biomedical manufacturing industry by an annual average of 6% amongst the energy workgroup B4: Encourage energy efficiency in industries through energy performance contracting under the ESCO model.	
Commercial, Institutional, and Residential	A1: The Green Building Master Plan, 3rd Phase – with a broad vision of greening 80% of buildings, this phase of the master plan focuses on accelerating the green building agenda with three broader strategic goals: continued leadership, wider collaboration and engagement, and proven sustainability performance in buildings. Three major initiatives include a $52 million fund for the Green Buildings Innovation Cluster, a $50 million Green Mark Incentive Scheme for Existing Buildings and Premises, and a new award, the Green Mark Pearl Award for developers.	A1: Minimum Green Mark standards for new buildings – enables 28% greater energy efficiency relative to the 2005 codes. A2: Minimum energy performance standards for home electric appliances A3: Green Data Centre Standard – as data centres are extremely energy-intensive facilities, the Infocomm Development Authority of Singapore is working with other agencies to develop a Singapore Standard for Green Data Centres. B1: Mandatory energy labelling schemes for home electric appliances B2: Green Mark ratings for existing

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
	A2: Mandatory energy auditing of building cooling systems every 3 years B1: ESCOs Accreditation Scheme – encourages the growth of ESCOs and enhances the quality of services. B2: Save Energy Save Money Initiative – encourages households to reduce their energy consumption by practicing simple energy-saving habits. B3: Online Life Cycle Cost Calculator for electrical appliances, Tips on Home Energy Audit B4: Public Sector Taking the Lead in Environmental Sustainability Initiative – encourages energy efficiency in public sector agencies. B5: Guaranteed Energy Savings Performance contracting model – promotes liaising with ESCOs to enjoy guaranteed energy performance and savings during the contract period.	and new buildings B3: The Energy Smart label for offices – encourages offices to perform in the top quartile in terms of energy efficiency and indoor air quality.
Transport	A1: Carbon Emissions-Based Vehicle Scheme – encourages the purchase of low-carbon emission vehicles. A2: Target to achieve 75% modal share of journeys made via public transport during peak hours A3: Continuous expansion and improvement of train infrastructure and bus networks – double the length of the train network by 2030	A: Higher emissions standards for vehicles – Euro V for diesel vehicles, and Euro IV for petrol vehicles B: Fuel economy labelling scheme for cars and light goods vehicles – helps consumers choose greener vehicles.

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
	A4: New regulations on the composition of petrol and diesel fuel supplied in Singapore from 2017 onwards A5: Vehicle quota system to limit the vehicle population; Certificate of Entitlement calculated based on the sustainable vehicle population in the long term A6: Electronic road pricing to manage vehicle usage – levies a charge (on the basis of fuel grade) on vehicles using congested portions of roads during peak hours. B1: Walk2Ride programme: Safe and Pleasant Walking for Everyone – connected shelters and walkways B2: National Cycling Plan – expand island-wide cycling paths from 230 km today to a network stretching over 700 km by 2030. B3: Testing of clean vehicle technologies	
Others	A2: Waste-to-energy plants – four waste-to-energy plants in operation, contributing 2%–3% of the electricity generated in Singapore, with more plants planned.	

ESCO = energy service company, km = kilometre.
Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

In Singapore, the Ministry of Trade and Industry formulates and implements energy policies. Energy conservation measures are implemented by Energy Efficient Singapore, in which multiple relevant ministries and agencies participate under the initiative of the NEA.

Financing tool

The following tax incentives are intended for motor vehicles.

(i) Vehicle Emissions Scheme (VES) (July 2018)

The VES is an energy conservation measure that replaced the previous measure called the Carbon Emissions-Based Vehicle Scheme. Under this scheme, new vehicles are subject to tax refunds or surcharges calculated based on their CO_2 emissions. The VES is also based on the measurement of four other gases and substances (carbon monoxide, hydrocarbons, nitrous oxide, and particulate matter) contained in exhaust gas. In this case, tax refunds and surcharges are calculated based on the substance with the highest content of the five pollutants.

1.3.9. Thailand

Overview

Thailand has been working on energy conservation since the 1980s. In 1992, the Energy Conservation Promotion Act (B.E. 2535) was enacted to promote energy conservation (particularly in factories and buildings). The act was revised in 1998, 2003, and 2007. The 2007 revision focused not only technical initiatives (such as equipment and systems) but also on various measures, including system management (human resources). The expanded authority of the Ministry of Energy (MOE) as the supervisory organisation was also defined in this revision.

Under the Energy Conservation Promotion Act, a subsidy system was introduced through the Energy Conservation Fund. This fund is intended to support investment in energy conservation mainly at designated factories and buildings, but is also used for energy-related research and development and human resource development.

In Thailand's 20-Year Energy Efficiency Development Plan: 2015–2036, which was released in 2015, the country presented its energy conservation goal of reducing energy consumption relative to GDP by 30% from 2010 levels. As a result, a reduction in energy consumption of 51.7 million tonnes of oil equivalent is expected in 2036 compared to 2010. Specific energy conservation measures to be taken are as follows:

(i) designate factories and buildings,

(ii) implement a building energy code,

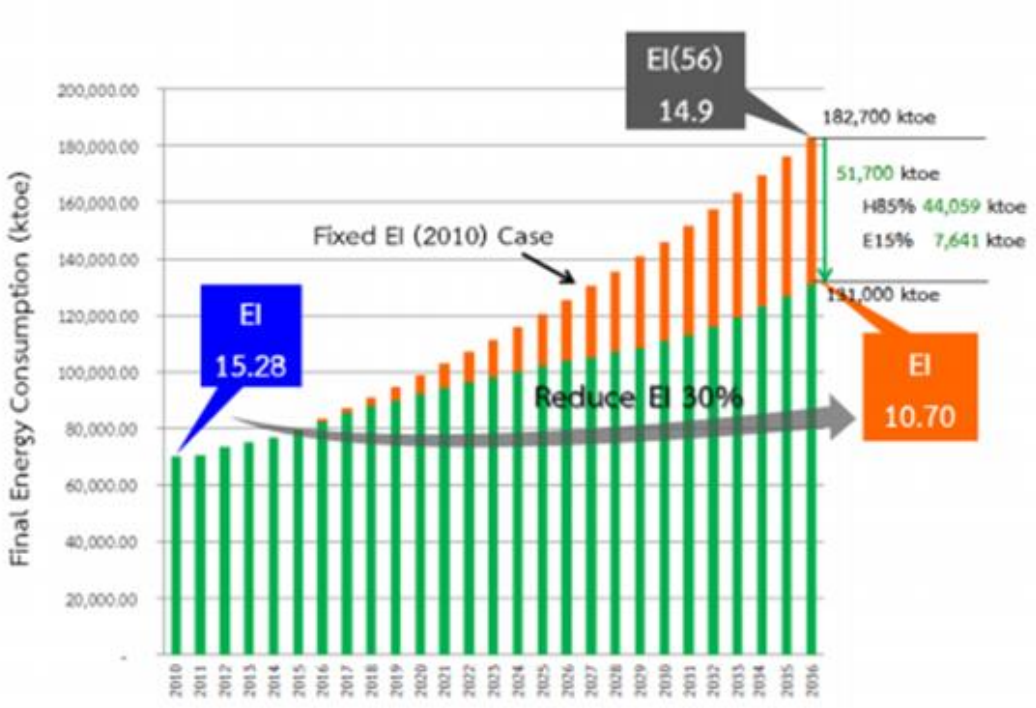
(iii) establish advanced and minimum energy performance standards for equipment,

(iv) provide financial support,

(v) encourage the widespread use of light-emitting diode lights, and

(vi) increase energy saving in the transportation sector, and elsewhere.

Figure 1.1: Energy Efficiency Target During 2010–2036 in Thailand



E = electricity, EI = energy intensity, H = heat, ktoe = kilotonne of oil equivalent.

Source: Energy Policy and Planning Office home page: Thailand Power Development Plan 2015–2036 http://www.eppo.go.th/images/POLICY/ENG/PDP2015_Eng.pdf (accessed 14 June 2019).

Regulations

The regulations being implemented include the following:

(i) The appointment of energy managers at designated factories and buildings

In accordance with the Energy Conservation Promotion Act, designated factories or buildings must appoint an energy manager, establish an energy management system, and report the result annually. Facilities subject to this requirement include those whose contract power demand is 1,000 kW or more, whose total installed capacity of

power transformers is 1,175 kilovolt-amperes or more, or whose annual demand for electricity and steam is 20 million megajoules or more.

(ii) Energy efficiency standard

The labelling system is operated based on an energy performance standard. Energy efficiency ratings are indicated according to five levels – Level 1 (low performance) through Level 5 (high performance). The need to indicate these ratings should be determined on a voluntary basis. MEPS are set for fluorescent lamps, CFLs, electric motors, air conditioners, liquefied petroleum gas stoves, and refrigerators, amongst others. There are two types of MEPS: mandatory and voluntary. As for high energy performance standards, voluntary standards of excellence are set for air conditioners, refrigerators, air conditioner electric fans, rice cookers, cooling systems, windowpanes, electric water heaters, and kitchen water heaters, amongst others.

(iii) Building energy code

This code sets standards for energy-saving building designs, although use of this code is not mandatory. The code is applied to new construction and renovation of buildings with a total floor area of 2,000 m^2 or more. The code stipulates standards for curtain walls, lighting equipment, air conditioners, hot water systems, renewable energy utilisation, and overall building energy performance.

Table 1.14: Energy Efficiency and Conservation Regulations by Sector in Thailand

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards, and Labelling A: Standard, B: Labelling
Industrial	A1: Designated factories or buildings – facilities whose contract power demand is 1,000 kilowatts or more, whose total installed capacity of power transformers is 1,175 kilovolt-amperes or more, or whose annual demand for electricity and steam is 20 million megajoules or more. A2: The appointment of managers to promote energy-saving activities	A1: MEPS for six product items A2: HEPS for eight product items

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards, and Labelling A: Standard, B: Labelling
	based on laws and regulations. The submission of annual energy management reports on the implementation of an energy management system for each facility. A3: Energy management system B1: Transforming industrial parks into eco-towns	
Commercial and Residential	A1: The appointment of at least one energy manager in a designated building or factory (with an energy consumption of 3 megawatts or less), or at least two energy managers in a designated building or factory (with an energy consumption of more than 3 megawatts), and providing education and training to these energy managers A2: Energy service companies (introduced in March 1999) A3: Building Energy Awards of Thailand, 2010 (implemented in 2010) A4: Energy conservation measures at government organizations and government-owned companies A5: Green procurement by public institutions B1: Promotion of the labelling of energy-saving buildings, which began in 2007. B2: Implementation of programmes to replace conventional lighting	A1: MEPS for six product items, HEPS for eight product items. A2: Building energy code B1: Energy-saving air conditioner programme B2: Green labels B3: MEPS labels for 18 product items B4: HEPS labels for 27 product items

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards, and Labelling A: Standard, B: Labelling
	systems with high-efficiency lighting systems B3: Implementation of programmes to apply energy efficiency labels to home appliances B4: Green building certification system	
Transport		B1: Eco-labels (started in October 2015)

HEPS = high energy performance standard, MEPS = minimum energy performance standard.

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

The MOE is responsible for energy policies in Thailand. The Department of Alternative Energy Development and Efficiency (DEDE) under the MOE is tasked with energy conservation. In 1985, the Energy Conservation Center of Thailand was established jointly by the DEDE and the Federation of Thai Industries. The centre is responsible mainly for providing energy consulting, energy diagnosis, technical assistance, training, and education, amongst other things.

Financing Tools

The following EE&C financing instruments are being implemented in Thailand (DEDE, 2019).

(i) Revolving fund

Requests for revolving funds are possible at the time of the development of the factory or building. The application must be made through a bank that then evaluates the financial aspect of the project, and the DEDE will carry out the technical review of the project. The loan limit is B50 million, with an interest rate of 3.5% or less, and a repayment period of not more than 5 years.

(ii) Direct subsidies for small and medium-sized enterprises (SMEs)

Factories and buildings of SMEs can apply. The subsidy ratio is 20–30% of equipment and

installation costs, the maximum subsidy amount is B1.5 million per corporation or business owner, and the payback period is less than 7 years.

(iii) Performance-based subsidy for demand side management (DSM)

This subsidy will be given only when the energy saving target is achieved. Equipment eligible for this subsidy is large (50 megawatt-hours per year or more) cooling and air conditioning systems. The subsidy amounts to B2.00/kWh if the payback period is more than 3 years and B1.00/kWh if the payback period is 3 years or less.

1.3.10. Viet Nam

Overview

In Viet Nam, the Law on Energy Efficiency and Conservation was enforced in 2010. As a result of the enforcement of this law, energy conservation-related measures such as energy management and reporting systems, energy conservation standard and labelling systems, and measures for promoting the installation of energy-saving equipment that had been stipulated via government decisions and notices are now organised in the form of bills. At the same time, a shift from voluntary initiatives to mandatory systems is currently being promoted.

The National Green Growth Strategy formulated in 2014 is the latest guideline related to energy conservation policies in Viet Nam. This guideline includes descriptions of action plans for 2014 through 2020. The following are four major action plan items, including a total of 66 activities.

(i) action plan at the local level,
(ii) reduction of GHG emission intensity and promotion of clean and renewable energy,
(iii) greening, and
(iv) promoting green life and sustainable consumption.

Regulations

The following regulations are being implemented:

(i) Regulations intended for the industrial sector

Pursuant to Article 9 of the Law on Energy Efficiency and Conservation, the following

energy conservation obligations are stipulated:

(a) formulate annual energy conservation plans,

(b) install highly energy-efficient equipment,

(c) make maximum use of natural lighting and ventilation,

(d) follow maintenance procedures for production lines to prevent possible energy loss, and

(e) remove outdated equipment consuming a large amount of energy one after another.

(ii) Regulations intended for the consumer sector

Article 15 of the Law on Energy Efficiency and Conservation recommends the introduction of building designs utilising the natural environment with the aim of reducing the amount of energy consumed for space heating and cooling. Article 18 recommends the use of high-efficiency heat-insulating materials and mechanical equipment specified by the government when constructing new buildings. Article 26 recommends that heat and electricity supply management systems be adopted. Article 27 requires commercial building owners to implement energy saving management and limit the use of high-capacity power equipment during peak hours.

(iii) Energy management officer system

Companies designated pursuant to the Law on Energy Efficiency and Conservation are mandated to deploy energy conservation officers, prepare and submit plans for the efficient use of energy each year and every 5 years, and implement energy conservation diagnoses every 3 years. Meanwhile, the details of qualification requirements for energy conservation officers are stipulated in Article 35 of the Law on Energy Efficiency and Conservation (including an energy engineering degree, technical skills obtained through field experience, or attendance at training courses offered by the Ministry of Industry and Trade).

(iv) Labelling system

Article 39 of the Law on Energy Efficiency and Conservation stipulates the use of a labelling system. There are two types of labels: certification labels and comparative labels. A certification label is affixed to a product that has passed the energy

performance standard stipulated by the Ministry of Industry and Trade, indicating whether or not the product satisfies the standard. On the other hand, a comparative label uses five stars to indicate how well the product satisfies the energy performance standard. A comparative label allows a consumer to choose the product he/she wants by comparing the energy performance of multiple products. Equipment is subject to two types of labelling: mandatory labelling and voluntary labelling. The number of equipment categories subject to mandatory labelling is increasing gradually – these include straight-tube fluorescent lamps, fluorescent bulbs, magnetic ballasts and electronic ballasts for fluorescent lamps, air conditioners, vertical washing machines, rice cookers, electric fans, refrigerators, drum washing machines, television sets, office equipment, and commercial use equipment (e.g. commercial-use refrigerators, copying machines, computer monitors, and printers).

Equipment subject to voluntary labelling includes commercial-use refrigerated warehouses, distribution transformers, electric motors, and passenger vehicles (seven seats or less).

Table 1.15: Energy Efficiency and Conservation Regulations by Sector in Viet Nam

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	A1: Formulation of an annual energy saving plan A2: Introduction of highly energy-efficient facilities A3: Maximum use of daylight and ventilation A4: Implementation of regulations on the maintenance of production lines aimed at the prevention of energy loss A5: Sequential dismantlement of energy-consuming facilities with old technologies	B1: Industrial equipment including three-phase distribution transformers, electric motors, and industrial boilers

Commercial and Residential	A1: Building designs that harness nature to reduce energy consumed by lighting, ventilation, and air conditioners A2: Use of heat insulators produced based on national or international specifications A3: Establishment of monitoring systems for the supply of electric power and heat B1: Preferential installment of highly efficient facilities using renewable energy in lighting equipment for public use B2: Encouraging homes to use natural light, ventilation, heat insulators, and energy-saving electric equipment B3: Encouraging the restrained use of large-capacity facilities during peak hour(s)	B: Applied to various lighting equipment, air conditioners, refrigerators, washing machines, electric cookers, electric fans, televisions, copy machines, monitors, printers, and others.
Transport	A1: Use of liquefied petroleum gas, natural gas, electric power, hybrid fuels, and biogas as oil alternatives A2: Selection of routes and transport methods that optimise the use of fuel, and establishment and adoption of regulations on maintenance and repair from the perspective of fuel reduction A3: Adoption of advanced technologies, including research into low fuel-consumption facilities, and use of clean fuel, renewable energies, and other alternative fuels	B1: Passenger cars with fewer than seven seats

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

Under the Ministry of Industry and Trade, the General Energy Office is responsible for energy conservation in Viet Nam.

Financing Tool

There is no EE&C financing programme at present. However, there was a financing programme until 2016, and plans are being made to establish a new programme after 2019. Under the project Low Carbon Transition in the Energy Efficiency Sector, bank guarantees were provided for SMEs in the brick, ceramic, and food-processing sectors, which invest in energy-efficiency equipment. The guarantee could not exceed 50% of the initial loan, ranging from D200 million to D4 billion. After energy saving is achieved, beneficiaries can enjoy an investment rebate of 10–30% of the initial loan, up to a maximum of D2.4 billion.

1.3.11. Japan

Overview

Japan began to formulate energy conservation policies after the oil crises, and enacted the Act on the Rational Use of Energy (Energy Conservation Act) in 1979. Since its enforcement, the Energy Conservation Act has undergone many revisions in response to changes in the energy situation at home and abroad. The act requires companies using more than a certain amount of energy to take measures to ensure the rational use of energy, appoint energy managers, and prepare and submit regular reports and energy saving plans.

In the 1998 revision to the Energy Saving Act, the Top Runner Program was introduced for the first time. Because of this revision, the energy efficiency of specified equipment has improved significantly. At the same time, the Energy Saving Act emphasised providing information to consumers to promote energy-saving equipment. For this reason, the act mandates manufacturing companies to fulfill their labelling obligation by providing information about energy consumption efficiency. The act also stipulates the need for an energy efficiency labelling system.

In 2008, the Benchmark System by Sector intended for the industrial sector began, although it was non-binding. This system is intended to encourage energy saving initiatives further by setting a specific energy consumption target (benchmark index) for each industry or sector to

enable companies to check their positions in the race to save energy.

In 2015, the Act for the Improvement of the Energy Saving Performance of Buildings (Building Energy Efficiency Act) was established. In 2017, the energy-saving performance of houses and buildings was mandated to conform to that of new non-residential buildings with a total floor area of over 2,000 m^2 (this had previously been a best effort obligation).

In April 2016, the Ministry of Economy, Trade and Industry announced the Innovative Energy Strategy, which referred to the following matters as major energy-saving measures in the future:

(i) To promote each company's voluntary initiatives, energy saving incentives for companies will be reinforced.

(ii) As actual energy management is changing along with the introduction of new production and distribution processes, an appropriate system will be built so that companies can implement energy-saving measures in line with their management policies.

(iii) To create an environment in which it is possible to determine the potential of energy saving efforts at the level of small and medium-sized companies and households, which lack energy saving know-how, the utilisation of private-sector companies that have sufficient energy saving know-how will be promoted.

Regulations

The following are major regulations relating to energy efficiency and conservation:

(i) Act on the Rational Use of Energy (Energy Conservation Act)

This act was established in 1979, and has undergone many revisions since then. The act is a fundamental law by which Japan's energy conservation measures will be vigorously promoted depending on the characteristics of each sector: industrial, consumer, and transportation.

(ii) Top Runner Program

This programme was introduced in the 1998 revision to the Energy Conservation Act. Intended mainly for automobiles and electric appliances, this system asks manufacturers and importers to achieve a certain standard by a target date 3–10

years in the future. In this case, the energy consumption efficiency goal is set by taking into account the advancement of technology based on the performance of the most energy-efficient equipment of all currently commercialised products in the same group. Those companies that continue to produce and sell products that fail to meet the targeted standard after the target date will be advised by the competent minister to improve the situation. In some cases the situation will be made public or the company will face a potential penalty. The product items subject to this programme are being expanded from home appliances such as air conditioners, television sets, machinery, and appliances such as automobiles to building materials like heat-insulating materials. There are currently 32 product items on this list.

(iii) Benchmark System by Sector (2008)

In this system, appropriate indexes (benchmark indexes) are set so that the energy efficiency levels of companies belonging to the same specific industry or sector can be compared. By making clear a company's status in energy saving initiatives in comparison with other companies, this system is intended to determine which companies are well ahead of others and urge those who are behind others to make a greater effort (best effort obligation). By analysing the specific energy consumption of companies whose consumption is above a certain level in each industry or sector, this system sets benchmark indexes at the specific energy consumption level of the top 10–20% of companies. To date, benchmark indexes have been set for nine industries and 13 sectors, including the blast furnace iron industry, the cement manufacturing industry, the cardboard industry, the oil refining industry, the basic petrochemical products manufacturing industry, and the soda industry.

(iv) Act for the Improvement of the Energy Saving Performance of Buildings (Building Energy Efficiency Act) (2015)

This act applies to the following types of buildings:

(a) Large-scale buildings (with a total floor area of more than 2,000 m^2), both residential and non-residential, are mandated to conform to the energy performance standard.

(b) Medium-scale buildings (with a total floor area of at least 300 m^2 and less than 2,000 m^2) are mandated to report conformance to the energy performance standard.

(c) For small-scale buildings (with a total floor area less than 300 m^2), conformance to the energy performance standard is a best effort obligation.

In addition to the above regulations, a number of energy-saving measures are being implemented and studied. Recent energy saving initiatives, such as zero-emission buildings and houses, are intended to reduce the amount of operational energy consumed in buildings and houses to as close to zero as possible through energy-saving measures and the use of renewable energy. One way to achieve these initiatives is the building of energy management systems or home energy management systems. These systems are designed to reduce the amount of energy consumed through the operational management of equipment and facilities in buildings and houses. These systems consist of technology to 'visualise' the consumption of electricity and gas on a monitor and technology to 'automatically control' electric equipment.

Table 1.16: Energy Efficiency and Conservation Regulations by Sector in Japan

	Management of Energy Saving A: Regulatory, B: Voluntary	Standards and Labelling A: Standard, B: Labelling
Industrial	A1: 1% per year reduction for large energy consumers (> 1500 kilolitres of crude oil equivalent) A2: Specifically targets very large energy-consuming sectors A3: Reporting obligation for designated consumers B1: Voluntary commitment by business associations to reduce greenhouse gasses and hence improve energy efficiency	A1: Specific target for very large energy-consuming sectors (e.g. iron and steel, power generation, cement, paper and pulp, oil refinery, petrochemical, and soda chemical [7 sectors in total])
Commercial and Residential	A1: Reporting obligation for designated consumers (building owners with more than 300 m^2 of floor space)	A1: Require designated building owners to implement energy efficiency measures. A2: Top Runner system is applied to 32 appliances and building insulation materials.

Transport	A1: Reporting obligation for designated consumers. Fleet operator: Rail: > 300 cars Truck: > 200 trucks Bus: > 200 buses Taxi: > 350 cars Seaborne: > 20,000 tonnes Airborne: > 9,000 tonnes Cargo owner: > 30 million tonne-kilometres	A1: Require designated fleet operators and cargo owners to implement energy efficiency measures.

Source: The Energy Research Institute Network Secretariat (2016), 'Energy Efficiency Policy Update', March.

Organisation

The Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry is responsible for energy policies.

Financing Tool

In 1975, Japan launched an energy conservation subsidy programme to support the introduction of energy-saving equipment, mainly in the industrial sector. While room for energy conservation in the industrial sector gradually decreased, support measures for the transportation and building sectors have been strengthened since the 1990s from the viewpoint of global warming countermeasures.

There are three types of financial support for energy conservation: (i) tax incentives, (ii) subsidies, and (iii) a loan programme.

(i) Tax incentives

This is one of the main measures to promote corporate investment in energy conservation. In 2000, a reduction in taxes on the purchase of fuel-efficient vehicles and energy-saving home renovations was introduced. These incentives target large enterprises, SMEs, or individuals. The available incentives can be applied to taxes on corporations (national tax), income (national tax), property (local tax), automobiles (local tax), and automobile acquisition (local tax).

A recent example is the tax reduction for eco-friendly vehicles. This incentive reduces

taxes on high-environmental-performance vehicles that meet the criteria for exhaust emissions and fuel efficiency set by the Ministry of Land, Infrastructure and Transport. While the tax reduction amount for gasoline-engine vehicles and hybrid vehicles is becoming smaller, 'next-generation vehicles' such as electric, fuel cell, plug-in hybrid, natural gas, and clean diesel vehicles enjoy tax exemptions or reductions. The criteria for this incentive include the achievement of fuel-efficiency standards, which vary depending on the vehicle. Eligible vehicles include electric, fuel cell, plug-in hybrid, natural gas, clean diesel, gasoline engine, and liquefied petroleum gas vehicles.

Tax reductions can be applied to the automobile acquisition tax imposed when you buy a car (a 20%–100% reduction), the weight tax imposed at the time of vehicle inspection (a 25%–100% reduction), and the automobile tax or light vehicle tax imposed every year on car owners (a 25%–75% reduction for the second year after purchase).

(ii) Subsidies

Through the New Energy and Industrial Technology Development Organization and the Energy Conservation Center Japan, the Government of Japan provides energy conservation subsidies to companies, local governments, individuals, and nonprofit organisations. The programme covers a wide range of activities, including the introduction of energy-saving equipment, the construction and renovation of energy-saving buildings and houses, public relations activities, and educational activities to promote energy conservation.

The programme targets large enterprises investing in energy conservation, SMEs, individuals, public organisations, and nonprofit organisations. It involves a fixed amount or fixed-rate subsidy for energy-saving activity.

A recent example is the subsidies to promote energy conservation investment. These subsidies promote energy conservation by supporting the introduction of large-scale energy-saving facilities and technologies or the renewal of existing facilities. The subsidy budget was ¥60.04 billion in fiscal year 2019, and the criteria include improving the energy-conservation rate (standards vary by category), and replacing existing facilities with those that exceed the efficiency threshold, amongst other things. The subsidy can be applied to factories or business sites based on the cost of design, equipment, and construction (¥1 million–¥1.5 billion), at a subsidy rate of one-fourth to one-half.

It can also be applied to equipment, including air conditioners, industrial heat pumps, commercial water heaters, boilers, combined heat and power, industrial furnaces, refrigerators, and industrial motors (¥300,000–¥30 million), at a subsidy rate lower than one-third[1].

(iii) Loan programme

A loan programme was established for large companies to invest in energy conservation, such as the use of waste heat recovery, and its scope was later expanded to include SMEs. Since then, facilities, buildings, and energy-efficient housing have also been eligible for loans. The programme targets large enterprises, SMEs, or individuals; and it encompasses special loans, low-interest rate loans, and interest subsidies.

A recent example of such a loan programme is the 'Flat 35 S', which provides low interest rate home loans (with a duration of 35 years) for energy-efficient or safe houses. The programme budget was ¥25.31 billion for part of fiscal year 2017, and the criteria included being a certified low-carbon house that satisfied primary energy consumption standards. The interest rate was lowered by 0.25% per year for the first 5–10 years.

Furthermore, in Japan, subsidies have been provided not only for the dissemination and promotion of energy-saving equipment but also for research and development of energy-saving technologies. Such grants are provided mainly by the following organisations and measures:

(a) research and development by government-affiliated research institutes,
(b) a tax incentive for promoting research and development, and
(c) the New Energy and Industrial Technology Development Organization.

Funds for the financing programmes mentioned above are provided from a special national account, the Energy Measures Special Account. The purpose of the special account is to increase the transparency of the accounting involved in energy-related policy measures, stabilise the fuel supply, improve the energy supply–demand structure, and promote power development. The special account is financed by the oil and coal tax and the power development promotion tax.

[1] The result is used to calculate the necessary investment amount to reduce unit electricity demand in Chapter 2, section 2.1.3 ($301 million per terawatt-hour).