

# COMPENDIUM OF ENERGY EFFICIENCY POLICIES OF APEC ECONOMIES

ASIA PACIFIC ENERGY RESEARCH CENTRE

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# FOREWORD

Energy efficiency is one of the most effective and economic tools APEC economies have to reduce energy demand, improve sustainability, and meet their climate change obligations. Indeed, the International Energy Agency has called it the “first fuel” in view that all scenarios aimed at achieving sustainability targets require a significant contribution from energy efficiency and recognizing that energy efficiency is transitioning from a niche to an established market.

This has been internationally recognized with initiatives such as the International Partnership on Energy Efficiency and Conservation (IPEEC) set up by the G20 to identify and share proven efficiency practices and data to progress energy efficiency among their members. Similarly, many economies around the world are also developing policies and strategies to address energy efficiency.

APEC also recognized the importance of energy efficiency in the development of member economies and in progressing its overall objectives. As such, at the 2007 Meeting of APEC Energy Ministers in Australia, the Ministers agreed to work towards achieving an APEC-wide aspirational goal of a reduction in energy intensity of at least 25% by 2030 compared with 2005 levels. This goal aimed at encouraging APEC economies to set individual goals and action plans for improving energy efficiency, reflecting the individual circumstances of each economy.

In 2011, following APERC analysis of the 2007 target, the APEC Energy Working Group (EWG) carried out a review and recommended a significant increase in recognition of the structural economic changes and ongoing energy efficiency and conservation work. As a result, APEC Leaders agreed to substantially strengthen the goal to a 45% reduction of regional aggregate energy intensity by 2035 compared with 2005.

The *Compendium of Energy Efficiency Policies of APEC Economies* intends to promote information sharing of energy efficiency and energy conservation policies and practices across APEC economies under a common format. It contains information on energy efficiency policies and initiatives in all APEC economies (with the exception of Papua New Guinea) based on the responses provided by each economy to a questionnaire.

APERC hopes that this report helps the understanding of energy efficiency issues across APEC.



Takato Ojimi  
President  
Asia Pacific Energy Research Centre (APERC)

April 2016

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The *Compendium of Energy Efficiency Policies of APEC Economies* could not have been accomplished without the contributions of many individuals and organisations. We would like to thank all those whose efforts made this publication possible, in particular those named below.

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# AUSTRALIA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The Australian Government released the Energy White Paper 2015 (EWP 2015) to provide consumers with certainty and confidence in the energy policy. The EWP 2015 includes a strategic policy framework that addresses the challenges in Australia's energy sector and positions the economy for long-term transformation regarding the way it produces and uses energy.

As part of the EWP 2015, the government announced that it would develop a National Energy Productivity Plan (NEPP), including a energy productivity improvement target of 40% between 2015 and 2030. This is equivalent to a 402 petajoule (PJ) energy demand reduction compared to business-as-usual (BAU). Energy productivity will be measured as the number of Australian dollars of the GDP produced per PJ of primary energy.

Australia also has an emissions reduction target of 26% to 28% below 2005 levels by 2030.

The other strategic policy framework addressing Australian energy efficiency is the Clean Energy Future (CEF) program, which contains a number of elements, including a price on carbon as well as initiatives to encourage energy efficiency in Australia (refer to Section 1.6). Further details on the CEF program are available at [www.cleanenergyfuture.gov.au](http://www.cleanenergyfuture.gov.au).

### 1.2. Sectoral Energy Efficiency Improvement Goals

The EWP 2015 does not state sectoral targets although it does provide estimates of potential energy savings by sectors. If all energy efficiency potentials are achieved, then Australia would far surpass its energy productivity target.

### 1.3. Action Plans for Promoting Energy Efficiency

#### 1.3.1. National Energy Efficiency Governance Arrangements

The Select Council on Climate Change (SCCC), formed in 2012, consists of Australian and State Government Ministers, New Zealand Ministers, and a representative from the Australian local government. The SCCC is currently responsible for overseeing the National Strategy on Energy Efficiency (NSEE).

The Standing Council on Energy and Resources (SCER) has the responsibility for the safe, prudent, and competitive development of Australia's energy markets. This includes energy market reform measures designed to increase demand-side participation through regulatory reforms of the electricity and gas markets.

#### 1.3.2. National Energy Productivity Plan

The NEPP will replace the previous NSEE, but it will also be broader to consider all measures across energy market reforms, which can support energy consumers to manage their costs (such as pricing reform and fuel switching).

##### a) Objective

The key objective is to empower energy consumers in all sectors to make better energy decisions and effectively manage their energy costs. Attached to this overall objective is the 40% energy productivity target.

##### b) Applicable sectors

Actions developed under the NEPP will cover the residential, commercial, transport, and industrial sectors.

**c) Outline**

The NEPP will replace the previous NSEE, but it will also be broader to consider all measures across energy market reforms, which can support energy consumers to manage their costs (such as pricing reform and fuel switching).

The NEPP will support energy consumers (both large and small) and service providers to make better decisions on energy and effectively manage energy costs. It will include:

- Measures that support efficient decisions when selecting energy services such as smart meters, cost-reflective prices, access to information, and labels.
- Measures that support the development of better energy services through innovation and competition such as reducing barriers to entry in the market for new technologies and service options.
- Measures that ensure efficient minimum services and performance including those through standards for equipment, appliances, and buildings as well as financial resources and budget allocation.

**d) Method for monitoring and measuring effects of action plans**

Surveys, statistic compilations, end-use information, monitoring, and trend analysis are all undertaken. In addition, databases are maintained to assist in program evaluation, meeting international reporting obligations, and policy formation.

The Australian Government's Department of Industry, Innovation and Science (DIIS) is mainly responsible for energy efficiency monitoring and reporting. Its programs and measures include:

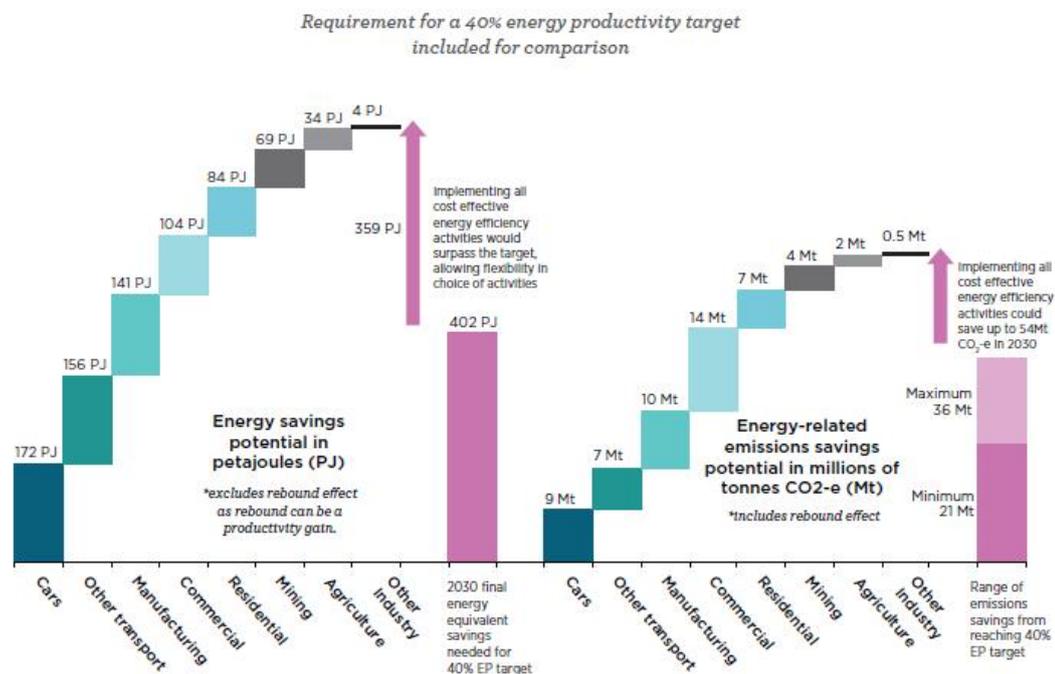
- The Department of Resources, Energy and Tourism (DRET) on behalf of the Equipment Energy Efficiency Program, monitors and reports information through its "Energy Use in the Australian Residential Sector 1986-2020" report. This report, the second economy-wide baseline study on residential energy use, covers private residential dwellings, including those that are separate (such as single-detached family homes) and attached (such as townhouses or apartments). The modeling incorporates Australian energy policy programs in place or finalized by mid-2007.
- The DRET is also responsible for the analysis regarding the projected effects of the Equipment Energy Efficiency Program over the 2000-2020 time period. The results are published in the report titled, "Prevention is Cheaper than Cure" Avoiding Carbon Emissions through Energy Efficiency, Projected Impacts of the Equipment Energy Efficiency Program to 2020.
- The Clean Energy Regulator administers the National Greenhouse and Energy Reporting Scheme (NGERS). The National Greenhouse and Energy Reporting Act established NGERS in 2008 under which corporations exceeding legislated thresholds must report their annual greenhouse gas emissions, energy production, and consumption. For the 2010-11 financial year and subsequent years, corporations must report if their group consumes more than 200 terajoules (TJs) of energy per year or if a facility in their group consumes more than 100 TJs of energy per year.
- The DRET administers the Energy Efficiency Opportunities (EEO) program under which companies and electricity generators using more than 0.5 PJ of energy per year must identify and report on energy efficiency opportunities both to the public and the government.
- Through the Commercial Building Disclosure Program, the DRET produces a public listing of energy performance regarding office buildings in Australia, along with an increasingly rich set of data analyses.

- The DRET commissions work on economy-wide energy intensity (undertaken by the Australian BREE). The most recent report titled, 'End Use Energy Intensity in the Australian Economy,' was published in 2012. A full list of publications is available at <http://www.bree.gov.au/publications/index.html>. The BREE also prepares the Australian Energy Statistics on behalf of the DRET.
- The Australian Bureau of Statistics also collects and publishes a wide range of energy-related statistics.

### e) Expected results

Besides the overall objective and target, the NEPP has identified potential savings in all sectors (Figure 1). While there is no prescribed target for each sector, all of the savings are assumed to be achievable and cost-effective. Thus, the target will be achieved through a combination of approaches in all of these areas.

Figure 1. Energy saving opportunities in the Australian economy



Source: Department of Industry, Innovation and Science of Australian Government

### f) Future tasks

Implementation the NEPP, which was published in 2015.

#### 1.4. Institutional Structure

##### a) Name of organization

The Australian Constitution divides legislative powers between the national and state governments. As such, policy responsibility for energy efficiency varies between the levels of government.

At the economy level, the DIIS has direct responsibility for the development of energy efficiency policies and measures as well as the coordination of the implementation of the NEPP. A number of other government agencies have sectoral interests in energy efficiency, including the departments in charge of transport, industry, climate change, research and development, and education.

The NEPP is the main mechanism for coordinating energy efficiency policies and actions with the state and local governments through the Commonwealth of Australian Governments (COAG). At the state/territory level, there is a wide range of institutional structures. The following includes the agencies that are primarily responsible for energy efficiency:

- New South Wales: Department of Environment and Heritage.
- Northern Territory: Department of Lands, Planning and the Environment.
- Queensland: Department of Energy and Water Supply.
- South Australia: Department for Manufacturing, Innovation, Trade, Resources and Energy; Department of Environment, Water and Natural Resources; and the Essential Services Commission of South Australia.
- Tasmania: Department of Infrastructure, Energy and Resources.
- Victoria: Department of Primary Industries; Sustainability Victoria; and the Essential Services Commission.
- Western Australia: Public Utilities Office within the Department of Finance.
- Australian Capital Territory: The Environment and Sustainable Development Directorate.

**b) Status of organization**

All agencies report to the relevant Australian or state government minister.

**c) Roles and responsibilities**

They vary across departments.

**d) Covered sectors**

All sectors of the economy are covered.

**e) Established date**

Multiple jurisdictions.

**f) Number of staff members**

No information available.

## 1.5. Information Dissemination, Awareness-Raising, and Capacity-Building

**a) Information collection and dissemination**

The department manages a wide range of information, capacity-building, and knowledge-sharing web resources, including the following websites:

The Energy Efficiency Exchange (EEX) ([eex.gov.au](http://eex.gov.au)) ó supporting energy management and energy efficiency strategies for industry, covering a range of sectors and technologies.

[YourEnergySavings.gov.au](http://YourEnergySavings.gov.au) ó how to save energy, save money, and reduce one's impact at home, including information regarding all available government assistance.

[YourHome.gov.au](http://YourHome.gov.au) ó providing guidance on building and renovating homes in a sustainable manner.

The department manages the COAG website for the Equipment Energy Efficiency Program ([energyrating.gov.au](http://energyrating.gov.au)), which is in the process of being redeveloped. The department also developed a mobile application that allows consumers to compare the energy efficiency of labeled appliances through their smartphones.

In January 2012, Australia commenced the Industrial Energy Efficiency Data Analysis Project (IEEDAP), which is a collaborative project between the DRET and state and territory governments. The project provides detailed analyses regarding energy usage and energy savings opportunities by subsector, fuel type, and technology processes in a wide range of

industrial sectors. The data has been sourced from five years of mandatory company reports submitted under the EEO program, the NGERs, and various state-based programs. The findings from this project will be used by policymakers to better integrate information, incentives, and other policy programs in order to unlock energy savings potential. The findings are also disseminated to the industry in order to allow them to improve their identification and evaluation of energy-saving opportunities.

#### **b) Awareness-raising**

There are no economy-wide, energy efficiency awareness-raising programs. However, awareness campaigns may be undertaken within specific initiatives such as the phasing out of inefficient incandescent lighting. Some states do participate in awareness-raising activities.

#### **c) Capacity-building**

The NEPP includes a number of measures related to capacity building for the industry, including supporting businesses to improve their energy efficiency and assisting businesses to ensure that they have adequate knowledge and skills as well as the capacity to meet the challenges of operating in a low-carbon economy. Key elements of these measures include developing targeted outreach information and addressing skills gaps and shortages.

In addition, numerous associations and universities provide energy management-related courses.

A National Energy Efficiency Skills Initiative (NEESI) is being developed under the NSEE. The NEESI will build on the existing processes under the National Framework for Energy Efficiency (NLEE) to ensure that Australia will have the skills and knowledge required to move toward a low-carbon economy.

The Enterprise Connect Clean Technology Innovation Network works with firms to determine ways to cut energy, water, and material use; plan for change; and adopt new technologies that will reduce their energy use and environmental impact. It also supports new products, processes, and skills as well as builds relationships with research, education, and training providers.

### **1.6. Research and Development in Energy Efficiency and Conservation**

In general, Australia undertakes a technology-neutral approach toward research and development funding, with researchers focusing on energy efficiency-related projects that compete with other projects for funding. However, there are a number of specific programs that support research and development in energy efficiency.

#### **Clean Energy Finance Corporation**

A new AUD \$10 billion Clean Energy Finance Corporation was established in July 2013, independent from the Australian Government. It will invest in the commercialization and deployment of renewable energy, low pollution, and energy-efficient technologies. The investments will be divided into two streams: a renewable energy stream and an energy-efficient, low-emissions technology stream, each with half of the allocated funding.

#### **Industrial Energy Efficiency Analysis Project**

As stated in Section 1.5, Australia commenced the Industrial Energy Efficiency Data Analysis Project (IEEDAP) in January 2012. This collaborative project between the DRET and state and territory governments provides detailed analyses of energy usage and energy savings opportunities by subsector, fuel type, and technology processes. The data, sourced from 5 years of mandatory reports submitted under the EEO program, the NGERs, and other state-based programs, focuses on the potential factors (both market and non-market) that affect the uptake of energy efficiency throughout various industrial sectors. The findings from this project will be used by policymakers to integrate information, incentives, and other policy programs in order to unlock energy savings potential and improve the identification and evaluation of energy-saving opportunities.

### **Clean Technology Program**

The Clean Technology Program (CTP) provides over AUD \$1 billion in funding to help reduce emissions and improve the energy efficiency of manufacturing industries as well as support the development of new low-emission, energy-efficient products, processes, and services.

The Clean Technology Program comprises three components:

The Clean Technology Investment Program and the Clean Technology Food and Foundries Investment Program provide combined funding of up to AUD \$865 million to help manufacturing businesses invest in energy-efficient capital equipment and low-emissions technologies, processes, and products.

The Clean Technology Innovation Program is an AUD \$173 million competitive, merit-based grant program that helps Australian businesses undertake applied research and development, and proof-of-concept and early-stage commercialization activities in order to develop low-emission, energy-efficient technologies that reduce greenhouse gas emissions.

### **Steel Transformation Plan**

The Steel Transformation Plan will provide assistance of up to AUD \$300 million over five years in order to encourage investment and innovation in the Australian steel manufacturing industry. This plan is designed to improve the environmental outcomes of steel manufacturing and promote the development of workforce skills.

### **Clean Energy Skills Program**

Funding of approximately AUD \$32 million will help educational institutions and the industry develop the materials and expertise necessary to promote clean energy skills. The Clean Energy Skills Program will provide the foundation for a new type of workplace skills that will become increasingly valuable as Australia moves toward a clean energy economy. Tradespersons and professionals alike will be eligible for assistance under this program to develop the skills necessary to deliver energy efficiency services, clean energy projects, and low-pollution products to Australian households, communities, and businesses.

### **Energy Efficiency Information Grants**

The Energy Efficiency Information Grants program will provide AUD \$40 million in grants over four years to industrial associations and non-government organizations that have established relationships with small businesses and community organizations. The main goals are to deliver information regarding the implications of the government's CEF program and how to reduce energy costs.

### **Low-Carbon Communities**

The government's Low-Carbon Communities (LCC) program was expanded to provide funding through competitive grants to local councils and communities, improve energy efficiency in council and community-use buildings and facilities, and assist low-income households. Information on LCC programs is available at <http://ee.ret.gov.au/energy-efficiency/grants>.

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## **2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS**

### **2.1. Government Laws, Decrees, and Acts**

#### **2.1.1. Mandatory Disclosure of Commercial Building Energy Efficiency**

##### **a) Name**

Building Energy Efficiency Disclosure Act 2010

**b) Purpose**

Commercial Building Disclosure (CBD) is an economy-wide program designed to improve the energy efficiency of Australia's large office buildings.

**c) Applicable sectors**

Commercial buildings sector.

**d) Outline**

Under the program, most sellers or lessors of office space of 2000 square meters or more are required to obtain and disclose a current Building Energy Efficiency Certificate (BEEC). The BEEC, which is valid for 12 months, must be publicly accessible on the online Building Energy Efficiency Register and include the following:

- A NABERS Energy Star rating for the building.
- An assessment of tenancy lighting in the area of the building that is being sold or leased.
- General energy efficiency guidance.

**e) Financial resources and budget allocation**

Funding of AUD 5 million was allocated to the program from 2009-10 to 2012-13.

**f) Expected results**

The Commercial Building Disclosure program will stimulate investment in energy efficiency improvements to existing commercial buildings. It will achieve this by providing purchasers and lessees with credible information about the energy efficiency of large, commercial office buildings at the point of sale, lease, and sublease. The program will lead to more informed purchasers and lessees as well as help transition the commercial office market to a low-carbon future.

The program also provides a wide range of public information that is useful to energy service providers in identifying markets for improved energy-performance services.

**2.2. Regulatory Measures****2.2.1. Minimum Energy Performance Standards and Labeling****a) Name**

Greenhouse and Energy Minimum Standards (GEMS) Act, 2012 (Gems Act)

**b) Purpose**

To specify mandatory requirements for the minimum energy performance standards and energy labeling of appliances, including offenses and penalties for non-compliance. Further information is available at [www.energyrating.gov.au](http://www.energyrating.gov.au).

**c) Applicable sectors**

Appliances, lighting, and equipment in the residential, commercial, and industrial sectors.

**d) Outline**

The Greenhouse and Energy Minimum Standards Act 2012 (GEMS Act) provides the framework for mandatory minimum energy performance standards (MEPS) and energy efficiency labeling. It is preceded by the long-standing Equipment Energy Efficiency Program (the E3 Program), which was co-funded by the Australian Government, state and territory governments, and the New Zealand Government. Products are included in the program based on whether the community would benefit from their regulation.

The establishment of MEPS and labeling requirements in Australia is a cooperative process between the government and the industry. Technical and economic analyses are undertaken in

the development and negotiation of targets and timetables. MEPS, labeling, and test method standards that are called up by regulation are Australian (in conjunction with New Zealand, where appropriate), and they are set to be the equivalent of the world's best practices, where possible.

The energy-rating label allows consumers to compare the energy efficiency of domestic appliances, thereby providing manufacturers with an incentive to continuously improve the energy performance of their appliances. The label includes two main features. First, it rates the energy efficiency of an appliance on a scale of 1 to 10 stars or 1 to 6 stars (in half-star increments). In this case, the more stars, the more efficient it is compared with other models of similar size and capacity. Second, the label displays an estimated, energy consumption figure based on typical use of the appliance (usually kWh/year).

The star system is regularly regraded in order to achieve a better spread in energy-efficient products (taking into account improvements in energy efficiency that occur over time and to allow room for further improvement).

Labeling is mandatory for the following electrical products sold in Australia:

- Refrigerators and freezers
- Clothes washers
- Clothes dryers
- Dishwashers
- Air conditioners
- Televisions

The following products are also regulated on the basis of MEPS, which means that they have regulated minimum energy-efficiency labels:

- Refrigerators and freezers
- Mains pressure electric storage water heaters
- Small mains pressure electric storage water heaters (<80L) and low pressure and heat exchanger types
- Three-phase electric motors (0.73kW to <185kW)
- Single-phase air conditioners
- Three-phase air conditioners up to 65kW cooling capacity
- Distribution transformers
- Ballasts for linear fluorescent lamps. In addition to MEPS, ballasts must be marked with an energy efficiency index)
- Linear fluorescent lamps - from 550 mm to 1500 mm inclusive with a nominal lamp power >16W
- Commercial refrigeration (self-contained and remote systems)
- Incandescent lamps
- Compact fluorescent lamps
- External power supplies
- Set-top boxes
- Televisions
- Commercial building chillers
- Close control air conditioners
- Transformers and electronic step-down converters for ELV lamps

The Australian Government is also working to introduce Greenhouse and Energy Minimum standards that will act as an expansion to the existing MEPS program. In addition, it will cover additional products that either consume other types of energy (e.g., gas) or do not consume energy, but affect the energy efficiency of appliances (e.g., air-conditioner ducts, building insulation or window glass).

### 2.2.2. Building Energy Codes

#### a) Name

National Construction Code (NCC ó formerly, the Building Code of Australia) - Energy Efficiency Provisions

#### b) Purpose

The aim of the NCC - Energy Efficiency Provisions is to improve the energy efficiency of the design and construction of new buildings. The NCC Energy Efficiency Provisions project was endorsed under the NFEE. Details can be found at [www.abcb.gov.au/](http://www.abcb.gov.au/).

#### c) Applicable sectors

Residential and commercial.

#### d) Outline

Energy efficiency provisions for housing were first introduced in 2003, following an extensive consultation process. The provisions are produced and maintained by the Australian Building Codes Board (ABCB) on behalf of the Australian Government and state and territory governments (through the COAG). The deemed to satisfy provisions vary according to the climate zone in which the building will be located. The original provisions included: the ability of the roof, walls, and floor to resist heat transfer; the resistance to heat flow and solar radiation of the glazing; the sealing of the house; the provision of air movement for free cooling, in terms of openings and breeze paths; and the insulation and sealing of air-conditioning ductwork and hot-water piping.

The provisions were developed to achieve a nominal level of energy efficiency equivalent to a 3.5- to 4-star rating under the Nationwide House Energy Rating Scheme (NatHERS) ([www.nathers.gov.au](http://www.nathers.gov.au)), which includes a maximum rating of 10 stars. Following the implementation of the provisions, some states indicated that they wanted to increase the stringency of the provisions. As such, the provisions were developed by the ABCB to increase the nominal level of energy efficiency equivalent to 5 stars under NatHERS. Enhanced housing provisions were introduced in 2006. The most significant changes were made to the provisions on building fabric and external glazing.

In April 2009, COAG requested that the ABCB develop more stringent provisions to allow for a 6-star home rating to be included in the 2010 BCA. The new proposals were subject to a regulatory impact assessment (cost-benefit analysis) after which they were found to be cost-effective. In addition to enhanced provisions for the thermal shell of residential buildings, the new residential standards included requirements for hot water and lighting. The 2010 BCA energy efficiency provisions for residential and commercial buildings were agreed on by the states and territories after which they were adopted on May 1, 2010.

#### e) Financial resources and budget allocation

The NCC is regularly reviewed by the ABCB.

#### f) Expected results

Reduction in energy consumption predominantly associated with thermal comfort, lighting, and hot water in new residential and commercial buildings, i.e., heating and cooling energy consumption.

### 2.2.3. Fuel Efficiency Labeling

#### a) Name

Fuel Consumption Labeling Standard (ADR81/02) and Fuel Consumption Label

#### b) Purpose

Mandated fuel consumption labeling to enable new vehicle purchasers to compare vehicles on a common basis and incorporate vehicle fuel use in their decision-making processes. More information can be found at <http://www.greenvehicleguide.gov.au/GVGPublicUI/Information.aspx?type=FuelConsumptionLabel>.

#### c) Applicable sectors

Transport.

#### d) Outline

The fuel consumption labeling standard was introduced in 2004 (ADR81/01) and subsequently updated in 2008 (ADR81/02). The standard requires all new vehicles up to 3.5 tons (which includes passenger cars, four-wheel drive vehicles, and light commercial vehicles) to display a model-specific, removable fuel consumption label on the front windscreen.

The label indicates the fuel used (in liters) to travel 100 kilometers and the amount of CO<sub>2</sub> emissions (in grams) that the vehicle emits for each kilometer traveled.

In 2010, a revised version of the fuel consumption label was developed for ADR81/02 to suit electric vehicles and plug-in hybrids. The new label uses the same format as the existing label, but it was reframed as an Energy Consumption label in order to list the test results for energy consumption and range on the vehicle. The label also includes fuel consumption and CO<sub>2</sub> emissions, with pure-electric vehicles displaying ∞ and plug-in hybrids displaying their respective testing results. A cross reference to the Green Vehicle Guide website ([www.greenvehicleguide.gov.au](http://www.greenvehicleguide.gov.au)) is also provided to address the potential for CO<sub>2</sub> emissions during recharging.

Further measures are being developed under the NSEE.

#### e) Financial resources and budget allocation

No information available.

#### f) Expected results

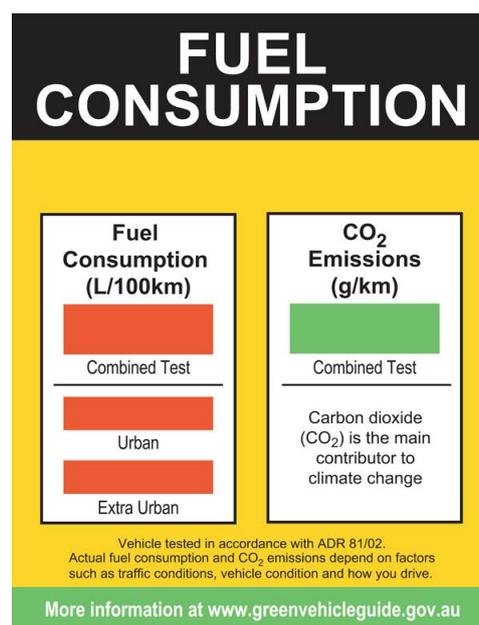
No information available.

### 2.3. Voluntary Measures

Australia has a number of voluntary initiatives for improving energy efficiency. For example, the Australia Energy Star Program provides an international standard for energy-efficient office equipment, including computers, printers, and photocopiers as well as home electronics such as televisions, audio products, and DVD players. Products that display the Energy Star label have energy-saving features enabled. See [www.energystar.gov.au/](http://www.energystar.gov.au/) for more details.

A number of additional projects have been developed with the support of the Australian Government:

- CBD ó Commercial Buildings Disclosure Program
- WERS - Window Energy Rating Scheme



- EDG - Environmental Design Guides
- Building Design Association of Australia (BDAA) Marketing Sustainable Design Workshops
- Australian Council of Building Design Professions (BDP) Making Energy Pay
- Housing Industry Association (HIA) Greensmart Professional Accreditation Course;
- Master Builders Association (MBA) Energy Wise - Dollar Wise Training Course
- Lighting Best Practice Project
- WELS - Water Efficiency Labeling and Standards

## 2.4. Financial Measures Taken by the Government

### 2.4.1. Tax Measures

Expenditures on capital equipment, which may improve energy efficiency, are generally deductible under capital allowance provisions.

### 2.4.2. Low-interest Loans

#### *Clean Energy Finance Corporation*

The new \$10 billion Clean Energy Finance Corporation, independent from the Australian Government, will invest in the commercialization and deployment of renewable energy, low-pollution, and energy-efficient technologies as well as manufacturing businesses that provide inputs for these sectors. The investments will be divided into two streams: a renewable energy stream and a clean energy stream, each with half of the allocated funding. This program does not include investments in carbon capture and storage (CCS), which is already cared for through a number of other programs such as the Global CCS Institute and the CCS Flagships program. The Clean Energy Finance Corporation (CEFC) will integrate the work of Low Carbon Australia, which worked to promote innovative financing and other energy-efficient approaches, mostly in the commercial sector.

### 2.4.3. Subsidies and Budgetary Measures

There are a number of budgetary measures for energy efficiency improvement programs at the federal and state levels. One example is the following:

#### a) Name

Low-Carbon Communities

#### b) Purpose

Low-Carbon Communities, comprised of three main programs (i.e., the Community Energy Efficiency Program, the Low-income Energy Efficiency Program, and the Local Government Energy Efficiency Program), provides AUD 200 million in grants to support local councils and operators of community facilities to implement energy-efficient upgrades. It also supports low-income households (through trials of energy efficiency approaches) to determine more sustainable ways to manage their energy consumption. All of these programs also increase information on the effectiveness of various technologies and policy approaches.

#### c) Applicable sectors

Local government, community, sport and recreation, low-income households.

#### d) Outline

The Community Energy Efficiency Program (CEEP) will provide \$112 million in grants to 170 local governments and non-profit community groups for energy efficiency upgrades. These grants will improve the energy efficiency and amenity of council- and community-use buildings and facilities, particularly where this would benefit low, socio-economic and other disadvantaged communities or support energy efficiency in regional and rural councils.

Projects under the CEEP may consist of the installation or upgrade of energy efficiency technologies including cogeneration, tri-generation, and geothermal heating; street lighting, indoor and outdoor lighting; and heating, ventilation, and air conditioning (HVAC), draught sealing, double-glazed windows, insulation, solar hot-water systems, building management systems, and variable speed drives.

The Low-Income Energy Efficiency Program (LIEEP) is a competitive, merit-based grant program that provides grants to consortia of government, business, and community organizations in order to improve the energy efficiency of low-income households and enable them to better manage their energy use.

The Local Government Energy Efficiency Program (LGEEP) is a \$24 million non-competitive grant program that will help local governing authorities (LGAs) install solar and heat pump hot-water systems to improve energy use in their buildings and community facilities.

#### e) **Expected results**

The government's objective is to support local councils, communities, and households to reduce emissions and energy costs.

The objectives of the CEEP include: support various local councils and community organizations to increase the energy efficiency of different types of non-residential council- and community-use buildings, facilities, and lighting, especially where this would benefit low socio-economic and other disadvantaged communities; support energy efficiency in regional and rural councils; and demonstrate and encourage the adoption of improved energy management practices within councils, organizations, and the broader community.

The objectives of the LIEEP include: trial and evaluation of a number of different approaches in various locations that assist low-income households to be more energy efficient; and obtain information and analyze data to determine future energy efficiency policies and program approaches.

The objective of the LGEEP is to support LGAs to install energy efficient solar and heat pump hot-water systems in their buildings and community facilities, particularly where LGAs are situated in low socio-economic or otherwise disadvantaged areas.

#### **2.4.4. Other Incentives**

The Australian Government provides a number of rebates in order to improve energy efficiency in the agriculture, transport, residential, commercial, power, and government sectors.

For a detailed description of Australian rebates for individuals, please refer to <http://www.livinggreener.gov.au/rebates-assistance>. Regarding rebates for businesses, please refer to <http://www.business.gov.au/BusinessTopics/Grantsandassistance/Pages/default.aspx>.

#### **2.5. Energy Pricing**

The Australian Government, in conjunction with state and territory governments through the SCER, implemented the National Energy Customer Framework (NECF) to regulate the sale and supply of energy (both electricity and gas) to retail customers on July 1, 2012. The NECF commenced operation in Tasmania on July 1, 2012, in South Australia on February 1, 2013, and in New South Wales on July 1, 2013. Queensland announced that it will introduce the NECF in early to mid-2014. It is expected to be implemented in other participating jurisdictions as soon as practical. The adoption of the NECF will streamline the regulation of energy distribution and energy retail functions (except price regulation), thus creating efficiencies and including appropriate consumer protection.

States and territory governments apply price regulation to retail energy everywhere except Victoria (deregulation from January 1, 2009) and South Australia (deregulation from February 1, 2013).

## **2.6. Other Efforts for Energy Efficiency Improvements**

### **2.6.1 Energy Efficiency in Government Operations Policy 2006**

The purpose of this policy is to improve the energy efficiency of Australian government operations with particular emphasis on building energy efficiency. It is committed to progressive improvement of overall agency energy performance through minimum efficiency requirements and regular energy reporting.

A key objective of this policy is for government office buildings to achieve specific energy efficiency targets by 2011-12. Progress towards the targets is tracked on an annual basis, showing that the targets for tenants' light and power have been achieved, whereas the targets for central services have not been achieved.

A major component of the policy is the Green Lease Schedule (GLS) through which Australian Government tenants and their building owners commit to working collaboratively in order to maintain and maximize the energy efficiency of the building. The GLS management framework also enables agencies to incorporate required energy efficiency standards into their leases and other procurement activities.

### **2.6.2 Cooperation with Non-Government Organizations**

The government cooperates with non-government organizations to stimulate energy efficiency improvements as appropriate.

### **2.6.3 Cooperation through Bilateral, Regional, and Multilateral Schemes**

Australia is a member of the International Energy Agency and it is involved in various working groups, including the Energy Efficiency Working Party. It is also involved in discussions related to better data collection and the development of energy efficiency indicators.

The International Partnership for Energy Efficiency Cooperation (IPEEC) is a high-level international forum that provides global leadership on energy efficiency by identifying and facilitating government implementation of policies and programs that yield high energy efficiency gains. The IPEEC also aims to promote information regarding the best practices as well as facilitate initiatives to improve overall energy efficiency.

Founded in May 2009, the IPEEC is a voluntary forum of developed and developing countries that represent the major economies of the world. As of June 2013, the members of the IPEEC members include: Australia, Brazil, Canada, China, the European Union, France, Germany, India, Italy, Japan, Mexico, Russia, South Korea, United Kingdom, and the United States.

Relevant international standards are taken into account in the development of Australian MEPS.

### **2.6.4 Other Cooperation/Efforts for Energy Efficiency Improvements**

The Australian Government is committed to engaging with the business sector and providing support to new technologies through public-private partnerships, including the \$10 billion CEFC. The objective of the CEFC is to overcome capital market barriers that hinder the financing, commercialization, and deployment of commercially oriented, energy-efficient, renewable, and low-emissions technologies.

The CEFC was built on the success of Low-Carbon Australia Limited (LCAL), formally the Australian Carbon Trust, which provided more than \$100 million in funding to promote investment in energy efficiency and building retrofits. Concurrent with the commencement of operation of the CEFC, in July 2013, the LCAL and the CEFC merged, which allowed the CEFC to leverage off the systems and the expertise of the LCAL, while providing certainty as well as the efficient delivery of financial support to the market.

The National Carbon Offset Standard (NCOS), which was introduced by the government on July 1, 2010, was administered by the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education as a result of the LCAL/CEFC merge. The NCOS's Carbon Neutral Program is a voluntary scheme that certifies products or organizations as "carbon neutral" and provides a trademark for participants to promote their carbon neutral status. This helps consumers and businesses trust such claims as well as provide them with another way to take effective action on climate change and energy efficiency.

# BRUNEI DARUSSALAM

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

As part of the Energy Efficiency and Conservation (EEC) initiatives, Brunei Darussalam has set a target to achieve 45% energy intensity reduction by 2035 (baseline 2005), which is in line with the target of Asia-Pacific Economic Cooperation (APEC) declared in Honolulu, Hawaii in 2011. In addition, at the United Nations Climate Change Summit 2014 in New York, Brunei Darussalam announced that it plans to reduce total energy consumption by 63% by 2035 with 2009 as the baseline (compared to business-as-usual (BAU)).

### 1.2. Sectoral Energy Efficiency Improvement Goals

In order to ensure that the target reduction of energy intensity to 45% is met, Brunei Darussalam has already established the EEC roadmap. Through rigorous implementation of energy efficiency and conservation programs, Brunei Darussalam will be able to reduce the nation's total energy consumption by up to 63%, primarily from a reduction of fossil fuel supply for inland energy use via five major sectors, namely, the power, commercial, residential, transport, and industrial sectors. Relevant government agencies, industries, and individuals are collaborating to evaluate legislative, financial, and fiscal policy measures that promote energy efficiency and low-energy intensive industries. The industries' role includes the identification of technical levers that may assist the reduction of energy usage over time, while individuals shift consumption behaviors toward energy efficiency, including making choices on high energy-efficient appliances.

### 1.3. Action Plans for Promoting Energy Efficiency

#### 1.3.1

##### a) Name

Electricity Tariff Reform ó New Electricity Tariff Structure

##### b) Objective

To help low-income citizens through a minimum charge of 1% per kWh for basic electricity consumption, while simultaneously promoting energy saving and avoiding energy waste.

##### c) Applicable sectors

Residential.

##### d) Outline

The new electricity tariff carries a progressive structure as opposed to the former regressive regime. The tariff came into effect on January 1, 2012.

##### e) Financial resources and budget allocation

The government is switching all residential electricity meters from post-paid meters to prepaid meters so that consumers can plan their energy usage better.

##### f) Method for monitoring and measuring the effects of action plans

The total consumption of the residential center is monitored by the Department of Energy and Industry, Prime Minister's Office (DEIPMO), and the Department of Electrical Services on a monthly basis.

##### g) Expected results

New progressive tariff structure ó January 1, 2012.  
Replacement of meters ó 97% completed (as of Q3 2015).

**h) Future tasks**

To implement electricity tariff reform (the new electricity tariff structure) to other sectors, i.e., commercial, government, and industrial sectors.

**1.3.2****a) Name**

Improvement of Power Plant Efficiency

**b) Objective**

Improving the overall existing power generation efficiency to more than 45% by replacing a simple-cycle power plant with a more efficient combined-cycle or co-generation plant and by having a structured maintenance program in place.

**c) Applicable sectors**

Power sector.

**d) Outline**

- Maximize utilization of the combined-cycle power plant (by 2012).
- The new power station shall have power generation efficiency > 45%.
- Replacement of the existing simple-cycle power station to the combined-cycle plant (by 2015).
- Expansion of the existing co-generation plant (by 2014).
- Introducing ORegen technology.

**e) Financial resources and budget allocation**

Government and private sectors.

**f) Method for monitoring and measuring the effects of action plans**

The action plan for the power plant will be implemented by the Department of Electrical Services and monitored by the DEIPMO.

**g) Expected results**

By 2020.

**h) Future tasks**

Expansion and improvement of power plant efficiency.

**1.3.3****a) Name**

EEC Building Guidelines for the Non-Residential Sector

**b) Objective**

To establish energy efficiency and conservation standards as well as a regulatory mechanism for buildings in Brunei Darussalam.

**c) Applicable sectors**

Government and commercial sectors.

**d) Outline**

- A collaboration project with the Ministry of Development.
- The guidelines were launched on May 14, 2015, by the Minister of Development.

- The guidelines are mandatory for all government buildings and voluntary to all commercial buildings. Regarding the latter, it will become mandatory upon notification by government authorities.

**e) Financial resources and budget allocation**

Government and building owners.

**f) Method for monitoring and measuring the effects of action plans**

Energy consumption for buildings shall be closely monitored by both the Ministry of Development and the DEIPMO, using the Automated Meter Reader (AMR).

**g) Expected results**

Beyond 2016.

**h) Future tasks**

- To expand the guidelines to other sectors i.e., commercial and industrial sectors.
- To create an Energy Manager position for each building.

### 1.3.4

**a) Name**

Standard and Labeling Order (Air conditioning ó Phase 1)

**b) Objective**

To restrict or halt the importation of non-efficient electrical appliances and products into the economy, while educating and encouraging people to opt for more energy-efficient electrical appliances and products.

**c) Applicable sectors**

All sectors.

**d) Outline**

- It is a collaborative project between the DEIPMO and the Brunei National Energy Research Institute (BNERI). The Attorney General Chambers (AGC) has provided the first clean copy of the draft order (to be further revised by the DEIPMO).
- For the first stage, the order would only focus on air-conditioning systems. Subsequently, it will be extended to other appliances or products i.e., refrigerators, lighting systems, rice cookers, water heaters, etc.

**e) Financial resources and budget allocation**

Supported by the government.

**f) Method for monitoring and measuring the effects of action plans**

The initiative will be regulated by the DEIPMO.

**g) Expected results**

The order is expected to be implemented in Q3/4 2016, after a one-year grace period.

**h) Future tasks**

To expand the order to other appliances, i.e., lighting, refrigerators, rice cookers, water heaters, etc.

### 1.3.5

**a) Name**

Energy Management Policy

**b) Objective**

- To create a clear picture of the status regarding current energy use after which new goals and targets can be set.
- To help reduce energy usage and carbon emissions in a more systematic manner.
- To evaluate and prioritize the implementation of new energy-efficient technologies and measures.
- To provide a framework to promote energy efficiency throughout the supply chain.
- To offer guidance on how to benchmark, measure, document, and report corporate energy use.
- To make better use of energy-consuming assets, thus identifying the potential to reduce maintenance costs or expand capacity.
- To demonstrate to the stakeholders that corporate commitment that complies with their best practices can help protect the environment.

**c) Applicable sectors**

All sectors, but more focus will be placed on the commercial and industrial sectors.

**d) Outline**

- Brunei Darussalam is considering adopting an Energy Management Policy that is compatible with the ISO 50001 standard.
- Building owners will be encouraged to introduce management systems that include equipment to monitor energy consumption, such as Building Automation Systems (BASs), Controllers (i.e., demand controllers), and Building Energy Management Systems (BEMS).
- The DEIPMO will be preparing the paperwork for the establishment of Energy Managers for all buildings belonging to government ministries in Brunei Darussalam.
- In order to demonstrate the effectiveness of energy management systems, a number of government, commercial, and industrial facilities should be selected to participate in an energy management pilot program in line with ISO 50001 criteria.
- In support of the energy management policy, a sufficient number of qualified external auditors should be trained to conduct monitoring and verification exercises in order to ensure compliance.
- To continue to work closely with ASEAN-Japan Energy Efficient Partnership (AJEEP) and seek assistance from international experts (ECCJ, Japan, ACE, etc.).

**e) Financial resources and budget allocation**

Supported by the government.

**f) Method for monitoring and measuring the effects of action plans**

The initiative will be regulated by the DEIPMO.

**g) Expected results**

Expected to be implemented by 2018.

**h) Future tasks**

To continuously conduct audits of buildings in all sectors.

**1.3.6****a) Name**

Introduction of Energy-Efficient Vehicles  
Implementation of Fuel Economy Regulation

**b) Objective**

- Part of the EEC initiatives to reduce energy intensity by 45% by 2035.
- To establish a cleaner, greener, and more sustainable transport system.

**c) Applicable sectors**

Transport.

**d) Outline**

- To set 17.2 km/l by 2020 and 21.3 km/l by 2025.
- Hybrid vehicles, electric vehicles (EVs), and fuel-efficient vehicles (FEVs) shall be introduced as well as the deployment of public transport.

**e) Financial resources and budget allocation**

Government and private sectors (key industrial players).

**f) Method for monitoring and measuring the effects of action plans**

The initiative will be facilitated by the DEIPMO and implemented by the Ministry of Communication.

**g) Expected results**

By 2020 and 2025.

**h) Future tasks**

- To increase the number of hybrid vehicles, FEVs, and EVs available in the market.
- To further improve the Fuel Economy Regulation beyond 21.3 km/l.

### 1.3.7

**a) Name**

Financial Incentives

**b) Objective**

- To support cost differences that may be incurred when purchasing more efficient equipment.
- To encourage end-users (consumers) to opt for more energy-efficient electrical appliances and products.

**c) Applicable sectors**

All sectors, but more focus will be placed on the residential and transport sectors.

**d) Outline**

- To discuss with the Ministry of Finance suitable financial incentives that can be introduced to the public, such as tax exemptions, tax reductions, or tax rebates, on energy-efficient appliances and products.
- To explore several options in order to provide appropriate financial incentives on the transport sector, especially regarding hybrid vehicles and FEVs.

**e) Financial resources and budget allocation**

Supported by the government.

**f) Method for monitoring and measuring the effects of action plans**

The initiative will be facilitated by the DEIPMO and endorsed by the Ministry of Finance.

**g) Expected results**

Beyond 2018.

**h) Future tasks**

- To further improve and expand the financial incentives for any new appliances and products with highly energy-efficient technologies.
- To provide continuous support to the transport sector by providing financial incentives to FEVs in line with the Fuel Economy Regulation being implemented.

**1.3.8****a) Name**

Brunei Darussalam Energy Consumption Survey (BDECS) 2015

**b) Objective**

The key objectives of the survey include the following:

- To quantify and characterize energy end-use efficiency and improve the basis for government policy planning and implementation.
- To provide new insights on energy consumption and eventually identify which energy efficiency policies or measures will have the greatest impact.

**c) Applicable sectors**

Residential sectors (Phase 1).

**d) Outline**

This is the first comprehensive energy-consumption survey that initially covers the residential sector (Phase 1) and then focuses on the commercial, government, and industrial sectors in Brunei Darussalam.

This project is the result of international cooperation between the Brunei Government, the Economic Research Institute for ASEAN and East Asia (ERIA), and the Institute of Energy Economics, Japan (IEEJ).

This survey includes a random sample of 5,000 households of which 1,000 were collected by interviewers and the remaining 4,000 were collected online through DEIPMO's website. The survey was completed in October 2015.

**e) Financial resources and budget allocation**

No information available.

**f) Expected results**

End of 2015.

**g) Future tasks**

To expand the survey to other sectors (commercial, government, and industrial sectors).

**1.4. Information Dissemination, Awareness Raising, and Capacity Building**

The DEIPMO holds an annual energy awareness campaign titled, "Energy Week," to continually increase the public's awareness of the subject. It also works closely with educational stakeholders through its "Energy Club," which is held at schools to educate students about energy efficiency and conservation.

Information on energy efficiency and conservation is continuously disseminated through briefings, seminars, workshops, reference books, energy-saving booklets and posters, the official website, and the media. This information and knowledge sharing has permeated all sectors and every level of society not only in urban areas but also in rural areas.

Capacity-building and energy efficiency and conservation activities have been going on for the past few years. To enhance competency, seminars/workshops have also been conducted in collaboration with local and international organizations.

### 1.5. Research and Development in Energy Efficiency and Conservation

Research and development on EEC projects in Brunei Darussalam are currently being planned and conducted by the Brunei National Energy Research Institute (BNERI), which was established in April 2012. Research and development of energy efficiency programs are also being carried out by the UBD|IBM Center, which is a research collaboration between the University of Brunei Darussalam and the International Business Machines (IBM) Corporation.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts

#### a) Name

Energy White Paper (EWP) ó a policy paper with detailed strategies on energy efficiency and conservation that was introduced on March 24, 2014

#### b) Purpose

The EWP is a long-term policy document with directives in order to achieve and fulfill the objectives of Wawasan 2035. It establishes a framework for action in order to address energy challenges and manage future risks to the economy. To ensure that all initiatives are translated into real action, the outcomes achieved are continuously generated, evaluated, and implemented.

#### c) Applicable sectors

The industrial (oil and gas industries), power, and transport sectors.

#### d) Outline

The EWP consists of three strategic goals, of which the EEC initiatives fall under the second goal, which focuses on ensuring safe, secure, and reliable supply and use of energy. In addition, the key initiatives that shall be undertaken by the government are as follows:

- Reduction of the total primary energy supply (TPES) to 63% and energy intensity to 45% through EEC initiatives by 2035.
- To have a secure and reliable domestic energy supply, less power outage, and a consistent supply of petroleum products.
- Deployment of renewable energy.

#### e) Financial resources and budget allocation

Supported by the government.

### 2.2. Legislative Measures

Implementation of the comprehensive set of supportive policies and regulatory frameworks regarding EEC initiatives, which includes the following:

Policy 1 ó Electricity Tariff Reform (Implemented: January 1, 2012)

Policy 2 ó EEC Building Guideline for Non-Residential Building (Launched: May 14, 2015)

Policy 3 ó Standards and Labeling Order (Currently in progress)

Policy 4 ó Energy Management (Project kick-off in Q1 2016)

Policy 5 ó Financial Incentives (Ongoing discussion).

Policy 6 ó Awareness-Raising (Ongoing discussion).

Policy 7 ó Fuel Economy Regulation (To be implemented in 2020 and 2025)

### 2.3. Voluntary Measures

#### a) Name

ASEAN Energy Award (AEA) Competition

**b) Purpose**

- To promote regional cooperation in various fields of energy such as energy efficiency and conservation.
- To serve as a platform to generate opportunities in the private sector and allow them to participate in energy development in the ASEAN region (in partnership with the public sector).

**c) Applicable sectors**

The competition is open to the government, commercial, and industrial sectors.

**d) Outline**

This project is organized by the ASEAN Centre of Energy (ACE) in collaboration with the Energy Centre of Japan (ECCJ) and the Ministry of Economy, Trade and Industry (METI). The competition provides international recognition to entities that apply the concepts, systems, and technologies of energy efficiency and conservation. The three categories of the competition include the following:

- Energy-Efficient Building Competition.
- Energy Management Competition.
- Renewable Project Competition.

**2.4. Financial Measures taken by the Government**

Most EEC initiatives and programs, such as the "Energy Week & Energy Exhibition," are fully funded by the government. A significant number of EEC activities are also being sponsored by the private sector, for example, the Energy Clubs Project Awards.

**2.5. Energy Pricing**

Energy pricing is regulated by the government (see Section 1.3.1)

**2.6. Other Efforts for Energy Efficiency Improvements**

The DEIPMO, in collaboration with the BNERI, are conducting an electricity tariff analysis survey for a sample of 200 high users (> 4,000 Kwh).

The DEIPMO, together with the Department of Electrical Services, are leading a discussion on energy savings and the new electricity tariff for residents in rural areas.

**2.6.1. Cooperation with Non-Government Organizations**

Both nongovernment organizations and private-sector organizations have shown support for all EEC initiatives and programs set by the DEIPMO. Some of these organizations have come forward with funding for EEC events such as the Energy Efficiency and Conservation video, energy club projects, and the energy exhibition. Private funding was also provided to sponsor EE technologies such as the inverter air-conditioning system for "Energy Club" activities at schools.

The DEIPMO is also working together with Earth Hour Brunei to implement the event on an annual basis.

The private sector has also made efforts to increase the awareness of energy efficiency and conservation as well as to implement their own EEC activities. The government has supported these initiatives and has brought different sectors to participate in workshops, seminars, and trainings such as energy auditing and energy management. Energy audits have also been conducted on selected companies.

**2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes**

Brunei Darussalam has become involved in international and regional programs on EEC initiatives, under ASEAN and APEC, through the following major platforms:

**Energy Efficiency and Conservation – Sub Sector Network (EEC-SSN)**

The EEC-SSN is an important platform for all ASEAN member states to establish effective networks toward the development and implementation of various EEC programs and initiatives. All EEC programs that have been endorsed through EEC-SSN meetings have proven beneficial for Brunei Darussalam in narrowing down the gaps regarding the implementation of the EEC initiatives, especially in terms of policy and legal frameworks. All EEC programs that have been endorsed by the EEC-SSN shall be materialized under the AJEEP program.

**ASEAN-Japan Energy Efficiency Partnership (AJEEP)**

The AJEEP program is important for Brunei Darussalam since it provides an opportunity to seek assistance directly from Japan for the development of EEC programs, including policy and legal frameworks. For the past three years, experts from the Energy Conservation Centre of Japan (ECCJ), the Institute of Energy Economics, Japan (IEEJ), and the Economic Research Institute of ASEAN and East Asia (ERIA) have visited Brunei Darussalam to conduct training workshops and provide advice. Through AJEEP, Brunei Darussalam is able to participate in the Energy Conservation ASEAN Partnership (ECAP) workshop, which is jointly organized by the Ministry of Economy, Trade and Industry (METI) of Japan, the ASEAN Centre of Energy (ACE), and the ECCJ.

Brunei Darussalam's participation under the AJEEP program has yielded many benefits in the development of EEC legislative measures, which include the Standard and Labeling Order and the EEC Building Guidelines. Brunei Darussalam also sees the continued involvement with AJEEP as an effective platform to accelerate the development of other EEC initiatives/programs, especially the implementation of important legislative measures such as energy management policies and the expansion of the standards and labeling scheme.

**Board of Judges on ASEAN Energy Awards (BOJ-AEA)**

The Board of Judges on ASEAN Energy Awards (BOJ-AEA) is another important platform for Brunei Darussalam to learn all of the best practices in terms of building efficiency management, which can ultimately be implemented and widely adopted. In addition, this program has given Brunei Darussalam an opportunity to participate in building management and efficiency competitions at the ASEAN level.

**APEC Expert Group on Energy Efficiency and Conservation (EGEEC)**

The EGEEC promotes energy conservation and the application of energy-efficient practices and technologies through advancing demonstrated options. The EGEEC also aims to enhance trade between APEC economies in products and services as well as energy-efficient practices and technologies. Brunei Darussalam benefits from this work, especially toward the development of EEC programs and initiatives. However, Brunei Darussalam is not a regular participant in the EGEEC, and hence, receiving assistance from APEC experts is extremely limited.

# CANADA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In Canada, the federal government cooperates and collaborates with the 13 provincial and territorial governments, local governments, and public and private utilities to develop and deliver an integrated network of energy efficiency policies and programs.

Under the Energy Efficiency Act, the federal government adopts and enforces minimum energy performance requirements, codes, standards, and labels for energy-using products that are traded across Canada or imported/exported to and from Canada. Energy efficiency regulations and standards are closely aligned with the United States through the work of the Canada-U.S. Regulatory Co-Operation Council. The federal government supports economy wide model codes, labeling, and rating initiatives (e.g., EnerGuide and Energy Star). It also promotes the use of alternative transport fuels and administers a number of federal programs together with the provinces and nongovernmental organizations.

Since the provinces own and have jurisdiction over their natural resources, they may collect royalties on and regulate the energy sector, including oil, gas, and power production. They also have wide powers over buildings, transport systems, and municipal governments. By virtue of these powers, the provinces have jurisdiction over efficiency standards for building designs and building components and equipment, at least within their borders.

Energy efficiency policies across Canada's federal, provincial, and territorial authorities are coordinated at the ministerial level through the Energy and Mines Ministers' Conference (EMMC) and its Steering Committee on Energy Efficiency (SCEE). Based on the 2011 Collaborative Approach to Energy and its associated action plan, the EMMC put forward a coordinated, complementary agenda for energy efficiency in the built environment and the equipment, industrial, and transport sectors in 2012. Work themes related to economic prosperity and responsible energy supply, efficient energy use, and knowledge and innovation, will all contribute to advancing common goals. Specific areas of interest include a more stringent model energy code for buildings, a next-generation energy-rating system for homes, project financing tools, transport, product regulation, industrial energy management standards, and integrated community energy solutions. For more details, please see the following link: <http://www.nrcan.gc.ca/publications/11102>.

### 1.2. Sectoral Energy Efficiency Improvement Goals

Not available.

### 1.3. Action Plans for Promoting Energy Efficiency

#### a) Name

ecoENERGY Efficiency and ecoENERGY Retrofit-Homes

#### b) Objectives

The ecoENERGY Efficiency initiative, operated through Natural Resources Canada's Office of Energy Efficiency, provides a broad framework of programs through which energy conservation and energy efficiency are promoted in every sector of the Canadian economy.

The components target market barriers to energy efficiency uptake, and they are constructed around three pillars of action operating in the residential, commercial, institutional, industrial, and transport sectors:

- Making the stock of housing, buildings, and energy-using products, as well as products that affect energy use, more efficient through regulation, codes, and standards.

- Making energy performance more visible in all sectors through labeling, benchmarking, training, and information sharing in order to affect behavior change.
- Making industrial, building, and vehicle operations more energy efficient.

A fourth pillar, addressed by the ecoENERGY Retrofit ó Homes program (2007ó2012), included making energy efficiency more affordable for Canadians.

In addition to coordinating these programs, the Office of Energy Efficiency is mandated to strengthen and expand Canada's commitment to energy efficiency in order to further support the Government of Canada's policy objectives and programs.

### **c) Applicable sectors**

Industrial, transport, residential, commercial, appliances, and equipment.

### **d) Outline**

In January 2012, the Government of Canada announced the funding of \$195 million over five years (2011ó2016) to support the ecoENERGY Efficiency initiative. This funding is aimed at maintaining the Government's momentum to improve energy use in Canada, thus contributing to a cleaner environment by reducing greenhouse gas emissions and saving Canadians money.

There are five elements under the ecoENERGY Efficiency initiative:

- ecoENERGY Efficiency for Vehicles: Reduces energy use and emissions from transport in Canada through the following: providing fuel-efficient driver training; offering energy information to vehicle consumers such as the Fuel Consumption Guide; and introducing the SMARTWAY Transport Partnership in Canada, which encourages freight companies to make their operations as energy efficient as possible.
- ecoENERGY Efficiency for Housing: Encourages the construction and retrofit of low-rise residential housing and makes the new/existing stock more energy-efficient. For example, funding provides support for the refinement of the EnerGuide Rating System as a standard measure and labeling system for the energy performance of new/existing homes.
- ecoENERGY Efficiency for Buildings: Provides information and benchmarking tools to improve the energy performance of new/existing buildings. For example, actions have led to the National Energy Code of Canada for Buildings establishing an overall 25% improvement in energy efficiency over the previous code and indicating minimum requirements for energy efficiency in new buildings. An online energy benchmarking system for existing buildings has also been developed by adapting the United States Environmental Protection Agency's Energy Star Portfolio Manager benchmarking tool to the Canadian context.
- ecoENERGY Efficiency for Equipment Standards and Labeling: Introduces or raises energy efficiency standards for a wide range of products, and promotes energy-efficient products through the Energy Star program. The program enhances labeling and promotion programs that have historically led to the introduction of new and more stringent standards that are closely aligned with U.S. developments.
- ecoENERGY Efficiency for Industry: Aids the adoption of a energy management standard, accelerates energy-saving investments in factories, and supports the exchange of best-practices information within Canada's industrial sector. For example, it supports the early implementation of the new ISO 50001 Energy Management System standard as well as the Canadian Industry Program for Energy Conservation, which offers networking opportunities for the industry to share information, identify common needs and best practices, and improve energy efficiency in more than 25 industrial sectors.

In July 2011, the Government of Canada announced a one-year extension of \$400 million to the ecoENERGY Retrofit ó Homes program in order to help homeowners make their homes more energy-efficient and reduce the burden of high energy costs. The ecoENERGY Retrofit ó Homes program was successful in meeting its economic and environmental goals. The program ran from 2007 to 2012, during which 640,000 Canadian homeowners benefited from more than \$934 million in program spending.

For more information on all of the ecoENERGY Efficiency initiatives, see <http://www.ecoaction.gc.ca>.

#### **e) Financial regulations and budget allocation**

From fiscal year 2011/2012 to fiscal year 2015/2016, total allocations to the ecoENERGY Efficiency initiative and the ecoENERGY Retrofit ó Homes program will be CDN 595 million (approximately USD 540 million<sup>1</sup>).

#### **f) Monitoring**

Program departments are responsible for monitoring and reporting on their individual programs. The efforts of Natural Resources Canada are compiled into the Report to Parliament under the Energy Efficiency Act, which is tabled annually in Parliament by the Government of Canada. For more information, see:

<http://oee.nrcan.gc.ca/publications/statistics/parliament10-11/index.cfm>.

The Office of Energy Efficiency also produces a publicly available report on Energy Efficiency Trends in Canada (and its companion document, the Energy Use Data Handbook). For more information, see:

[http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data\\_e/publications.cfm?attr=0](http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/publications.cfm?attr=0).

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

The Energy Efficiency Sub-Program goals for energy savings in 2015-16 is 36-44 PJ with associated reductions in greenhouse gas emissions of 3.6-4.4 Mts. For more information, see:

<http://www.nrcan.gc.ca/evaluation/reports/2015/17155>.

### **1.4. Institutional Structure**

#### **1.4.1. Office of Energy Efficiency, Natural Resources Canada**

##### **a) Status of organization**

Government organization (policymaker and regulator).

##### **b) Roles and responsibilities**

The Office of Energy Efficiency (OEE), Canada's center of excellence for energy conservation, energy efficiency, and alternative fuels information, plays a dynamic leadership role in helping Canadians save millions of dollars in energy costs, while contributing to a healthier environment. One of the key tasks of the OEE is managing the Government of Canada's ecoENERGY Efficiency initiative in order to reduce energy use in buildings and houses, industry, personal vehicles and fleets, appliances, and equipment.

The OEE provides practical energy conservation information and advice to consumers, businesses, and institutions. Examples include the following:

- Promotion of the International Energy Star symbol in Canada. This includes information about checking whether products that display the Energy Star symbol meet or exceed high energy-efficiency levels without compromising performance. For

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<sup>1</sup> Based on the 2014 World Bank official exchange rates.

houses, an Energy Star certified new home is, on average, 20% more energy-efficient than a home built to code.

- Mandatory and/or voluntary EnerGuide labeling for products including appliances, heating and cooling equipment, houses, and vehicles. EnerGuide is a Government of Canada initiative that rates the energy consumption of these products.
- Publication of a Fuel Consumption Guide, which provides estimated fuel-consumption ratings for passenger cars and light-duty pickup trucks, vans, and special-purpose vehicles sold in Canada.

Informing key decision-makers in the government, industry, and non-profit sectors about Canada's energy conservation and energy efficiency efforts is a major focus of the OEE.

The OEE also plays a regulatory role under the Energy Efficiency Act (see Section 2.1.1 below). The act gives the Government of Canada the authority to develop and implement minimum energy performance standards for energy-using products or products that affect energy use, which are either imported to Canada or manufactured in Canada and shipped across provincial or territorial borders. The first regulations, which came into effect in 1995, now cover 47 products.

#### **c) Covered sectors**

Industrial, transport, residential, commercial, appliances, and equipment.

#### **d) Established date**

April 1998.

#### **e) Number of staff members**

Approximately 280.

### **1.4.2. Regional and local institutions**

Canada is a federation comprising a federal government and 13 sub-federal entities. These sub-federal entities are active in the field of energy efficiency, and they have organizational structures of their own. Many energy utilities are also active in provincial/territorial policy and programming. Information regarding provincial/territorial incentives is provided by the OEE Directory of Energy Efficiency and Alternative Energy Programs in Canada, which is available at [http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/policy\\_e/programs.cfm?attr=0](http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/policy_e/programs.cfm?attr=0).

### **1.4.3. Coordination**

In Canada, the separation of powers means that all levels of government exercise some jurisdiction in the area of energy use. As such, coordination is a key aspect of the federal energy efficiency policy. Coordination among the federal and provincial/territorial governments is ensured through annual meetings of the Energy and Mines Ministers Conference and regular meetings of the Steering Committee on Energy Efficiency, which includes representatives from all of Canada's provinces and territories. These efforts seek to generate a complementary agenda for energy efficiency in which the ministers continue to develop real and sustainable energy solutions in their own jurisdictions as well as collaborate on cross-cutting initiatives that require a more integrated approach.

## **1.5. Information Dissemination, Awareness Raising, and Capacity Building**

### **a) Information collection and dissemination**

Information dissemination is the responsibility of individual program departments, which cooperate with stakeholders in the government, industry, and civil society. Comprehensive information on OEE programs and related energy efficiency issues is available on the OEE website at <http://www.nrcan.gc.ca/energy/efficiency>.

### **b) Awareness Raising**

Specific awareness-raising elements are incorporated in the ecoENERGY Efficiency initiative, including the following:

- ecoENERGY Efficiency for Equipment Standards and Labeling: Supports the energy labeling of a wide range of products:
  - EnerGuide labels the rate and summarizes the energy efficiency of major household appliances as well as heating, ventilating, and air-conditioning (HVAC) equipment. The EnerGuide label shows how much energy major appliances use so that consumers can easily compare models of the same size and class.
  - The Energy Star symbol identifies the most energy-efficient products in their class. Products that carry the Energy Star symbol meet premium levels of energy efficiency. In fact, the majority are 10%-50% more efficient than the minimum regulated standard.
- ecoENERGY Efficiency for Vehicles: Provides Canadian motorists with helpful tips on purchasing, driving, and maintaining their vehicles in order to reduce fuel consumption and greenhouse gas emissions. Freight companies are also encouraged to make their operations as energy-efficient as possible through the introduction of the SMARTWAY Transport Partnership in Canada.
- ecoENERGY Efficiency for Buildings: Provides technical information and benchmarking tools to improve the energy performance of new/existing buildings. For example, a monthly electronic newsletter titled, "Heads Up: Building Energy Efficiency," is sent to more than 16,000 subscribers.
- ecoENERGY Efficiency for Industry: Supports the implementation of the Canadian Industry Program for Energy Conservation, which offers opportunities for the industry to share information, and identify common needs and best practices.
- ecoENERGY Efficiency for Housing: Includes the Energy Star for New Homes initiative, which promotes energy efficiency guidelines that enable new homes to be more energy-efficient than those built to minimum provincial building codes.

Beyond the ecoENERGY programs, improving the energy information available to Canadians was identified as a key priority for Canada's Energy Ministers at their July 2011 Conference. Regarding this issue, federal, provincial, and territorial governments will collaborate to find the gaps in the current energy information available across Canada, and provide recommendations on how information systems can be improved and how fact-based information can be communicated more effectively to Canadians.

### c) Capacity Building

The ecoENERGY Efficiency for Housing program provides for the management of a network of service organizations, energy advisors who deliver Energy Star for New Homes, R-2000, and the EnerGuide rating system to homeowners and builders. Through its ecoENERGY Efficiency for Industry and ecoENERGY Efficiency for Buildings programs, the OEE offers a wide range of energy efficiency workshops to representatives from industrial, commercial, and institutional organizations cross Canada. The "Dollars to Sense" workshops are designed to educate participants on how to lower operation and production costs, improve competitiveness, reduce greenhouse gas emissions, increase operational efficiency, and create a better work environment.

The ecoENERGY Efficiency for Vehicles program offers fuel-efficient driver training through a series of initiatives. AutoSmart targets novice light-duty vehicle drivers and driving educators to promote fuel-efficient and safe-driving practices. A number of driving schools throughout Canada are registered to deliver the AutoSmart driver education program. FleetSmart introduces energy-efficient practices that can help reduce fuel consumption and emissions. In addition, it offers free practical advice on how energy-efficient vehicles and business practices can reduce fleet operating costs, improve productivity, and increase

competitiveness. A major component of FleetSmart is the SmartDriver training program, which is targeted at drivers in the commercial and institutional fleet sector.

## 1.6. Research and Development in Energy Efficiency and Conservation

### 1.6.1. Policy: CanmetENERGY

#### a) Level

Economy-wide (federal).

#### b) Responsible department

CanmetENERGY, Natural Resources Canada.

#### c) Applicable sectors

Buildings and communities, industrial, and transport.

#### d) Outline

Natural Resources Canada's energy efficiency technology activities are guided by CanmetENERGY. CanmetENERGY manages science and technology programs and services, supports the development of energy policies, codes, and regulations, acts as a window to federal financing, and works with partners to develop more energy-efficient and cleaner technologies in areas such as buildings and communities, clean fossil fuels, bioenergy, renewables, industrial processes, oil sands, and transport. Its goal is to ensure that Canada is at the leading edge of clean-energy technologies in order to reduce air and greenhouse gas emissions, and provide a sustainable energy future. For more information, see the CanmetENERGY website at <http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/index.html>.)

The efforts of CanmetENERGY include research, development, and demonstration of energy-efficient technologies in the buildings and communities, industrial, and transport sectors:

- 1) Buildings and Communities ó Net-zero houses, buildings, and communities; modeling and simulation software tools; and advanced heating, ventilation, air-conditioning, and refrigeration technologies. For more information, see [http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/buildings\\_communities.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/buildings_communities.html).
- 2) Industrial - Includes knowledge and new technological tools for industrial energy systems and industrial systems optimization. For more information, see [http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/industrial\\_processes.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/industrial_processes.html).
- 3) Transport - Includes advanced fuels, hybrid and electric vehicles, and hydrogen and fuel cells. For more information, see <http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/transportation.html>.

#### e) Financial resources and budget allocation

Energy efficiency science and technology (S&T) expenditures were CDN 85.7 million (approximately USD 77 million) for fiscal year 2010/2011. For more information on S&T expenditures, see the annual Report to Parliament under the Energy Efficiency Act.

### 1.6.2. Program: ecoENERGY Innovation Initiative

#### a) Level

Economy-wide (federal).

#### b) Responsible department

Natural Resources Canada's Office of Energy Research and Development (OERD) is the Government of Canada's coordinator of energy research and development activities. The

OERD is responsible for the ecoENERGY Innovation Initiative, which supports energy technology innovation.

**c) Objectives and period**

The ecoENERGY Innovation Initiative is a CDN 97 million (approximately USD 87 million) investment over two years by the Government of Canada to support energy technology innovation, and produce/use energy in a more clean and efficient manner. Activities funded under the initiative will be in five strategic priority areas:

- Energy Efficiency
- Clean Electricity and Renewables
- Bioenergy
- Electrification of Transport
- Unconventional Oil and Gas

**d) Applicable sectors**

Industrial, transport, residential, and commercial.

**e) Financial resources and budget allocation**

CDN 97 million (approximately USD 87 million).

**f) Expected results**

The ecoENERGY Innovation Initiative will help in the search for long-term solutions that can reduce or eliminate air pollutants from energy production and use.

### 1.6.3. Program: Clean Energy Fund

**a. Level**

Economy-wide (federal).

**b. Responsible department**

Natural Resources Canada's Office of Energy Research and Development (OERD) is the Government of Canada's coordinator of energy research and development activities. The OERD is also responsible for the Clean Energy Fund.

**c. Objectives and period**

The Clean Energy Fund is providing nearly CDN 795 million (approximately USD 720 million) over five years under Canada's Economic Action Plan to advance Canadian leadership in clean energy technologies. In fall 2009, three carbon capture and storage projects in Alberta were announced, totaling CDN 466 million (approximately USD 420 million) from the fund. Up to CDN 146 million (roughly USD 130 million) will also be invested over five years to support renewable, clean energy, and smart grid demonstrations in all regions. Energy efficiency projects relate to integrated community energy systems. The program has allocated all of its funding to existing projects and no further calls for proposals are planned at this time. For a complete list of projects see <http://www.nrcan.gc.ca/eneene/science/renren-eng.php>.

**d) Applicable sectors**

Industrial, residential, and commercial.

**d. Financial resources and budget allocation**

CDN 795 million (approximately USD 720 million).

**e. Expected results**

Projects for renewable and clean energy systems will demonstrate numerous technologies, including marine energy, smart grid, wind, energy storage, bioenergy, geothermal energy in the north, and community energy systems (the principal energy efficiency element).

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**2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS****2.1. Government Laws, Decrees, and Acts****2.1.1. Energy Efficiency Act****a) Level**

Economy-wide (federal).

**b) Purpose**

The goal of the Energy Efficiency Act is to improve the efficiency of energy-using products and promote the use of alternative energy sources. This act allows for the making of regulations on performance and labeling requirements for energy-using products and the collection of data on energy use.

**c) Applicable sectors**

All sectors of the economy.

**d) Outline**

Canada's Energy Efficiency Act came into force in 1992, giving the Government of Canada the authority to develop and implement minimum energy performance standards for energy-using products and products that affect energy use, which are either imported to Canada or manufactured in Canada and shipped across provincial or territorial borders. The act also gives the federal government the authority to set labeling requirements for these products so consumers can compare the energy efficiency of various models of the same product.

**2.1.2. Canadian Environmental Protection Act****a) Level**

Economy-wide (federal).

**b) Purpose**

Pollution prevention.

**c) Applicable sectors**

All sectors of the economy.

**d) Outline**

The Canadian Environmental Protection Act (CEPA) came into force in 2000. The CEPA is an important part of Canada's federal environmental legislation that makes pollution prevention the cornerstone of efforts to reduce toxic substances in the environment. The Government of Canada has developed new regulations under the CEPA to reduce greenhouse gas emissions from light- and heavy-duty vehicles. These regulations are in force and aligned with those of the United States.

**2.2. Regulatory Measures****2.2.1. Energy Efficiency Regulations****a) Level**

Economy-wide (federal)

**b) Purpose**

To improve the energy efficiency of energy-using products.

**c) Applicable sectors**

All sectors of the economy.

**d) Outline**

The Energy Efficiency Regulations, under the Energy Efficiency Act, removes the least-efficient product model from the market by setting minimum energy performance levels for 47 energy-using products such as appliances, lighting, heating, and air conditioning. They also require eight products to bear the EnerGuide label. The regulations also cover 75% of energy use in the residential sector, 30% of energy use in the commercial sector, and 8% of energy use in the industrial sector. For more information, see <http://oee.nrcan.gc.ca/regulations/11239>.

Canada works with U.S. and Canadian stakeholders to implement performance and labeling requirements, and the associated compliance activities. In August 2014, under the Canada-U.S. Regulatory Cooperation Council, Natural Resources Canada and the U.S. Department of Energy established the goal of aligning new and updated energy efficiency standards and test methods to the extent practicable and permitted by law.

**e) Financial resources and budget allocation**

Funding for this initiative is provided through the ecoENERGY Efficiency for Equipment Standards and Labeling element of the ecoENERGY Efficiency initiative.

**f) Expected results**

Improvements in the performance of energy-using products in Canada.

**2.2.2. National Energy Codes for Houses and Buildings****a) Level**

Economy-wide (federal).

**b) Purpose**

The National Building Code of Canada (NBC), a model for provincial/territorial building codes, provides a minimum baseline for new building design. Growing concerns over energy use in the housing/building sector have recently led to the development of additional requirements specifically aimed at promoting energy-efficient design and construction.

**c) Applicable sectors**

Commercial/institutional, industrial, and residential.

**d) Outline**

In Canada, building regulations are provincial and territorial responsibilities. However, the provinces and territories have recognized that an economy-wide model building code adapted to particular provincial or territorial circumstances is a better approach than a series of unrelated codes. The NBC was originally established in 1941 to serve as a basis for provincial/territorial building codes, and to provide a baseline for new building design. It should be noted that the NBC distinguishes between two distinct sub-sectors: 1) larger buildings of all types; and 2) houses and small buildings. In addition, distinct requirements are provided for each of these sectors.

Growing concerns over energy use through the 1990s led to the addition of energy requirements, with distinct paths followed for each of the above sectors. The larger building sector was first addressed in 1997 with the publication of the Model National Energy Code for Buildings (MNECB). The MNECB complemented the existing NBC with a set of cost-

effective minimum energy efficiency criteria for new building design. The MNECB was then updated in 2011 and is now referred to as the National Energy Code of Canada for Buildings (NECB 2011). For more information, see <http://www.nationalcodes.ca/eng/necb/index.shtml>.

Code requirements for the housing and small buildings sector have been addressed through the inclusion of minimum energy requirements in the relevant part of the NBC, which was released at the end of 2012.

In all cases, the development of model national energy code requirements is the responsibility of the Canadian Commission on Building and Fire Codes, which collaborates with the National Research Council, Natural Resources Canada, provincial, territorial, and municipal governments, the construction industry, and the general public.

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

Funding for this initiative is provided through the ecoENERGY Efficiency for Buildings and the ecoENERGY for Housing elements of the ecoENERGY Efficiency initiative.

#### **f) Expected results**

A significant increase in the energy efficiency of new houses and buildings. For example, larger buildings designed and built in compliance with NECB 2011 should, on average, be 25% more energy-efficient than those designed in accordance with the previous (1997) MNECB.

### **2.2.3. Building Energy Benchmarking**

#### **a) Level**

Economy-wide (federal).

#### **b) Purpose**

To develop and promote participation in an economy wide system for the benchmarking of building energy consumption.

#### **c) Applicable sector**

Commercial.

#### **d) Outline**

Natural Resources Canada and the U.S. Environmental Protection Agency (EPA) have agreed to collaborate on the adaptation of the EPA's Portfolio Manager benchmarking tool in Canada. This common platform for measuring and assessing the energy performance of commercial and institutional buildings allows the comparison of a building to other similar facilities. It is also a management tool that allows the sharing and reporting of energy and greenhouse gas emissions data.

The agreement harmonizes the approach of the two economies by enhancing the EPA's existing Energy Star Portfolio Manager tool to track and rate the energy performance of commercial buildings both in Canada and in the United States. It also involves the integration of Canadian site and source energy factors, Canadian greenhouse gas emission factors, enhanced Canadian weather data, metric units, French language, postal codes, web services, and the Canadian 1-100 Energy Star scores for certain building types.

The Canadian adaptation helps to ensure relevance to Canadian policy requirements, and provides a tool for organizations and provincial-territorial governments wishing to set energy standards. This tool also supports labeling/certification programs offered by trade associations. These trade associations, including the Canada Green Building Council (CaGBC), the Building Owners and Managers Association (BOMA), the Real Property Association of Canada (REALpac), and the Greater Toronto CivicAction Alliance are currently utilizing the tool to support their programs.

**e) Financial resources and budget allocation**

Funding for this initiative is provided through the ecoENERGY Efficiency for Buildings element of the ecoENERGY Efficiency initiative.

**f) Expected results**

Greater awareness and understanding of energy use will promote further implementation of energy-efficient technologies and practices in buildings.

**2.2.4. Greenhouse Gas Emission Regulations****a) Level**

Economy-wide (federal).

**b) Purpose**

To reduce greenhouse gas emissions (GHG) and fuel consumption of motor vehicles.

**c) Applicable sectors**

Transport.

**d) Outline**

In September 2014, the Government of Canada finalized GHG regulations to further reduce these emissions from new cars and light trucks. The new regulations build on the existing standards covering model years 2011 to 2016, and establish progressively more stringent GHG emission standards for new cars and light trucks for model years 2017 and beyond.

The Government of Canada's regulations for cars and light trucks will lead to significant reductions in GHG emissions. As a result of this regulation, 2025 model-year cars and light trucks will consume up to 50% less fuel and half as many GHGs than 2008 vehicles, thus leading to significant savings at the pump.

Over the lifetime operation of 2017 to 2025 model-year vehicles, the new regulations are projected to deliver total GHG reductions of 174 Mt, which is roughly equivalent to one year of GHG emissions from Canada's entire transport sector.

The Government of Canada has also announced its intent to further regulate GHG emissions for post-2018 model-year heavy-duty vehicles and engines, building on the final regulations already in place for model years 2014 to 2018.

As a result of the existing regulations covering model years 2014 to 2018, GHG emissions from 2018 model-year heavy-duty vehicles will be reduced by up to 23%. New regulations would build on these reductions for post-2018 model-year heavy-duty vehicles.

**e) Financial resources and budget allocation**

Initial funding for these initiatives was provided through the Canada's Clean Air Agenda (Budget 2011 funding for the Clean Air Agenda was almost CDN 870 million (approximately USD 780 million) over two years).

**f) Expected results**

Reduced greenhouse gas emissions and fuel consumption from on-road motor vehicles.

**2.3. Voluntary Measures****2.3.1. Canadian Industry Program for Energy Conservation (CIPEC)****a) Level**

Economy-wide (federal).

**b) Purpose**

The Canadian Industry Program for Energy Conservation (CIPEC) is a collaboration between the government and private industry to improve Canada's industrial energy efficiency.

**c) Applicable sectors**

Industrial.

**d) Outline**

The CIPEC is a voluntary partnership between the Government of Canada and the industry that brings together industrial associations and companies. Since 1975, the CIPEC has been helping companies cut costs and increase profits by providing information, training, financial support, and tools to improve energy efficiency. Current activities include the following:

- Financial contributions for CAN/CSA-ISO 50001-Energy Management Systems standard implementation pilot studies and industrial energy assessments.
- Dollars to \$ense energy management workshops and technical webinars.
- Bi-annual national Energy Conference on industrial energy efficiency, complete with awards for industrial energy efficiency projects.
- Information on financing sources and accelerated capital cost allowances for energy-efficient and alternative energy systems and upgrades.
- On-line publications such as energy benchmarking and case studies, technical guides, and the CIPEC Annual Report.
- Twice-monthly electronic newsletter titled, "Heads Up CIPEC," which is distributed to 10,000 subscribers.
- On-line tools such as the Boiler Efficiency Calculator and the Energy Management Information Systems toolkit.

Thousands of registered CIPEC leader companies have voluntarily met and exceeded annual targets to reduce their energy intensity; that is, energy use per unit of output. Year-over-year trends in energy intensities per industrial sector are disseminated in the CIPEC Annual Report. For more information, see [www.cipec.ca](http://www.cipec.ca).

**e) Financial resources and budget allocation**

Funding for this initiative is provided through the ecoENERGY Efficiency for Industry element of the ecoENERGY Efficiency initiative.

**f) Expected results**

Improvements to energy efficiency in the industrial sector.

**2.3.2. Houses and Building Certification**

**a) Level**

Economy-wide (federal).

**b) Purpose**

To promote energy-efficient technologies and building practices.

**c) Applicable sectors**

Residential and commercial.

**d) Outline**

R-2000 and Energy Star for New Homes are voluntary new home labeling initiatives that provide Canadians with reliable options for energy-efficient new homes.

R-2000 has been a best-in-class energy efficiency home label for more than 30 years, and it has been effective at encouraging innovation in new home construction. R-2000 also encourages the early adoption of innovative technologies and building practices before they

eventually filter into the greater housing construction market. The R-2000 standard certifies new residential dwellings that are, on average, 50% more energy-efficient than those built to the minimum building code requirements. However, the standard does not specify how a house must be built.

Every R-2000 home undergoes the following process:

- Constructed by trained and licensed builders.
- Evaluated, inspected, and tested by an independent third-party inspector.
- Certified by the Government of Canada.

The Energy Star for New Homes initiative is designed to provide homebuyers with access to energy-efficient new homes, and builders with the means of building these homes in a timely, simple, and cost-effective manner using common building practices. The Energy Star for New Homes standard qualifies new residential dwellings that are, on average, 20% more energy-efficient than those built to the minimum building code requirements.

R-2000 and Energy Star homes are expected to reduce energy costs and provide greater occupant comfort. For more information, see <http://www.nrcan.gc.ca/energy/efficiency/housing/new-homes/5025>).

The Canadian Mortgage Housing Corporation also offers mortgage assistance to buyers of R-2000 and other energy-efficient certified homes. For more information, see [http://www.cmhc-schl.gc.ca/en/co/moloin/moloin\\_008.cfm](http://www.cmhc-schl.gc.ca/en/co/moloin/moloin_008.cfm)).

Natural Resources Canada (NRCan) and the U.S. Environmental Protection Agency (EPA) have agreed to collaborate on the adaptation of the EPA's Portfolio Manager benchmarking tool in Canada. This common platform for measuring and assessing the energy performance of commercial and institutional buildings allows the comparison of a building to other similar facilities in its region or across Canada. NRCan has been working under the guidance of participating provinces, territories, and other key stakeholders to develop this system. NRCan is aiming to harmonize this system with existing, non-governmental building certification programs, such as LEED® of the Canada Green Buildings Council and BOMA Best of the Building Owners and Managers Association. For more information, see <http://oee.nrcan.gc.ca/commercial/regulations-standards/labelling.cfm?attr=20>.

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

Funding for these initiatives is provided through the ecoENERGY Efficiency for Houses and ecoENERGY Efficiency for Buildings elements of the ecoENERGY Efficiency initiative.

#### **f) Expected results**

Greater use of energy-efficient technologies and practices in new homes and buildings.

### **2.4. Financial Measures Taken by the Government**

#### **2.4.1. Tax Scheme**

Accelerated Capital Cost Allowance for Clean Energy Generation

##### **a) Level**

Economy-wide (federal).

##### **b) Purpose**

Encouraging investments in energy-efficient and alternative energy technologies in order to contribute to reductions in greenhouse gas emissions, improvements in air quality, and diversification of the energy supply.

##### **c) Application sectors**

Industrial.

**d) Outline**

A 50% accelerated capital cost allowance (CCA) is provided under Class 43.2 (Schedule II) of the Income Tax Regulations for specified clean energy generation equipment. Class 43.2 includes the following categories of systems or equipment:

- Cogeneration and/or Specified-Waste-Fueled Electricity Generation Systems
- Active Solar Equipment and Ground Source Heat-Pump Systems
- Small-Scale Hydroelectric Installations
- Heat Recovery Equipment
- Wind Energy Conversion Systems
- Photovoltaic Electrical Generation Equipment
- Geothermal Electrical Generation Equipment
- Landfill Gas and Digester Gas Collection Equipment
- Specified-Waste Fueled Heat Production Equipment
- Expansion Engine Systems
- Systems to Convert Biomass into Bio-Oil
- Fixed-Location Fuel Cell Equipment
- Systems to Produce Biogas by Anaerobic Digestion
- District Energy Systems/Equipment
- Wave or Tidal Energy Equipment

Specified-waste fuels include biogas, bio-oil, digester gas, landfill gas, municipal waste, pulp and paper waste, and wood waste.

Class 43.2, introduced in 2005, is currently available for assets acquired on/after February 23, 2005, and before 2020. For assets acquired before February 23, 2005, accelerated CCA is provided under Class 43.1 (30%). The eligibility criteria for these classes are generally the same, except that cogeneration systems that use fossil fuels must meet a higher efficiency standard for Class 43.2 than that for Class 43.1. The systems that only meet the lower efficiency standard of Class 43.1 continue to be eligible for Class 43.1.

Budget 2011 expanded Class 43.2 to include equipment that is used by the taxpayer (or by a lessee of the taxpayer) in order to generate electrical energy in a process in which all (or substantially all) of the energy input is from thermal waste.

**e) Financial resources and budget allocation**

No information is available.

**f) Expected results**

Improvements to energy efficiency in the industrial sector.

**2.4.2. Low-Interest Loans****a) Level**

Sub-federal (provinces/territories).

**b) Purpose**

To support energy efficiency investment.

**c) Applicable sectors**

Industrial (including agriculture), transport, residential, commercial, power, and public sectors.

**d) Outline**

Examples include Manitoba's PowerSmart Residential Loan program. For more information, see [http://www.hydro.mb.ca/your\\_home/residential\\_loans.html](http://www.hydro.mb.ca/your_home/residential_loans.html).

**e) Expected results**

Improved energy efficiency in the residential sector.

**2.4.3. Subsidies and Budgetary Measures**

ecoENERGY Retrofit ó Homes

**a) Level**

Federal and sub-federal (provincial/territorial).

**b) Purpose**

In July 2011, the Government of Canada announced a one-year extension of CDN 400 million (approximately USD 360 million) to the ecoENERGY Retrofit ó Homes program, which provides financial support to homeowners to help them implement energy-saving retrofits that result in more comfortable living spaces and a cleaner environment. Many of Canada's provinces and territories have complementary incentive programs.

**c) Applicable sectors**

Residential.

**d) Outline**

For more information, see <http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/retrofithomes-renovationmaisons-eng.cfm>.

**e) Financial resources and budget allocation**

CDN 400 million (approximately USD 360 million), in addition to provincial/territorial funds.

**f) Expected results**

Homeowners that participate in the ecoENERGY Retrofit ó Homes program reduced their energy consumption by an average of 20%. The ecoENERGY Retrofit ó Homes program was successful in meeting its economic and environmental goals. The program ran from 2007 to 2012, during which 640,000 Canadian homeowners benefited from more than CND 934 million (approximately USD 840 million) in program spending.

**2.4.4. Other Incentives**

Provinces and territories offer various incentives in their respective jurisdictions.

**a) Level**

Sub-federal level (provinces and territories).

**b) Applicable sectors**

All sectors of the economy.

**c) Outline**

A wide range of program incentives are offered by federal, provincial, and territorial governments and utilities. For more information on provincial/territorial incentives, consult the OEE Directory of Energy Efficiency and Alternative Energy Programs in Canada at [http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/policy\\_e/programs.cfm](http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/policy_e/programs.cfm).

**d) Expected results**

Increase in energy efficiency and reduction in greenhouse gas emissions.

**2.5. Energy Pricing**

Market-based.

**2.6. Other Efforts for Energy Efficiency Improvements**

### **2.6.1. Cooperation with Non-Government Organizations**

The OEE programs cooperate with numerous interested partners, including non-governmental organizations.

### **2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes**

Canada continues to work with the United States and Mexico to promote the harmonization of energy efficiency test methods, mutual recognition of conformity assessment systems for energy efficiency standards, and cooperation on trilateral energy efficiency labeling programs. Energy efficiency collaboration is also an element of the bilateral Canada-U.S. Clean Energy Dialog as well as the multilateral Clean Energy Ministerial process.

Canada is a member of the International Energy Agency, supporting its activities and participating in its Energy Efficiency Working Party. Canada is also a member of the International Partnership for Energy Efficiency Cooperation.

### **2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements**

Public-private partnerships are commonly used to support a wide range of energy efficiency investments, especially in the public sector. The Federal Buildings Initiative (FBI), operated through Natural Resources Canada's Office of Energy Efficiency, facilitates access to tools and services to undertake energy efficiency retrofit projects in buildings owned or managed by the Government of Canada. More specifically, the FBI helps federal organizations enter into third-party performance contracts that allow major retrofits to be self-financing, thus addressing barriers such as the lack of capital and resources when undertaking such projects. Using the FBI approach removes much of the risk of implementing a retrofit project. The program also coordinates a community of practice among federal government property managers, and provides information on other related building energy matters such as efficient operations, commissioning, etc.

Section 2.2.1 (above) discusses collaboration on equipment standards. However, the Office of Energy Efficiency has also cooperated with the Canadian Standards Association on the development of whole-building standards such as Building Commissioning and the Operation and Maintenance of Health Care Facilities.

Partnerships are also extensively used during the technology development and demonstration process such as through Canadian Mortgage and Housing Corporation (CMHC) initiatives. Regular cooperation occurs through the partnerships and demonstration projects between the CMHC and financial institutions.

# CHILE

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

Chile aims to foster the efficient use of energy and achieve a 20% savings goal by the year 2025 compared to business-as-usual (BAU).

### 1.2. Sectorial Energy Efficiency Improvement Goals

No sector targets are specified.

### 1.3. Action Plans for Promoting Energy Efficiency

In 2014, the Chilean Government, through its Ministry of Energy, released its National Energy Agenda to guide the economy's long-term energy policy. The key goals of the agenda include the following:

- Reduce the electricity marginal cost by 30% in the Central Interconnected Grid (SIC).
- Reduce the prices of the electricity supply bids by 25%.
- Lift existing barriers for nonconventional renewable energy sources to increase the participation of renewable energy to 45% of the new electricity generation capacity by 2025.
- Set up a fuel price stabilization system to reduce the volatility of internal fuel prices.
- Turn ENAP (National Oil Company) into a main actor in the energy challenges of the member economy government.
- Develop, by 2015, a long-term energy policy that will be validated by the Chilean citizens.

#### 1.3.1 Energy Efficiency Monitoring and Reporting

The Division of Energy Efficiency and the Agencia Chilena de Eficiencia Energética (AChEE) have established a division specializing in measurement and verification. It seeks to implement methodologies in order to produce reports at both the macro and project levels.

At the macro level, energy statistics are prepared by the Prospective and Energy Policy Division of the Ministry of Energy, while economic data (e.g., national accounts and production) are reported by both the Central Bank of Chile and by the National Institute of Statistics. In addition, Chile is participating in a project to build a database of energy efficiency indicators in the Mercosur countries and partners, with the assistance of the Economic Commission for Latin America and the Caribbean (ECLAC).

At the project level, the results will be measured on the basis of international methodologies (e.g., Protocol CMVP) or by third parties (e.g., universities and consultants) to support the savings achieved by each project.

### 1.4. Institutional Structure

The Ministry of Energy is the institution responsible for developing public policies in energy efficiency. It centralizes the functions to develop, propose, and evaluate actions in this area. The Energy Efficiency Division of the Ministry is responsible for defining and promoting the following: objectives and goals in energy efficiency, the regulatory framework that promotes energy efficiency, and long-term strategies.

In Chile, a number of government institutions are involved in working toward increasing energy efficiency, one of the most important of which is AChEE. The goal of this institution is to promote, strengthen, and consolidate the efficient use of energy by bringing together relevant stakeholders (domestic and international) and implementing public-private initiatives

in energy sectors. AChEE is also in charge of implementing energy efficiency programs according to the policies developed by the ministry.

Other important actors include Superintendencia de Electricidad y Combustibles (Superintendency of Electricity and Fuels (SEC), the Ministry of Housing, and the Ministry of Transport and Communications.

#### 1.4.1 Central Institutional Structure

##### a) Name of organization

Ministry of Energy - Energy Efficiency Division

##### b) Status of organization

Design, proposal, implementation, and evaluation of public policies and projects in energy efficiency

##### c) Roles and responsibilities

Development of energy efficiency policies, plans, lines of action, and standards.

##### d) Covered sectors

Industrial and mining, transport, building, firewood, appliances, and education.

##### e) Date of establishment

2010.

##### f) Number of staff members

The Ministry of Energy includes approximately 150 staff members, while The Energy Efficiency Division has 20 professionals, not including those working in regional offices.

##### g) Description of the Ministry of Energy

The Ministry of Energy is the highest-level government body through which the President of the Republic collaborates in the government and administrative functions of the energy sector.

The overall objective of the Ministry of Energy is to develop and coordinate plans, policies, and standards for the proper functioning and development of the sector. In addition, it ensures compliance and advises the government on all matters related to energy.

The energy sector includes all activities of study, exploration, generation, transmission, transport, storage, distribution, consumption, efficient use, imports and exports, and other aspects related to electricity, such as coal, gas, oil and oil products, nuclear energy, and geothermal, solar, and other energy sources.

#### 1.4.2 Implementing Institution Structure

##### a) Name of organization

Chilean Energy Efficiency Agency (Agencia Chilena de Eficiencia Energética (AChEE))

##### b) Status of organization

Implementation of specific programs and projects that drive efficiency in energy consumption.

##### c) Roles and responsibilities

AChEE's role is to study, evaluate, promote, implement, and disseminate information on diverse initiatives related to energy diversification, conservation, and efficiency.

##### d) Covered sectors

Building, industrial and mining, transport, education and training, measurement and verification, and business development.

**e) Date of establishment**

2010.

**f) Number of staff members**

AChEE includes approximately 30 staff members, with more involved through various projects.

**g) Description of AChEE**

AChEE is a public-private, non-profit foundation whose mission is to promote, strengthen, and consolidate the efficient use of energy by bringing together public and private stakeholders (domestic and international) and implementing initiatives in various sectors of energy, thus contributing to the economy's sustainable development. AChEE includes a board comprising representatives of the Ministry of Energy, the Ministry of Finance, and the Confederation of Production and Trade

**1.4.3 Regional or Local Institutional Structure****a) Name of organization**

Ministerial Regional Secretaries of Energy (SEREMIS)

**b) Status of organization**

SEREMIS leads the implementation of energy efficiency strategies in different regions of the economy.

**c) Roles and responsibilities**

Disseminate and promote the efficient use of energy at the local level.

**d) Covered sectors**

Industrial and mining, transport, building, firewood, appliances, and education.

**e) Starting date**

2010.

**f) Number of staff members**

There are six regional ministry representatives (SEREMI) covering the entire economy.

**1.4.4 Information Dissemination, Awareness Raising, and Capacity Building****a) Information collection and dissemination**

Chile includes a product labeling program that leverages the comparative European labeling scheme, which breaks down all similar models of a product into one of seven efficiency categories: A (most efficient) through G (least efficient). This labeling is currently applied to the following: incandescent bulbs (2007), compact fluorescent lamps (2007), refrigerators (2008), refrigerator-freezers (2008), freezers (2008), microwaves (2010), TVs (2012), TV set-top boxes (2012), stereos (2012), DVD players (2012), Blu-ray players (2012), electric motors up to 10 hp (2011), air conditioners (2011), and fluorescent tubes (2011).

Appliances that are in the process of label measurement and verification include washing machines (public consultation on November 2015), dishwashers, and clothes dryers. Appliances that have a label standard include gas water heaters, gas stoves, halogen lamps, standby power consumption home theaters, and standby consumption printers and TV sets.

Other products that are covered with energy efficiency protocols but are without labels include sodium lamps, high- and low-pressure products (2012), ballasts for sodium lamps (high- and low-pressure), ballasts for high-pressure mercury lamps and/or metal halides (2012), and LED technology devices for lighting fixtures (2013).

The Ministry of Energy is working with the Ministry of Housing and Urbanism in volunteer housing labeling.

Another initiative is the compulsory new car labeling scheme, which began in February 2013, and only applies to the first sale of light passenger vehicles (up to 2,700 kg) homologated from 2008, except for those primarily used for freight, such as large trucks and vans.

### **b) Awareness Raising**

During 2014 and 2015, the economy wide campaign titled, "When you use energy well, you win and we all win" (*Cuando usas bien la energía ganas tú y ganamos todos*), focused on energy efficiency and was aimed at residential users through television, billboards, and newspapers.

In 2013, the 3rd Energy Efficiency Expo was held to exchange experiences and learn more about this topic. It featured five international speakers and included approximately 80 stands from 60 participating companies. More than 9,000 visitors attended the event.

### **c) Capacity Building**

There are numerous opportunities for energy efficiency training for professionals, including courses offered at approximately 20 universities along with two engineering associations that offer subgroups focused on energy.

AChEE continues to offer three professional certifications: 1) Certified Retscreen User (CRU), 2) Certified Measurement and Verification Professional (CMVP), and 3) Certified Energy Manager (CEM). The first certified "European Energy Manager" was also established by the German-Chilean Chamber of Commerce and Industry. Moreover, to complement the study of energy efficiency, AChEE has incorporated introductory courses on measurement and verification as well as a course for the certification of energy managers.

## **1.5. Research and Development in Energy Efficiency and Conservation**

The Energy Efficiency Division has conducted a series of studies to evaluate the potential savings and benefits of energy efficiency. Research highlights include the following:

- Study regarding the basis of an Action Plan for Energy Efficiency.
- Study of energy end-uses in the residential sector.
- Study of energy end-uses in hospitals.
- Study of energy end-uses in the industrial and mining sectors.
- Study of energy end-uses in schools.

The government is currently developing policies on energy efficiency research, development, and demonstration.

Although research is mostly performed in universities, there are energy efficiency research projects and programs in the government.

## **2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS**

### **2.1. Government Laws, Decrees, and Acts**

In 2014, the Chilean Government published its Energy Agenda 2014. According to the agenda, the action lines and goals can be summarized as follows:

- Energy Efficiency as a State Policy: Energy Efficiency Law.
- Introduce measures to spread the development of energy-efficient projects .
  - a. Implement the Energy Efficiency Action Plan until year 2020.

- b. Include, in the 12 months following the launch of the agenda, the definition of 'efficient cogeneration' to the relevant regulations.
  - c. Develop a new Energy Efficiency labeling scheme during 2014 and 2015.
- Housing and construction
  - a. Subsidize the thermal conditioning of existing dwellings.
  - b. Promote energy-efficient public buildings and dwellings.
- Support energy management in municipalities with an emphasis on street lighting.
  - a. Replace 200,000 street lights by 2018, while placing special emphasis on those using more inefficient technologies.
  - b. Develop a new street lighting regulation.
  - c. Support municipalities in energy management plans and provide advice on the most convenient tariff options.
- Mass campaigns and educational programs in energy efficiency (EE)
  - a. Conduct an EE campaign that emphasizes the benefits of EE both for families and society as a whole by June 2014.
  - b. Continue mass awareness and education campaigns about the good use of energy in subsequent years.
  - c. The Ministry of Energy will increase the coverage regarding the implementation of an educational energy efficiency program.
  - d. Action plan.

**a) Name**

Energy Agenda 2014

**b) Purpose**

Reduce the economy's energy consumption by 20% by the year 2025 (in terms of the expected consumption without the energy efficiency measures included in the agenda).

**c) Applicable sectors**

Industrial and mining, transport, building, firewood, appliances, and education.

**d) Outline**

Industrial and Mining

- Promotion of the implementation of energy management systems.
- Promotion of cogeneration (CHP).
- Promotion of technical assistance to projects.
- Incorporation of efficient technologies.

Transport

- Improve energy efficiency of light and medium vehicles.
- Improve operating efficiency of fleet passenger vehicles.
- Promote the introduction of more efficient technologies in heavy vehicles.
- Improve the efficiency of the existing fleet of heavy vehicles.
- Promote energy efficiency throughout the supply chain of heavy vehicles.
- Promote the shift to more efficient transport.
- Initiate electric mobility.

Buildings

- Improve the quality of building envelopes and equipment.
- Promote efficient energy management of buildings.
- Promote the design of buildings with high energy efficiency standards.
- Promote the supply of construction products and services with efficiency standards.

- Promote energy efficiency in street lighting for vehicular and pedestrian areas, especially in urban locations.

#### Firewood

- Improve the knowledge regarding firewood and its processes.
- Improve and update firewood burning appliances.
- Improve the quality standard of firewood.
- Increase the efficiency of residential firewood consumption.
- Develop a firewood energy market.

#### Appliances

- Expand energy efficiency labeling.
- Set minimum energy performance standards (MEPS).
- Develop a program of efficient residential lighting.

#### Cross Sector

- Develop an Energy Efficiency Seal.
- Creation of the Interministerial Committee on Energy Efficiency (CIEE).
- Raise awareness and promote energy efficiency.
- Recognition of job skills related to energy efficiency.
- Promote the integration of energy efficiency in education.
- Promote I + D in energy efficiency.
- Incorporation and promotion of smart grids.
- Promote measurement and verification (M&V) in the implementation of energy efficiency programs.

#### e) Financial resources and budget allocation

Budget for 2015: USD 24 million.

#### f) Expected results

By 2025, reduce projected energy consumption by 20% (in terms of the expected consumption without the energy efficiency measures included in the Energy Agenda 2014).

## 2.2. Regulatory Measures

### 2.2.1. Interministerial Committee on Energy Efficiency (CIEE)

The government believes that the state must be one of the main drivers of energy efficiency and it must set an example for the rest of society. For this reason, it established the CIEE to coordinate energy efficiency policies within the government, thus integrating this element into sectorial policies. The committee reports directly to the President and it was created by Supreme Decree No. 74.

#### 2.2.2. Mandatory Labeling

See Section 1.4.4 (a)

#### 2.2.3. Minimum Energy Performance Standards

The first MEPS regulation was established in 2012 and the first product class targeted was Non-Directional Lamps for General Lighting in 2013. In 2014, MEPS for residential use refrigerators were released.

#### 2.2.4. Minimum Thermal Standards

##### a) Name

Minimum Thermal Standard for Residential Buildings

##### b) Purpose

To improve the thermal efficiency of residential building envelopes.

**c) Applicable sectors**

Construction.

**d) Outline**

In 2000, the Ministry of Housing and Urbanism introduced a Minimum Thermal Standard for Residential Buildings, thus establishing minimum transmittance and thermal resistance requirements. In January 2007, this was superseded by the Building Envelope Regulation, which included requirements for the entire building envelope including the roof, walls, ventilated floors, and windows.

**e) Financial resources and budget allocation**

No information is available.

**f) Expected results**

No information is available.

**g) Other regulatory measures**

No information is available.

**2.3. Voluntary Measures**

**a) Name**

Ministry of Energy, Codelco, and Mining Council Agreement on Energy Efficiency

**b) Level**

Large mining industry.

**c) Purpose**

Promoting energy efficiency in the industry through the following initiatives: promotion of energy efficiency research; dissemination of results resulting from energy efficiency projects in the mining sector; evaluation of energy efficiency pilot projects; technology development and innovation in the mining sector; and fostering an energy efficiency culture within mining companies that are members of the roundtable.

**d) Applicable Sectors**

Mining.

**e) Outline**

Started in 2014.

**f) Financial resources and budget allocation**

No information is available.

**g) Expected results**

Energy efficiency audits on large mining companies related to operational and maintenance improvements as well as equipment replacement and instruction of new technologies. The results of the audits are expected for October 2015.

**h) Description**

The mining industry will subject itself to independent energy audits that will allow for the identification of greater energy efficiency related to operational and maintenance improvements as well as equipment replacement and instruction of new technologies.

**i) Other voluntary measures**

Based on the results of these audits, energy efficiency plans will be prepared and implemented in the short, medium and long term after which the progress will be publically reported.

## 2.4. Other Measures

### a) Name

Thermal Retrofitting Subsidy under the Ministry of Housing and Urban Development

### b) Level

For regions from the center to the south (Region of O'Higgins to the Region of Magallanes).

### c) Purpose

Fund projects to improve the building envelopes of residences built before the thermal regulation came to effect. The improvements should at least meet the minimum standards required by the current Minimum Thermal Standards regulation.

### d) Applicable Sectors

Residences constructed before the date when the second phase of the thermal regulations came into force in 2007, and those that meet the requirements for the Ministry of Housing and Urban Planning's Family Property Protection Program.

### e) Outline

Started in 2009.

### f) Financial resources and budget allocation

Since 2009, the Ministry of Energy has allocated funds totaling USD 73 million for 15,500 beneficiaries. Since 2011, the Ministry of Housing and Urban Planning has incorporated this program in its budget, thus allocating USD 40 million per year.

### g) Expected results

Grant 8,000 subsidies per year.

## 2.5. Financial Measures Taken by the Government

### 2.5.1. Tax Scheme

Chile does not provide any tax scheme for energy efficiency improvements.

### 2.5.2. Other Incentives

Information is not available.

## 2.6. Energy Pricing

The government has a regulated a pricing mechanism for small clients. The price of electricity for regulated consumers is set by the regulator (National Energy Commission/Comisión Nacional de Energía), calculated based on the long-term nodal price, and based on the prices of distributor's energy auctions.

## 2.7. Other Efforts for Energy Efficiency Improvements

### 2.7.1. Cooperation with Non-Government Organizations

The Ministry of Energy works with several non-government organizations and international organizations in energy efficiency projects including the following: the United Nations Development Programme (UNDP) with the public lighting replacement program; and the United Nations Environment Programme (UNEP) with the "Enlighten" initiative to develop a strategy for transitioning to efficient lighting.

### 2.7.2. Cooperation through Bilateral, Regional, and Multilateral Schemes

Chile participates in COPANT<sup>2</sup> for the harmonization of energy efficiency standards. It is also involved in the design discussions of the ISO 50 001 standard.

Chile is actively participating in the Energy Working Group (EWG) of the Asia Pacific Economic Cooperation (APEC). On the regional level, Chile participates in MERCOSUR's efforts to promote energy efficiency in the region, and collaborates with ECLAC in this area.

### 2.7.3. Other Cooperation/Efforts for Energy Efficiency Improvements

#### 2.7.3.1. Cooperation Agreements

Chile has several non-binding cooperation agreements that involve energy efficiency with institutions from different economies, including New Zealand, Korea and the U.S. state of Massachusetts, among others.

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<sup>2</sup> Pan American Standards Commission ó COPANT.

# CHINA

Energy is a major strategic issue for China, especially as the economy moves toward its goals of modernization and common prosperity for its people. Since China adopted the policy of reform in the late 1970s, its energy industry has made significant advances. However, China is in the ongoing process of industrialization and urbanization, which brings high economic growth accompanied by high-energy consumption.

To alleviate the unsustainable demand for energy consumption, China's State Council issued The 12<sup>th</sup> Five-Year Development Plan for the Energy Saving and Environmental Protection Industry (Guofa [2012] No. 19). According to this plan, the energy intensity (TCE/GDP) of China will be reduced by approximately 16% in 2015 compared to 2010. Furthermore, it is anticipated that the annual growth rate of output for the energy saving and environmental protection industry will remain at 15% or above until 2015. By then, the output value is expected to reach RMB 4.5 trillion (approximately USD 730 billion).

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In the outline of the 12<sup>th</sup> Five-Year Plan (2011–2015) for National Economic and Social Development, the State Council stipulated that non-fossil energy will increase to 11.4% of total primary energy consumption by 2015, energy consumption per unit of GDP will drop by 16% from 2010, and CO<sub>2</sub> emissions per unit of GDP will decrease by 17% from 2010.

### 1.2. Local Energy Efficiency Improvement Goals

The most important feature of China's strategy to improve energy intensity is the creation of a chain of responsibility that reaches from the economy-wide target down to the target that must be achieved at the local level. The domestic energy intensity target is 16%, while each province (along with municipalities and autonomous regions) has a specific overall target. The provincial goals of reduction in local energy consumption per unit of GDP by 2015 (from the 2011 level) are as follows:

**Table 1: Provincial energy efficiency improvement goals of the 12<sup>th</sup> Five-Year Plan (2011–2015) of China**

|               |                |          |           |        |              |           |          |
|---------------|----------------|----------|-----------|--------|--------------|-----------|----------|
| Province/City | Anhui          | Beijing  | Chongqing | Fujian | Gansu        | Guangdong | Guanxi   |
| Goal          | 16%            | 17%      | 16%       | 16%    | 15%          | 18%       | 15%      |
| Province/City | Guizhou        | Hainan   | Hebei     | Henan  | Heilongjiang | Hubei     | Hunan    |
| Goal          | 15%            | 10%      | 17%       | 16%    | 16%          | 16%       | 16%      |
| Province/City | Inner Mongolia | Jiangsu  | Jiangxi   | Jilin  | Liaoning     | Ningxia   | Qinghai  |
| Goal          | 15%            | 18%      | 16%       | 16%    | 17%          | 15%       | 10%      |
| Province/City | Shaanxi        | Shandong | Shanghai  | Shanxi | Sichuan      | Tianjin   | Xinjiang |
| Goal          | 16%            | 17%      | 18%       | 16%    | 16%          | 18%       | 10%      |
| Province/City | Xizang         | Yunnan   | Zhejiang  |        |              |           |          |
| Goal          | 10%            | 15%      | 18%       |        |              |           |          |

Source: State Council document, 2011, No. 26

### 1.3. Sectoral Energy Efficiency Improvement Goals

Sectoral targets have been allocated with specific units for different industries to be achieved by 2015 (see Table 1), thus leading to the overall industrial energy intensity target of a 21% decrease compared to 2010.

**Table 1: Sectoral energy intensity (efficiency) targets in the 12<sup>th</sup> Five-Year Plan**

| Index  | Work unit                        | 2010  | 2015  | Variation/rate of change |
|--|----------------------------------|-------|-------|--------------------------|
| Industrial   |                                  |       |       |                          |
| Industrial energy consumption per unit area  | %                                |       |       | [-21%]                   |
| Power-supply coal consumption  | Grams of SC <sup>1</sup> per kWh | 333   | 325   | -8                       |
| Power plant auxiliary-power consumption rate   | %                                | 6.33  | 6.2   | -0.13                    |
| Comprehensive line loss rate   | %                                | 6.53  | 6.3   | -0.23                    |
| Comprehensive energy consumption   | Kg of SC per ton                 | 605   | 580   | -25                      |
| Aluminum-integrated AC power consumption   | KWh per tonne                    | 14013 | 13300 | -713                     |
| Copper smelting energy consumption   | Kg of SC per ton                 | 350   | 300   | -50                      |
| Crude oil processing energy consumption  | Kg of SC per ton                 | 99    | 86    | -13                      |
| Ethylene production energy consumption   | Kg of SC per ton                 | 886   | 857   | -29                      |
| Ammonia production energy consumption  | Kg of SC per ton                 | 1402  | 1350  | -52                      |
| Caustic soda (ion-exchange membrane) energy consumption                              | Kg of SC per tonne               | 351   | 330   | -21                      |
| Cement clinker energy consumption  | Kg of SC per tonne               | 115   | 112   | -3                       |
| Energy consumption per glass   | Weight kg SC per box             | 17    | 15    | -2                       |
| Paper and paperboard energy consumption  | Kg of SC per ton                 | 680   | 530   | -150                     |
| Pulp energy consumption  | Kg of SC per ton                 | 450   | 370   | -80                      |
| Ceramics energy consumption  | Kg of SC per ton                 | 1190  | 1110  | -80                      |
| Building   |                                  |       |       |                          |
| Renovation of existing residential buildings in heating areas in the northern region | Million square meters            | 1.8   | 5.8   | 4                        |
| Town new green building standard rate  | %                                | 1     | 15    | 14                       |
| Traffic and transport  |                                  |       |       |                          |
| Railway transport comprehensive energy consumption per workload                      | Ton of SC per million ton/km     | 5.01  | 4.76  | [-5%]                    |
| Energy consumption of commercial vehicles unit of transport turnover                 | Kg of SC per hundred ton/km      | 7.9   | 7.5   | [-5%]                    |
| Ships in energy consumption per unit volume of transport                             | Kg of SC thousand ton/km         | 6.99  | 6.29  | [-10%]                   |
| Energy consumption of aviation transport turnover                                    | Kg of SC /KMS                    | 0.450 | 0.428 | [-5%]                    |
| Public institutions  |                                  |       |       |                          |
| Public energy consumption per unit area  | Kg of SC per square meter        | 23.9  | 21    | [-12%]                   |
| Public institutions energy consumption   | Kg of SC per person              | 447.4 | 380   | [15%]                    |
| Terminal equipment energy efficiency   |                                  |       |       |                          |
| Coal-fired industrial boilers (run)  | %                                | 65    | 70~75 | 5~10                     |
| Three-phase asynchronous Motors  | %                                | 90    | 92~94 | 2~4                      |

|   |                             |                            |                                       |                    |
|---|-----------------------------|----------------------------|---------------------------------------|--------------------|
| (design)  |                             |                            |                                       |                    |
| Positive-displacement air compressors input power | KW/(m · min <sup>-1</sup> ) | 10.7                       | 8.5~9.3                               | -1.4~-2.2          |
| Power transformer losses                          | KW                          | Idling: 43<br>Payload: 170 | No load:<br>30~33<br>Load:<br>151~153 | -10~-13<br>-17~-19 |
| Passenger motor vehicle average fuel consumption  | Litres per km               | 8                          | 6.9                                   | -1.1               |
| Room air conditioners                             | Energy efficiency rating    | 3.3                        | 3.5~4.5                               | 0.2~1.2            |
| Refrigerators (energy efficiency index)           | %                           | 49                         | 40~46                                 | -3~-9              |
| Residential gas water heater (efficiency)         | %                           | 87~90                      | 93~97                                 | 3~10               |

1. Standard coal.

#### 1.4. Action Plans for Promoting Energy Efficiency

A comprehensive plan for energy conservation and emission reduction was issued in September 2011 to promote energy efficiency in China during the 12<sup>th</sup> Five-Year-Plan period.

##### a) Objectives

This plan requires reducing energy intensity by 16% in 2015 (compared to 2010), by decreasing the energy consumption to 0.869 tons of standard coal (based on prices in 2005) per RMB 10,000 (approximately USD 1,600) of GDP, thus saving 670 million tce in the 12<sup>th</sup> Five-Year-Plan period.

##### b) Applicable sectors

It outlines the direction and major tasks for seven strategically important emerging industries, including environmental protection, information technology, biochemical, high-end equipment manufacturing, new energy, new material, and new-energy automobiles. It also sets major tasks for key industries and lists eight substantial measures to improve the import and export of electromechanical and high-tech products.

##### c) Outline

The plan helps to promote the strategic restructuring of the economy, push forward the optimization of the industrial structure, and strengthen all aspects of energy utilization management in industrial, building, transport, and public organizations as well as in the fields of urban and rural construction and consumption.

##### d) Financial resources and budget allocation

The central government arranges energy conservation funds and lends the finances to the provincial and local municipal governments in order to improve their energy conservation investment, thus forming a mechanism of investment with an ongoing effect.

##### e) Method for monitoring and measuring the effects of action plans

China has established an energy conservation and emission reduction leadership group and assigned energy conservation goals to local governments and major enterprises. Their performance assessments are based on the Energy Conservation and Emission Reduction Statistics and Monitor Evaluation System and Method. Local governments are commended and rewarded if they meet their requirements. However, if the requirements are not met, then a wide range of sanctions may occur, including the following:

- Barred from participation in the annual awards or receiving an honorary title.
- New high energy-consuming projects in these regions cannot be approved.

- Provincial leaders must submit a written report to the State Council and indicate a deadline for correction measures.

Statistics departments at all government levels are required to develop a strong energy statistics system in order to report on local government performance. For the industry, high energy-consuming projects must contract energy managers and provide annual reports on energy efficiency and conservation activities.

A comprehensive evaluation of target realization for provincial governments is carried out every year by the central government, which is helpful for understanding the local energy conservation situation, identifying problems, and promoting energy conservation efforts.

#### f) Expected results

The expected results include increasing energy conservation efforts based on laws and regulations and introducing administrative measures, economic incentives, capacity-building activities, etc. This is expected to promote the realization of energy conservation goals.

#### g) Future tasks

China will most likely introduce a further energy-demand reduction goal in the next Five-Year Plan, to be achieved by 2020 (compared to 2015).

### 1.5. Institutional Structure

The Chinese National People's Congress (NPC), the highest organization of state power in China, produces a Five-Year Plan to guide economic policies in five-year increments. The current Five-Year Plan includes a 16% energy intensity reduction target, which now underlies China's drive for energy efficiency and conservation.

The drafting and implementation of the plan is tasked to the State Council, the administrative organization of the government. In terms of energy efficiency, China's government established the National Leading Group for Climate Change and Energy Conservation and Emission Reduction (NLGCCECER) to coordinate all of the energy conservation activities in China.

The National Development and Reform Commission (NDRC) undertakes the daily work of the NLGCCECER and plays a crucial role in the design and execution of policies on energy efficiency and conservation. The Resource Conservation and Environmental Protection Department of the NDRC is responsible for day-to-day efforts in energy efficiency. In addition, energy saving and emission reduction are still crucial tasks of other departments in the Chinese Government.

#### a) Names, roles of ministries/administrations

| Name of organisation                             | Roles of organization  |
|--|--|
| National Development and Reform Commission       | Overall work and coordination  |
| Ministry of Industry and Information Technology  | Energy conservation and efficiency in the industrial and information sectors |
| Ministry of Transport                            | Energy conservation and efficiency in the transport system                   |
| Ministry of Housing and Urban Rural Construction | Energy conservation and efficiency in building                               |
| National Government Offices Administration       | Energy conservation and efficiency in public institutes                      |
| The Ministry of Agriculture                      | Energy conservation and efficiency in the agriculture sector                 |
| The National Energy Bureau                       | Energy conservation and efficiency in energy supply systems                  |
| Ministry of Finance                              | Finance and tax measures related to energy                                   |

|  |   |
|--|---|
|  | conservation and efficiency   |
| Ministry of Science and Technology   | R&D of energy conservation and efficiency technology  |
| Administration of Quality Supervision, Inspection and Quarantine (Standardization Administration of China, Certification and Accreditation Administration) | Energy efficiency standards, labels, certifications, accreditation, and monitoring, verification, and enforcement |
| National Bureau of Statistics of the People's Republic of China  | Energy statistics   |

#### b) Status of organization

Policymaker and supervisor.

#### c) Number of staff members

Currently, there are approximately 15 staff members in the key agency of the department above who are directly in charge of energy conservation and emission reduction projects. There are significantly more staff members once all of the departments and the regional governments are included.

### 1.6. Information Dissemination, Awareness-Raising, and Capacity-Building

#### a) Information collection and dissemination

The National Energy Conservation Center was established in 2009 as a dependent and authoritative non-profit organization, replacing the Energy Conservation Information Dissemination Center. The center makes use of market mechanisms to bring China's energy conservation information and dissemination in line with international practices. A number of dissemination activities were adopted, including meetings, media, exhibitions, and websites. In addition, there are more than 20 journals related to the energy conservation field in China.

#### b) Awareness raising

China has organized economy-wide actions for energy conservation and emission reduction through 17 government departments covering nine special actions. China's government also runs its "Energy Conservation Awareness Week" once a year, promotes its "Energy Conservation and Emission Reduction: Actions by All People" campaign through CCTV, and conducts other awareness activities to enhance public consciousness about energy conservation and environmental issues. Presently, energy conservation and emission reduction are common topics discussed in the public domain.

#### c) Capacity building

The government of China organizes energy management training in major energy-consuming enterprises, such as energy auditing, energy planning, energy measurement and statistics, etc. Energy consumption statistics and indicators are more accurate than ever, and enterprises are improving their energy consumption measuring devices. All of these efforts have made the foundation of energy conservation more solid.

### 1.7. Research and Development in Energy Efficiency and Conservation

The Ministry of Science and Technology is in charge of promoting energy efficiency research and development and demonstrations (RD&D). Programs that encourage RD&D in energy efficiency have been established, including the State Key Basic Research Program, the National Science and Technology Support Program, and the High-Tech Development Projects. There are a number of major energy conservation technology and emission reduction projects underway. During the 12<sup>th</sup> Five-Year-Plan period, the government has arranged more than USD 10 billion to support hundreds of research projects in energy efficiency, new energy, recycling, clean production, pollution control, and climate change.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1. Government Laws, Decrees, and Acts

### a) Name

Energy Conservation Law of the People's Republic of China

### b) Purpose

The law was designed to promote overall social energy conservation, and improve energy efficiency and environmental protection. It also mandates the comprehensive and sustainable development of the economic society.

### c) Applicable sectors

The law applies to all sectors, including industrial, transport, residential, commercial, power, government, etc.

### d) Outline

The Energy Conservation Law of the People's Republic of China, enacted in 1997, includes the following objectives:

- Promote energy conservation.
- Improve energy efficiency and productivity.
- Bolster economic performance.
- Protect the environment.
- Strengthen domestic socio-economic development.
- Satisfy the requirements of people's livelihood.

The law aims to achieve this by improving the basic system of energy conservation and establishing requirements for energy conservation management. It also aims to combine market and government strengths by using market mechanisms, while strengthening government regulation. In addition, it uses economic instruments, such as taxation, pricing, credit, and government procurement policies, to encourage and guide energy conservation. The Energy Conservation Law was revised on April 1, 2008. The 2008 Energy Conservation Law defined energy conservation as a "long-term strategy" for China, and it provided a list of major energy consuming industries, gave clearer guidelines on energy conservation in construction, and introduced transport and public energy conservation measures.

## 2.2. Regulatory Measures

The Interim Measures for the Assessment and Examination of Energy Efficiency of Fixed-Assets Investment Projects, published by the NDRC in order to enhance energy efficiency management on fixed-asset investment projects, promote the scientific and rational use of energies, curb energy waste at the source, and improve energy use efficiency. This regulation applies to any fixed-asset investment projects that are constructed within China, and mainly focuses on energy efficiency assessments and energy efficiency document examinations.

### 2.2.1. Minimum Energy Performance Standards and Labeling

#### a) Name

Minimum Energy Performance Standards (MEPS) for High-Energy-Consuming Products

#### b) Purpose

The energy efficiency standards are the policy basis for the control of energy consumption regarding high-energy-using products.

#### c) Applicable sectors

Lighting, appliances, and equipment.

**d) Outline**

In 2012, the 100 Energy Efficiency Standards Promotion Program was initiated. By 2015, approximately 300 standards were developed or revised, including 61 MEPS.

**2.2.2. Norms of energy consumption per unit throughput****a) Name**

Norms of Energy Consumption per Unit Throughput

**b) Purpose**

The norms of energy consumption per unit throughput provide a technical basis for energy-saving assessments of new projects in order to phase-out backward production capacity and high-energy-consuming enterprises.

**c) Applicable sectors**

Industrial.

**d) Outline**

These norms specify the advanced energy efficiency values, the admittance energy efficiency values for new enterprises, and the limited energy efficiency values for existing enterprises.

There are 73 mandatory standards for the sectors of non-ferrous metals, iron and steel, chemical engineering, power, building materials, and coal mining. In addition, more norms of energy consumption per unit throughput are being developed.

**2.2.3. Building Energy Conservation****a) Name**

Energy Conservation Regulations for Civil Buildings and Building Energy Codes

**b) Purpose**

The regulations aim to strengthen the energy conservation management of civil buildings, improve energy efficiency, and reduce energy consumption in civil buildings, including residential units, offices, etc.

**c) Applicable sectors**

Residential and commercial.

**d) Outline**

On October 1, 2008, the Energy Conservation Regulations for Civil Buildings came into force. The regulations consist of six chapters and 45 terms, including general principles, new building energy efficiency, existing building energy efficiency, operation of building energy systems, and legal liability supplements.

In 2012, the Ministry of Housing and Urban-Rural Development (MOHURD) published the 12<sup>th</sup> Five-Year Building Energy Efficiency Plan. This plan required more stringent building energy codes and energy efficiency standards, promoted renewable energy and green building in construction, and suggested further improvements of the building energy efficiency standards. The plan actively promoted solar energy, shallow geothermal energy, biomass energy, and other renewable energy applications in buildings in order to highlight the importance of renewable energy construction. Currently, the energy conservation and emission reduction targets of the 12<sup>th</sup> Five-Year Plan, from a legal standpoint, were expected to be completed on time.

**2.2.4. Fuel Efficiency Standards****a) Name**

## Vehicle Fuel Economy Standards

### b) Purpose

To require passenger vehicles and light-duty cargo vehicles to meet efficiency standards, which vary according to the vehicle's weight.

### c) Applicable sectors

Transport

### d) Outline

During the 12<sup>th</sup> Five-Year Plan, the Chinese Government actively promoted the standard system and regulations construction for fuel efficiency.

Currently, more than 10 standards regarding vehicle fuel economy (mandatory and voluntary) are being implemented.

## 2.2.5. Top 10,000 Enterprises Program

### a) Name

Top 10,000 Enterprises Program

### b) Purpose

This program is an important part of China's efforts to reduce energy intensity.

### c) Applicable sectors

Industrial (including agriculture), transport, residential, commercial, power, government, etc.

### d) Outline

The Top 10,000 Enterprises Program, which is a mandatory program in the 12<sup>th</sup> Five-Year Plan period, is an expansion of the Top 1,000 Enterprises Program in the 11<sup>th</sup> Five-Year Plan. The latest version, implemented in the industrial sector, covers two-thirds of China energy consumption enterprises. Under this program, approximately 10,000 enterprises that use more than one million tons of coal equivalent (TCE) per year are required to meet energy consumption standards.

Detailed energy audits are also performed to ensure the quality of energy audits performed by enterprises or to verify actual energy savings from enterprises' implementation of energy-efficiency projects.

### e) Financial resources and budget allocation

Financial support comes from the government and private sectors.

### f) Expected results

The program could help enterprises discover problems and improve their energy efficiency.

## 2.3. Voluntary Measures

China has a number of voluntary initiatives for improving energy efficiency, such as the certification of energy-efficient products, and energy conservation basic standards.

### 2.3.1. Certification for Energy-Efficient Products

#### a) Name

Certification for Energy-Efficient Products

#### b) Purpose

The certification for energy-efficient products aims to continually aid improvements in energy efficiency and environmental protection. In addition, it assists social and economic

sustainable development in order to harmonize social values and economic benefits, and stimulate technical development in the industry, thus increasing public awareness of resource consumption and environment protection, and ultimately increasing the market share of energy-efficient products.

**c) Applicable sectors**

Industrial (including agriculture), transport, residential, commercial, power, and government.

**d) Outline**

Energy Conservation Certification is a guarantee label, which indicates that energy-consuming products have met the stipulated energy efficiency standard. The process of obtaining Energy Conservation Certification is as follows: product inspection + factory inspection + supervision after receiving the certificate.

**e) Financial resources and budget allocation**

Primarily from the private sector (enterprises).

**f) Expected results**

Promote energy conservation technology progress and competition for certification of energy-efficient products. Eventually, both consumers and companies will recognize and accept energy conservation product certification.

### 2.3.2. Energy Conservation Basic Standards

**a) Name**

Energy Conservation Basic Standards

**b) Purpose**

The energy conservation basic standards cover energy measurement, energy consumption calculation, economic operation, energy management system (EnMS), measurement and verification of energy savings (M&V), etc. In addition, such standards help establish a technological foundation for energy measurement, and unify energy consumption calculations and equipment operating efficiency.

**c) Applicable sectors**

All sectors.

**d) Outline**

Currently, there are more than 100 energy conservation basic standards issued in China.

**e) Financial resources and budget allocation**

Government and private sectors.

**f) Expected results**

Establish a technological foundation for energy measurement, and unify energy consumption calculations and equipment operating efficiency.

## 2.4. Financial Measures Taken by the Government

### 2.4.1. Tax Scheme

There are a number of preferential tax policies related to energy conservation in China, such as corporate income tax relief, capital gains tax relief, export tax rebates, refined oil tax, etc. One example is provided below.

**a) Name**

Energy-Efficient or Water-Saving Equipment Directory of Corporate Income Tax Concessions

**b) Purpose**

To reduce corporate income tax for enterprises that purchase and use energy-efficient devices and equipment, thereby guiding and encouraging the promotion of these products as well as stimulating technological innovation and energy efficiency improvement.

**c) Applicable sectors**

Industrial (including agriculture), transport, commercial, and power.

**d) Outline**

In the 12<sup>th</sup> Five-Year Plan, these financing policies are continued, with encouragement from the government to push for more research on innovative, energy-saving technology.

**e) Financial resources and budget allocation**

Government-sponsored scheme.

**f) Expected results**

Benefit the promotion of energy-efficient products, stimulate technological innovation, and improve energy efficiency.

**2.4.2. Subsidies and Budgetary Measures****2.4.2.1. Supporting Energy Saving Technological Innovation****a) Name**

Financial Rewards for Energy-Saving Technical Retrofits

**b) Purpose**

To encourage and motivate enterprises to invest in energy conservation technological transformation, promote the implementation of key energy-conservation projects, and facilitate achievement of the energy conservation goal of the 12<sup>th</sup> Five-Year Plan

**c) Applicable sectors**

Industrial (including agriculture), transport, residential, commercial, power, government, etc.

**d) Outline**

The Financial Rewards for Energy-Saving Technical Retrofits program, under the Ministry of Finance (MOF) and the National Development and Reform Commission (NDRC), rewards enterprises for energy savings achieved through technical renovation projects. The program was first initiated in 2007 and during the 11<sup>th</sup> Five-Year Plan, energy savings from qualified projects were required to more than 10,000 TCE to qualify for the financial reward. Funds for the rewards come from the central government's budget. Fiscal rewards have been increased to 240 RMB (approximately USD 40) per TCE saved in the eastern region and 300 RMB (around USD 50) per TCE saved in the middle and western regions.

**e) Financial resources and budget allocation**

Government-sponsored.

**f) Expected results**

Ensure the actual energy savings of energy-efficient technological transformation projects, improve efficiency in the use of the funds, and stimulate energy efficiency improvement.

**2.4.2.2. Benefiting the Public through Energy-Efficient Products****a) Name**

Subsidies to the Public for Energy-Efficient Products Program

**b) Purpose**

This program aims to expand domestic demand in China, especially consumer demand, and promote stable and rapid economic development. It can significantly improve the energy efficiency of end-use products, and promote energy conservation and emission reduction.

**c) Applicable sectors**

Residential and commercial.

**d) Outline**

This program refers to financial subsidies for energy-efficient products whose energy efficiency levels are Grades 1 or 2, including the following: air conditioners, refrigerators, flat-panel TVs, and washing machines. The program has been running since May 2009, and as of December 2010, the range of products has covered efficient lighting, efficient air conditioners, energy-saving cars, and high-efficiency motors. The standards for the subsidies are based on the price gap between energy-efficient products and general products. For example, after June 1 2010, the subsidy for high-efficiency air conditioners was set at CNY 200-250 per unit for Grade 1, and CNY 150-200 per unit for Grade 2. Air conditioners were the first products to be subsidized.

**e) Financial resources and budget allocation**

Government-sponsored

**f) Expected results**

Increase the market share of energy-efficient products by 10% to 20%.

### 2.4.2.3. Supporting Energy Services Companies

**a) Name**

Financial Rewards for energy Performance Contracting Projects

**b) Purpose**

To support energy performance contracting projects and promote the development of the energy service industry in applicable sectors.

**c) Outline**

In 2010, China increased its support for Energy Service Companies (ESCOs) with a number of fiscal and tax incentive policies as well as some service standardization requirements. Energy performance contracting (EPC), among other market mechanisms, is a key focus for the Chinese Government in the 12<sup>th</sup> Five-Year Plan. In April 2010, the National Development and Reform Commission (NDRC), the Ministry of Finance (MOF), the People's Bank of China, and the General Tax Bureau released the paper titled, "Opinions on the Acceleration of the Promotion of Energy Performance Contracting and Development of Energy Efficiency Service Industry." This document acknowledges the growing role of EPC and sets qualitative targets and guidelines for 2012 and 2015, with regard to the growth and maturation of the industry.

In June 2010, the MOF and the NDRC released a new fiscal reward policy for ESCOs running shared-savings projects, whereby the ESCOs make the initial investment and the savings is then shared between the ESCO and the client. In August 2010, China's National Standardization Management Committee released a national standard on EPC that became effective on January 1, 2011, thus setting the technical requirements for EPC projects and offering a template for energy performance contracts. Incentives for projects were jointly issued by the MOF and the NDRC. For example, for projects with savings of 10,000 TCE or less, approximately 70% of the investment is from ESCOs and the measures to share the energy savings are contracted. In general, a project receives rewards of no less than CNY 300 (approximately USD 50), after audited by the government.

## 2.5. Energy Pricing

The pricing mechanism for coal, crude oil, and natural gas in China has been largely market-oriented, while the electricity price is controlled by the government, according to its electricity pricing management system. Under the implementation of a fuel tax policy, the new refined oil pricing mechanism is clear, which is indirectly controlled by the international market. The government is working to provide a stronger signal for energy conservation through energy prices. The primary mechanism to drive improvements in energy efficiency in China is placing a price on electricity, such as different electricity prices, peak-valley prices, time-sharing of the prices, etc. Different electricity pricing policies are implemented to limit the industrial development of high energy-consuming, high-pollution, and outdated process equipment, i.e., to implement a normal price to encourage development of allowable enterprises and higher prices for restricted or outdated enterprises. This policy can promote industrial adjustment and stimulate energy-efficient technological transformation in energy-consuming enterprises through the price leverage.

Furthermore, price incentives have been introduced to encourage electricity production from biomass energy, wind energy, solar energy, etc. Provisional measures on urban heating price control were issued to promote payment for units of heat, rather than fixed or no-fee services, in the centralized heating system.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation through Bilateral, Regional, and Multilateral Schemes

The Chinese Government cooperates with other economies through bilateral, regional, and multilateral schemes for energy efficiency improvements, such as the United States, Japan, Korea, the European Union, etc. Currently, China has established bilateral cooperation mechanisms with 36 economies and regions, and it is involved in multilateral energy cooperation mechanisms in 22 international organizations and international conferences.

For example, in June 2008, China and the United States held the 4<sup>th</sup> Strategic Economic Dialogue in Washington, D.C., and signed the Decade Cooperation Framework Agreement in Energy and Environment. Energy efficiency is under the framework of the six priority areas of cooperation. In November 2009, during U.S. President Barack Obama's visit to China, the China National Development and Reform Commission, the U.S. Department of State, and the U.S. Department of Energy formed an agreement on the Decade Action Plan for Energy Efficiency. An important part of this plan is that both sides will jointly hold a China-U.S. Energy Efficiency Forum once a year, alternately in the two economies, in order to exchange experiences and the best practices regarding energy efficiency of buildings, communities, industries, end-use products, and the energy-saving services market. In addition, the two sides will also cooperate on the areas of building codes, labeling and rating systems, industrial energy efficiency audits and benchmarking, energy efficiency product identification and promotion, and energy efficiency technology trade and investment.

### 2.6.2. Cooperation with Non-Government Organizations

The Chinese Government cooperates with non-government organizations to stimulate energy efficiency improvements, as appropriate.

For example, the World Wide Fund, which is the first international conservation organization invited to work in China, includes four energy efficiency improvement programs: 1) Low-Carbon City Initiative in China (LCCI), which explores low-carbon development models in different cities and works to improve energy efficiency in the industrial, building, and transport sectors. It also addresses the development of renewable energy and ensures that other cities in China can learn from successful experiences and replicate them; 2) Business engagements; 3) Climate change: post-Kyoto negotiations; and 4) The 2020 Ways to 20% initiative.

### 2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvement

China has other cooperative arrangements with international organizations for energy efficiency improvement, in addition to APEC, such as the Asian Development Bank, the World Bank, etc.

For example, since 1997, the World Bank and the Global Environment Facility China Energy Conservation Project has been a significant international cooperation project. It is jointly organized and implemented by the Chinese Government (NDRC), the World Bank, and the Global Environment Facility (GEF) to focus on energy conservation and greenhouse gases emission mitigation. The project was implemented to build a model of ESCOs and an energy management contract mechanism, based on the market economy system in China. It also establishes support for technical institutions, both technically and financially.

The Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling (BRESL) project, another international cooperation venture, is sponsored by the UNDP and the GEF. China is the lead economy on the BRESL project with the Executing Agency being the NDRC. The BRESL project is aimed at rapidly accelerating the adoption and implementation of the energy standards and labels (ES&L) program in Asia, which will also facilitate harmonization of test procedures, standards, and labels among developing economies in Asia.

# HONG KONG, CHINA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

Reduction of energy intensity by 40% by 2025 (as compared to the 2005 level).

### 1.2. Sectoral Energy Efficiency Improvement Goals

No applicable sector level targets are in place.

### 1.3. Action Plans for Promoting Energy Efficiency

With the adoption of the Honolulu Declaration, the Hong Kong, China (HKC) Government continues to step up efforts in energy efficiency and conservation monitoring, as well as reporting, using an end-use energy database.<sup>3</sup> The action plan includes the following:

- To unveil the Energy Saving Plan for Hong Kong's Built Environment 2015~2025+.
- The promotion of building energy efficiency through legislation for mandatory implementation of Buildings Energy Codes.
- The implementation of the Mandatory Energy Efficiency Labeling Scheme.
- The provision of incentives in the post-2008 Scheme of Control Agreements with power companies to encourage investments in renewable energy facilities and enhance energy efficiency.
- To implement a district cooling system at the Kai Tak Development to supply chilled water to buildings for centralized air conditioning.
- To promote environmental protection and energy conservation in government buildings by setting targets in various environmental aspects of new government buildings and through identifying demonstration projects.
- To promote the replacement of incandescent light bulbs with more energy-efficient lighting products.
- To promote electric transport through lower taxation for electric vehicles and providing funds for electric buses.

### 1.4. Institutional Structure

#### a) Name of organization

The Energy Efficiency Office (EEO) of the Electrical and Mechanical Services Department (EMSD) under the directive of the Environment Bureau (ENB).

#### b) Status of organization

The ENB, as the policymaker, and the EEO of the EMSD, as the regulator and implementer.

#### c) Roles and responsibilities

The government (the ENB and the EEO/EMSD) is responsible for promoting energy efficiency both within the government and in the community. The government works with professional bodies, tertiary institutes, related industries, and the general public to promote energy efficiency through voluntary and mandatory schemes.

#### d) Covered sectors

Public and private sectors.

#### e) Established date

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<sup>3</sup>HKEEUD (2015).

The EEO of the EMSD was established in 1994.

**f) Number of staff members**

There are 75 employees in the EEO.

### 1.5. Information Dissemination, Awareness-Raising, and Capacity-Building

**a) Information collection and dissemination**

For major energy efficiency policies, public consultation and business impact assessments may be conducted. Information is mainly disseminated through the media and via press releases and websites.

**b) Awareness Raising**

The HKC Government organizes and participates in various exhibitions, seminars, outreach programs to schools, guided tours on education, and workshops to promote energy efficiency and conservation in various sectors. There are also websites and the Energy Efficiency Newsletter to promote energy efficiency and renewable energy.

Technical information related to energy-efficient products is promoted and disseminated through the publication of information leaflets and technical guidelines and the posting of information for the public via the following websites: HK EE Net (<http://ee.emsd.gov.hk>), HK RE Net (<http://re.emsd.gov.hk>), Energy Label Net (<http://www.energylabel.emsd.gov.hk>), and Energy Saving for All Portal (<http://www.energysaving.gov.hk>).

The HKC Government also launched publicity programs and campaigns to promote awareness of energy efficiency and conservation, particularly regarding specific measures such as the Energy Efficiency Labeling Scheme, the Buildings Energy Efficiency Funding Schemes, and the Energy Saving Charter on Indoor Temperature. In addition, it launched the Liberal Studies Education Kit for New Senior Secondary Curriculum, the New Energy New Generation Solar Car Competition, and the Youth Energy Saving Award to promote energy efficiency and conservation among students.

**c) Capacity Building**

Capacity-building is achieved by organizing strategic and specific briefings as well as presentations and workshops for both the industry and the general public. Professional bodies and educational institutions are also involved in sharing experiences and providing training to build up the necessary capacity in the concerned sectoral areas.

### 1.6. Research and Development in Energy Efficiency and Conservation

In order to evaluate and review the application of new energy efficiency and conservation technologies, the HKC Government promotes applied research and development activities, including energy efficiency projects through university research grants and dedicated technology funds.

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## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts:

**a) Name**

- 1) Energy Efficiency (Labeling of Products) Ordinance (Chapter 598)
- 2) Building (Energy Efficiency) Regulation (Chapter 123M)
- 3) Building Energy Efficiency Ordinance ( Chapter 610)

**b) Purpose**

- 1) To facilitate the choice of energy-efficient appliances and raise public awareness on energy saving in electrical appliances.
- 2) To regulate the design and construction of external walls and roofs of buildings in order to achieve a minimum overall thermal transfer value and control the energy consumption of commercial buildings and hotels.
- 3) To regulate the building installations, including lighting, electrical, air conditioning, lifts, and escalators, in order to comply with the specified minimum energy efficiency standards and requirements.

**c) Applicable sectors**

- 1) All sectors.
- 2) Commercial buildings and hotels.
- 3) A total of 13 categories of public and private prescribed buildings are included, which are as follows: commercial buildings, hotels and guesthouses, residential buildings (common area only), industrial buildings (common area only), composite buildings (non-residential and non-industrial portion), composite buildings (common area of residential or industrial portion), educational buildings, community buildings, municipal buildings, hospitals and clinics, government buildings, airport passenger terminal building, and railway stations.

**d) Outline**

- 1) The Energy Efficiency (Labeling of Products) Ordinance, enacted on May 9, 2008, provides the basis for implementation of the Mandatory Energy Efficiency Labeling Scheme. This scheme requires that the energy label be shown on prescribed products in order to inform consumers of the products' energy performance. The first phase, covering room air conditioners, refrigerating appliances, and compact fluorescent lamps, has been in full implementation since November 9, 2009. The second phase extends the coverage to washing machines and dehumidifiers, and it has been fully implemented since September 19, 2011. The energy efficiency grading standards of room air conditioners, refrigerating appliances, and washing machines was reviewed in late 2014. The tightened grading standards of these products will be fully implemented in November 2015.
- 2) The Building (Energy Efficiency) Regulation, enacted in 1995, regulates the design and construction of external walls and roofs of buildings in order to maintain a suitable overall thermal transfer value and control the energy consumption of commercial buildings and hotels. Thus, the emission of greenhouse gases from power generation can be reduced.
- 3) The Buildings Energy Efficiency Ordinance for mandatory implementation of the Building Energy Code (BEC) and energy audit was enacted in December 2010, after which it was fully implemented on September 21, 2012. The ordinance requires compliance with the BEC in the design of new construction and major retrofitting works of prescribed buildings, especially regarding four types of installations (i.e., lighting, electrical, air conditioning, and lifts and escalators) as well as the implementation of energy audits for commercial buildings. Further energy savings will occur by requiring compliance with the BEC when major retrofitting works and energy audits are conducted in existing buildings.

**e) Financial resources and budget allocation**

N/A.

**f) Expected results**

- 1) Products with lower energy efficiency to be driven out by market forces.

- 2) Commercial buildings and hotels achieve better energy performance in overall thermal transfer requirements.
- 3) Key installations of new prescribed buildings and major retrofitting works comply with the design standards of the BEC. In addition, energy management opportunities and energy utilization indices are identified from energy audits of commercial buildings.

## 2.2. Regulatory Measures

See Section 2.1.

## 2.3. Voluntary Measures

### a) Name

- 1) Voluntary Energy Efficiency Labeling Scheme
- 2) Scheme for the Wider Use of Fresh Water in Evaporating Cooling Towers for Energy-Efficient Air-Conditioning Systems
- 3) Hong Kong Energy Efficiency Registration Scheme for Buildings (HKEERSB).<sup>4</sup>

### b) Purpose

See Section 2.3 (d)

### c) Applicable sectors

All sectors.

### d) Outline

- 1) The EMSD operates a voluntary Energy Efficiency Labeling Scheme for appliances and equipment used at home and at the office as well as for vehicles in order to make it easier for the public to choose energy-efficient products. The scheme now covers 22 types of household appliances and office equipment of which 13 are electrical appliances, seven are office equipment, and two are gas appliances. Details can be found at [http://www.emsd.gov.hk/emsd/eng/pee/eels\\_vlntry.shtml](http://www.emsd.gov.hk/emsd/eng/pee/eels_vlntry.shtml).
- 2) The Scheme for Wider Use of Fresh Water in Evaporative Cooling Towers for Energy-Efficient Air-Conditioning Systems was launched in 2000 as a pilot scheme after which it became a standing scheme in 2008 to promote the wider use of energy-efficient, water-cooled air conditioning (WACS), and facilitate the territory-wide implementation of WACS. It is also open for application by owners who plan to use freshwater cooling towers for air conditioning of non-domestic buildings in designated areas.
- 3) The HKEERSB was launched in October 1998 as a voluntary scheme to promote the application of the Building Energy Code (BEC). The BEC covers lighting, air conditioning, electrical, and lift and escalator installations, and stipulates the minimum energy performance standards of such installations. Under the scheme, if the designer/owner of a building submits an application to the EMSD, then a registration certificate will be issued to the building that successfully meets the individual BEC standards.

### e) Financial resources and budget allocation

N/A.

### f) Expected results

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<sup>4</sup> [www.emsd.gov.hk/emsd/eng/pee/eersb.shtml](http://www.emsd.gov.hk/emsd/eng/pee/eersb.shtml).

- 1) To enable consumers to make better decisions when purchasing energy-efficient appliances, which, in turn, helps reduce energy consumption.
- 2) To save energy consumption in air-conditioning systems in non-residential buildings.
- 3) To enhance building energy efficiency.

## **2.4. Financial Measures Taken by the Government**

### **2.4.1. Tax Scheme**

- a) For energy saving and conservation in the building sector, the depreciation period for building service installations (registered under the HKEERSB) and renewable energy installations would be reduced from 25 years to five years.
- b) Tax incentives for the promotion of electric vehicles. The scheme eliminates the tax imposed on new vehicle purchases for electric vehicles. Furthermore, the government supports the development of a network of charging stations.
- c) Financial support is provided for the purchase of electric buses with the goal of expanding electric buses to the entire public transport fleet.

### **2.4.2. Low-Interest Loans**

N/A.

### **2.4.3. Subsidies and Budgetary Measures**

N/A.

### **2.4.4. Other Incentives**

N/A.

## **2.5. Energy Pricing**

N/A.

## **2.6. Other Efforts for Energy Efficiency Improvements**

### **2.6.1. Cooperation with Non-Government Organizations**

The government cooperates with the professional sector and non-government organizations regarding the promotion of energy efficiency and conservation.

### **2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes**

To maintain close collaboration with the Chinese Government in order to harmonize the adoption of appropriate energy efficiency standards and approaches.

### **2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements**

The following are some of the efforts for energy efficiency improvements:

- 1) For the government to lead by example in implementing energy efficiency demonstration projects in order to showcase energy-efficient designs and emerging technologies as well as adopt advanced energy-saving products.
- 2) To mandate government capital projects and minor projects for incorporating various energy efficiency features into such projects.
- 3) The Hong Kong Green Building Council, which was established in November 2009 to advance green building initiatives in the HKC Government, is a professional organization that supports the creation of green, energy-efficient buildings, and promotes standards throughout Hong Kong. In addition, it engages the community, industry, and government in creating a more sustainable environment.

**REFERENCES**

HKEEUD (2015), *Hong Kong Energy End-use Data 2015*, issued by the Energy Efficiency Office of Electrical and Mechanical Services Department, [www.emsd.gov.hk/emsd/e\\_download/pee/HKEEUDB2015.pdf](http://www.emsd.gov.hk/emsd/e_download/pee/HKEEUDB2015.pdf).

# INDONESIA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The National Energy Policy (2014)<sup>5</sup> (*Kebijakan Energi Nasional* or KEN) states that Indonesia's energy conservation goals are to achieve energy elasticity of less than 1 by 2025 and decrease energy intensity by an average of 1% per year to 2025.

### 1.2. Sectoral Energy Efficiency Improvement Goals

The Government of Indonesia has identified the following sectoral energy-efficiency goals:

- Industrial sector: 15% to 30%.
- Transport sector: 15% to 35%.
- Commercial building sector: 10% to 30%.
- Residential sector: 15% to 30%.

### 1.3. Action Plans for Promoting Energy Efficiency

#### a) Objectives

The objective of Indonesia's energy conservation program is to maintain and increase the value and diversity of energy resources in its supply and utilization.

#### b) Applicable sectors

Industrial, commercial building, households, transport, government (local and central).

#### c) Outline

Energy programs:

- **Mandatory Energy Management Program:** The government imposed a mandatory energy management program for large energy users, with consumption of 6,000 TOE<sup>6</sup> or more. The program requires companies to set up an energy management system, appoint an energy manager, perform regular energy audits, implement energy conservation programs, and report to the government. The government also provides support for companies to adopt the ISO 50001:2011 Energy Management System Standard.
- **Mandatory Government Energy Reporting Program:** This is an energy consumption reporting scheme that requires central and local government organizations as well as state-owned companies to report monthly energy use to the president every 6 months.<sup>7</sup>
- **Partnership Program on Energy Conservation:** Aimed to support energy conservation by providing government-funded energy audits for buildings and industries. This program started in 2003, and by 2014, a total of 1,274 audits were performed. Participating industries and buildings are required to implement the recommended energy-saving measures identified in the energy audit. In 2005, with the enactment of the mandatory energy management program, this program designates approximately 10 buildings each year as "energy efficient."
- **Energy Managers and Auditors:** The government issued a Ministerial Decree on

<sup>5</sup> Government Regulation No. 79/2014 regarding National Energy Policy.

<sup>6</sup> Government Regulation No. 70/2009 on Energy Conservation.

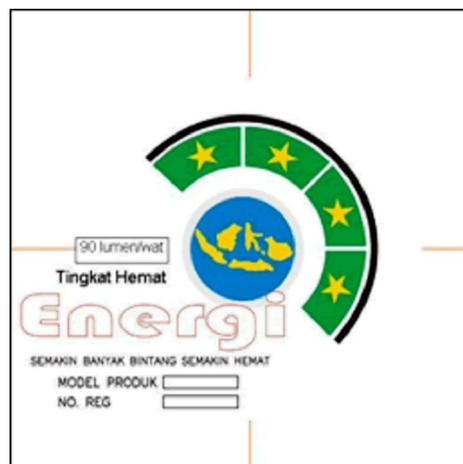
<sup>7</sup> Presidential Instruction No. 13/2011 regarding Energy and Water Saving.

Competency for energy managers and auditor in the industrial and building sectors.<sup>8</sup> The Ministry of Energy and Mineral Resources has provided capacity-building to train energy managers and auditors. Energy managers and auditors are certified by the Association of Energy Conservation Experts (*Himpunan Ahli Konservasi Energi* or HAKE).

- Energy Standard and Labeling: Indonesia implements Minimum Energy Performance Standards (MEPS) and the Comparative Label to promote the use of energy-efficient appliances.

The energy labeling system design shows: 1) product performance, such as kWh per year; and 2) a star-rating system with four stars for top-performing products.<sup>9</sup>

The star rating is assigned by an independent and accredited test facility. The new energy label design (shown to the right) is an example for compact fluorescent lamps (CFLs). The energy label also provides information on the lumens produced per watt.



MEPS were introduced to provide energy efficiency products to Indonesians. This standard prevents inefficient products, produced locally or abroad, from entering the Indonesian market.

The government imposes both or either MEPS or label for other appliances. For example, in lighting appliances, such as CFLs, the government imposes labeling

<sup>10</sup> but for air conditioners, both MEPS and labeling are applied.<sup>11</sup>

- Energy Efficiency and Conservation Clearing House Indonesia (EECCHI): Created as a media and information center for energy efficiency, it conducts outreach programs in homes, schools, government buildings, and private organizations. By 2016, EECCHI will be expanded to include renewable energy.
- Energy Awards: Indonesia is an active participant in the ASEAN Energy Award program, especially the Best Practice Competition for Energy-Efficient Buildings, and the Best Practice Competition for Energy Management in Buildings and Industries. Indonesia has won several awards in these programs. Since 2011, the Ministry has held the Indonesia Energy Efficiency Awards program (*Penghargaan Efisiensi Energi Nasional* or PEEN) in order to stimulate energy efficient local industries and building owners to participate in the competition. Winners and runners-up of the PEEN are subsequently invited to participate in the ASEAN Energy Award competition.

<sup>8</sup> Ministry of Labor and Transmigration Decree No. 614/2012 on Competency for Energy Auditors, Ministry of Labor and Transmigration Decree No. 321/2011 and No. 323/2011 on Competency for Energy Managers in the Industry and Building Sector.

<sup>9</sup> CLASP (2008).

<sup>10</sup> Ministerial Decree No. 6/2011 on CFLs.

<sup>11</sup> Ministerial Decree No. 7/2015 on MEPS and Labels for ACs.

**d) Financial resources and budget allocation**

The government allocated a budget for energy conservation of IDR 72 billion in FY2012 (approximately USD 8 million), 80 billion IDR in FY2013 (around USD 8 million), and 89 billion IDR in FY2014 (roughly USD 8 million).<sup>12</sup>

**e) Method for monitoring and measuring the effects of action plans**

The Center of Data and Information Technology (*Pusat Data dan Teknologi Informasi* or Pusdatin) of the Ministry of Energy and Mineral Resources collects energy supply and consumption data on a regular basis. The Mandatory Energy Management Program and the Government Energy Reporting Program provide online reporting systems that assist in data collection. Data regarding energy use in buildings of government departments and agencies as well as those of regional governments is also obtained on a regular basis.

**f) Expected results**

Indonesia's energy conservation program expects to realize the goal of energy savings identified in the National Energy Conservation Master Plan (RIKEN), which is based on studies of energy saving potential and energy audits.

**g) Future tasks**

Continuing the energy conservation program, which includes the following: developing and implementing of energy conservation policy, providing both incentives and disincentives to promote energy conservation activities, developing standards and labels for energy-efficient appliances, promoting energy management systems, supporting energy managers and auditors, developing an Energy Service Companies (ESCOs) market, conducting activities related to public awareness and training, and engaging in international cooperation to support energy efficiency and conservation activities.

**1.4. Institutional Structure**

Under the Energy Law, energy policies are formulated by the National Energy Council (*Dewan Energi Nasional*, or DEN), which was established in 2008. The DEN consists of seven ministers and high-ranking government officials, eight stakeholder members from the industrial, academic, and technological fields, and representatives of environmental concerns and consumers.

The Ministry of Energy and Mineral Resources is the focal point of economy-wide energy conservation and energy efficiency programs. The regional governments are responsible for implementing energy efficiency and energy conservation programs within their jurisdiction.

**a) Name of organization**

The Ministry of Energy and Mineral Resources (MEMR), the Directorate General of New Renewable Energy and Energy Conservation, and the Directorate of Energy Conservation.

**b) Status of organization**

Government.

**c) Role and responsibility**

Formulating energy conservation policies; implementing energy conservation policies; establishing norms, standards, processes, and criteria regarding energy conservation; and providing technical training and evaluations of energy conservation programs.

**d) Covered sectors**

Industry, transport, commercial, and residential.

**e) Established dates**


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<sup>12</sup> Exchange rates sourced from the World Bank for each year.

August 2010.

**f) Number of staff**

The number of staff members of the Directorate of Energy Conservation is approximately 50.

### 1.5. Information Dissemination, Awareness Raising and Capacity Building

**a) Information collection and dissemination**

The MEMR established EECCHI as a one-stop shop for expertise and outreach to the private sectors, schools, and the public. EECCHI is the center for data and information on energy efficiency and renewable energy. The Government of Indonesia received bilateral assistance from the Danish International Development Agency (DANIDA) in the development of EECCHI.

**b) Awareness-Raising**

The National Energy Efficiency Movement of the MEMR promotes energy conservation awareness through seminars, workshops, talk shows, public advertisements, brochures, and leaflets, which are specifically directed toward households, specific industries, and the transport sector. PLN Electricity, the state-owned electricity company, promotes energy conservation in electricity use. Other institutions also promote awareness, including the Agency for the Assessment and Application of Technology (BPPT), the Association of Energy Conservation Experts (HAKE), and Indonesian Scout as well as various universities and nongovernment organizations.

**c) Capacity Building**

Indonesia is instituting mandatory training and accreditation for energy managers and energy assessors. In addition, training is provided to government officials responsible for mandatory energy saving and reporting. The Education and Training Center for Electricity and New Renewable Energy of the MEMR (*Pusdiklat Ketenagalistrikan dan Energi Baru Terbarukan* or PPPKEBT) actively organizes training in energy efficiency and energy conservation, new and renewable energy technologies, and energy planning and modeling.

### 1.6. Research and Development in Energy Efficiency and Conservation

The R&D Centre of the Ministry of Mineral Resources conducts research and development of several appliances, particularly to support the standards and labeling for energy-efficient appliances. The PLN Electricity R&D Centre (PLN-LITBANG) conducts research and development related to the power industry, and it provides testing services for certain electric appliances and electric lighting, including CFLs. The Agency for the Assessment and Application of Technology (BPPT) has developed an energy audit mobile unit to perform energy audits and assessments of energy saving potential in industrial and commercial buildings.

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## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts

**a) Name**

Law No. 30/2007 regarding Energy (The Energy Law)

**b) Purpose**

The Energy Law is the key strategic planning legislation. The Energy Law highlights energy security as a key issue for Indonesia and it aims to develop domestic resources including natural gas, biofuels, and geothermal resources, while reducing their dependence on foreign oil resources. The law also considers the environment with provisions for the promotion of renewable energy and energy efficiency.

**c) Applicable sectors**

All sectors of the economy, including government departments and agencies as well as regional governments.

**d) Outline**

The Energy Law states the principles regarding the utilization of energy resources and final energy use, security of supply, energy conservation, protection of the environment with regard to energy use, pricing of energy, and international cooperation.

The Energy Law defines the principle under which the National Energy Policy (KEN) was developed. This includes the roles and responsibilities of the government and regional governments in planning, policy and regulation, energy development priorities, energy research and development, and the role of enterprises.

Under the Energy Law, the National Energy Policy addresses the sufficiency of domestic energy resources to meet the economy's needs, energy development priorities, utilization of indigenous energy resources, and energy reserves.

**e) Financial resources and budget allocation**

The government allocates the budget for its energy efficiency and conservation programs.

**f) Expected results**

Achieve significant energy-saving levels identified in the KEN and in the RIKEN.

**Regulatory Measures**

On November 16, 2009, the government issued Governmental Regulation No. 70/2009 regarding energy conservation.

The regulatory measures include:

- Formulation of the RIKEN, to be updated every five years or annually, as required.
- Mandatory assignment of an energy manager, energy auditing, and the implementation of an energy conservation program for users of at least 6,000 TOE (tons of oil equivalent) of energy
- Mandatory energy efficiency standards and energy labeling.
- Implementation of government incentives, including tax exemptions and fiscal incentives for imports of energy-saving equipment and appliances, and special low-interest rates for investments in energy conservation.
- Implementation of government disincentives, including written notices to comply, public announcements of non-compliance, monetary fines, and reductions in energy supply for non-compliance.

In 2011, Indonesia issued several regulations related to energy efficiency and conservation:

- Presidential Instruction No. 13 on Energy and Water Saving.
- Presidential Regulation No. 61 on the National Action Plan on Greenhouse Gas Emissions Reduction.
- Presidential Regulation No. 71 on National Greenhouse Gas Emissions Inventories.

In 2012, a set of implementing regulations were issued:

- Ministry of Energy and Mineral Resources Regulation No. 12/2012 on Control of Fuel Utilization.

- Ministry of Energy and Mineral Resources Regulation No. 13/2012 on Electricity Saving.
- Ministry of Energy and Mineral Resources Regulation No. 14/2012 on Energy Management.

### 2.1.1. Minimum Energy Performance Standards and Labeling

#### a) Name

Indonesia has MEPS and comparative labels for select electrical appliances, based on the Indonesia National Standard (*Standar Nasional Indonesia* or SNI) and other energy performance testing standards (EPTS) for electrical appliances.

#### b) Purpose

To specify technical requirements with regard to energy efficiency, and prevent inefficient technology in Indonesia. The comparative label is the guideline for consumers to choose electrical appliances based on its energy efficiency level.

#### c) Applicable sectors

Applicable to residential and commercial sectors: appliances, lighting, and equipment.

**Table 1:** Regulated Appliances and its Energy Performance Testing Standards

|    | Product                            | EPTS                 |
|----|------------------------------------|----------------------|
| 1. | Ballast (magnetic)                 | SNI IEC 60929-2009   |
| 2. | Fluorescent lamps                  | SNI IEC 60901-2009   |
| 3. | Incandescent lamps                 | SNI IEC 60432-1-2009 |
| 4. | Room air conditioners - split type | ISO 5151             |
| 5. | Room air conditioners - window     | ISO 5151             |
| 6. | Household refrigerators            | SNI IEC 15502-2009   |
| 7. | Clothes washers                    | SNI IEC 60456-2009   |
| 8. | Electric irons                     | SNI IEC 60311-2009   |
| 9. | Vacuum cleaner                     | SNI IEC 60312-2009   |

#### d) Outline

The SNI standard on electrical appliances and equipment is drafted and registered under a strict system through the National Standardization Agency (*Badan Standardisasi Nasional* or BSN). Additional energy standards on electrical appliances are being developed.

### 2.1.2. Building Energy Codes

Government Regulation No. 36/2005, under Law No. 28/2002 requires all buildings to comply with standards. Indonesia includes four energy standards (SNI) for buildings: 1) building envelope; 2) air conditioning; 3) lighting; and 4) building energy auditing. Energy building standards have yet to be mandated. However, voluntarily energy conservation and efficiency measures in commercial buildings are widely implemented.

#### a) Name

## SNI for Buildings

**b) Purpose**

The building energy codes are designed to improve building energy performance.

**c) Applicable sectors**

Residential and commercial buildings.

**d) Outline**

The standards outline the following:

- Building envelope: design criteria, design procedures, and energy efficiency standards.
- Air-conditioning systems: technical calculation, selection, measurement assessment, and energy efficiency standards.
- Lighting systems: lighting guidelines for optimal and efficient operation.
- Energy-audit procedures: energy-audit procedures for offices, hotels, shopping centers, hospitals, apartments, and residences.

The standards/codes provide recommendations that take into account productivity, comfort, and cost-effectiveness.

**Table 2: SNI for Buildings**

|    |                  |   |
|----|------------------|---|
| 1. | SNI 03-6389-2000 | Energy conservation for building envelopes<br><i>(Konservasi energy selubung bangunan pada bangunan gedung)</i>                       |
| 2. | SNI 03-6390-2000 | Energy conservation for air-conditioning systems in buildings<br><i>(Konservasi energy system tata udara pada bangunan gedung)</i>    |
| 3. | SNI 03-6197-2000 | Energy conservation for lighting systems in building structures<br><i>(Konservasi energy system pencahayaan pada bangunan gedung)</i> |
| 4. | SNI 03-6196-2000 | Energy auditing procedure for buildings<br><i>(Prosedur audit energy pada bangunan gedung)</i>  |

**e) Financial resources and budget allocation**

The government provides funding for the Partnership Program, while follow-ups of the program and voluntary EEC measures are self and commercially financed.

**f) Expected results**

The standards are expected to initiate construction of more energy-efficient buildings and improve overall energy efficiency of existing buildings (through retrofitting).

**2.1.3. Fuel Efficiency Standards**

Currently, Indonesia does not have minimum fuel-efficiency standards. However, fuel-efficiency standards are expected to be implemented in the near future.

Current emissions standards are equivalent to Euro II compliance, implemented in 2006. Indonesia must advance to Euro-IV equivalent emission standards by 2012. Pertamina, the state-owned oil company, is working on plans to upgrade their refineries in order to produce Euro-IV-compliant gasoline. The refinery upgrading projects are expected to be completed during the 2014-2016 time period.

## 2.2. Voluntary Measures

Voluntary energy efficiency and conservation measures are being implemented by industrial and commercial buildings through commercial financing. Certain energy-intensive industries, such as the fertilizer, cement, pulp and paper, and steel industries as well as certain commercial buildings have implemented EEC measures, including the installation of automated energy management.

## 2.3. Financial Measures Taken by the Government

### 2.3.1. Tax Scheme

Currently, the government does not have a tax scheme, such as tax deductions, regarding investments in energy efficiency and conservation.

### 2.3.2. Low-Interest Loans

Currently, the government does not have low-interest loans for investments in energy efficiency and conservation.

### 2.3.3. Subsidies and Budgetary Measures

Government subsidies and budgetary measures are provided for energy conservation programs, including the following: 1) the Partnership Program on Energy Conservation in energy auditing; 2) Investment Grade Audits (IGAs) for selected industries; 3) capacity-building for financial institutions; and 4) other programs that promote information dissemination and awareness-raising.

### 2.3.4. Other Incentives

The government is expected to introduce incentives that include tax exemptions and fiscal incentives on imports of energy-saving equipment and appliances, especially low-interest rates on investments in energy conservation in the near future (Governmental Regulation No. 70/2009). The MEMR is also developing community credit (*Kredit Usaha Rakyat* or KUR) and the regulatory framework for ESCO implementation in Indonesia. As part of educating financial institutions, the ministry is developing guidelines for energy efficiency financing.

## 2.4. Energy Pricing

The government hopes to gradually remove fuel and electricity subsidies, and have their retail prices reflect the costs of supply.

The government subsidy for gasoline, RON 88 octane, and diesel oil, which are primarily consumed in the transport sector, has been removed since the end of 2014. However, there is the remaining government subsidy for automotive diesel oil for transport, kerosene for households (particularly in eastern Indonesia), liquefied petroleum gas (LPG) in the government kerosene-to-LPG conversion program for households, and electricity price (only for low-income households).

## 2.5. Other Efforts for Energy Efficiency Improvements

### 2.5.1. Cooperation with Non-Government Organizations

Currently, most non-government organizations that are working in the field of energy are involved in small-scale new and renewable energy development. Thus, their programs still help conserve fossil energy reserves, especially through the use of locally available energy resources.

### 2.5.2. Cooperation through Bilateral, Regional, and Multilateral Schemes

Ongoing cooperation in energy efficiency and conservation include the following: 1) Indonesia-JICA (Japan): Study on Energy Conservation and Efficiency Improvement in the Republic of Indonesia; 2) Indonesia-NEDO (Japan): Demonstration Project for Smart Communities in Industrial Parks; 3) Indonesia-Denmark: Energy Efficiency in Industrial,

Commercial, and Public Sector (EINCOPS); 4) Indonesia-German(GIZ): Development of a NAMA for Energy-Efficient Cooling Systems and Cold Supply in Indonesian Industry and Commerce; 5) Indonesia-ASEAN: Promotion of Energy Efficiency and Conservation; and 6) Indonesia-UNIDO: Promoting Energy Efficiency in the Industries through System Optimization and Energy Management Standards.

### 2.5.3. Other Cooperation/Efforts for Energy Efficiency Improvements

Indonesia has reviewed the APEC-Energy Working Group (EWG) Peer Review on Energy Efficiency in 2011.

#### REFERENCES

Ministry of Energy and Mineral Resources (ESDM), Blueprint *Pengelolaan Energi Nasional 2006-2025*, in accordance with Presidential Regulation No. 5/2006, <http://esdm.go.id/>.

Directorate General of Electricity and Energy Utilization (DJLPE), <http://djlpe.esdm.go.id>.

Clearinghouse *Energi Terbarukan & Konservasi Energi, Konservasi Energi*, <http://energiterbarukan.net/>.

Badan Pembina Hukum Nasional (BPHN), Pusat Jaringan Dokumentasi dan Informasi Hukum (JDIH) Nasional.

Presidential Instruction (Instruksi Presiden - INPRES) No. 9/1982 regarding Energy Conservation; Presidential Decree (Keputusan Presiden óKEPRES) No. 43/1991 regarding Energy Conservation; Presidential Instruction (INPRES) No. 10/2005 regarding Energy Savings, Presidential Instruction (INPRES) No. 2/2008 regarding Energy and Water Efficiency, <http://bphn.go.id/>.

# JAPAN

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Sectoral Energy Efficiency Improvement Goals

On September 11, 2015, the Keidanren Action Plan toward Low-Carbon Society was presented. The goals of the action plan, such as CO<sub>2</sub> reduction targets, were individually formulated for 54 industries in the industrial, commercial, transport, and energy-conversion sectors. For more information, see [http://www.keidanren.or.jp/policy/2015/031\\_honbun.pdf](http://www.keidanren.or.jp/policy/2015/031_honbun.pdf).

#### 1.1.1. Power Sector

**a) Sector**

Power (Federation of Electric Power Companies).

**b) Goals**

Reduce the nationwide CO<sub>2</sub> emissions coefficient to 0.37kg-CO<sub>2</sub>/kWh.

**c) Base year**

Fiscal year 2013.

**d) Goal year**

Fiscal year 2030.

#### 1.1.2. Petrochemical industry

**a) Sector**

Industrial (Petroleum Association of Japan).

**b) Goals**

Reduce energy consumption by 1 million tons (crude oil equivalent) compared to business-as-usual (BAU)

**c) Base year**

Fiscal year 2005.

**d) Goal year**

Fiscal year 2030.

#### 1.1.3. Iron and Steel industry

**a) Sector**

Industrial (Japan Iron and Steel Federation).

**b) Goals**

Reduce CO<sub>2</sub> emissions by 9 million tons compared to BAU.

**c) Base year**

Fiscal year 2005.

**d) Goal year**

Fiscal year 2030.

#### 1.1.4. Cement industry

**a) Sector**

Industrial (Japan Cement Association).

**b) Goals**

Reduce specific energy consumption by 49 MJ/ton cement to 3,410 MJ/ton cement.

**c) Base year**

Fiscal year 2010.

**d) Goal year**

Fiscal year 2030.

### 1.1.5. Chemical industry

**a) Sector**

Industrial (Japan Chemical Industry Association).

**b) Goals**

Reduce CO<sub>2</sub> emissions by 2 million tons compared to BAU.

**c) Base year**

Fiscal year 2005.

**d) Goal year**

Fiscal year 2030.

### 1.1.6. Paper industry

**a) Sector**

Industrial (Japan Paper Association).

**b) Goals**

Reduce CO<sub>2</sub> emissions by 2.86 million tons to 18.84 million tons compared to BAU.

**c) Base year**

Fiscal year 2005.

**d) Goal year**

Fiscal year 2030.

## 1.2. Institutional Structure

The lead energy agency is the Ministry of Economy, Trade and Industry and supported by the Agency of Natural Resources. Continuous information exchange for necessary coordination is conducted among relevant divisions of the energy-related ministries as follows:

### 1.2.1. Lead energy agency

**a) Name**

Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (ANRE/METI)

**b) Status of organization**

Policymaker, regulator, and implementer.

**c) Roles and responsibilities**

Policymaking, regulation, and implementation.

**d) Covered sectors**

Energy matters in general.

**e) Established data**

1973.

**f) Number of staff members**

No information is available.

**1.2.2. Support agency in transport**

**a) Name**

Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

**b) Status of organisation**

Policymaker, regulator, and implementer.

**c) Roles and responsibilities**

Policymaking, regulation, and implementation.

**d) Covered sectors**

Transport and building.

**e) Established date**

2001.

**f) Number of staff members**

No information is available

**1.3. Information Dissemination, Awareness-Raising and Capacity-Building**

**a) Information collection and dissemination**

Relevant information is available from the websites of ANRE/METI, the Energy Conservation Center, Japan (ECCJ), and major industrial associations.

**b) Awareness raising**

Relevant information is available from the websites of ANRE/METI, the Energy Conservation Center, Japan (ECCJ), and major industrial associations.

**c) Capacity building**

The Energy Conservation Center, Japan (ECCJ) has been providing a training course for energy managers who will be in charge of the management of energy (heat, electricity) at large energy-using businesses.

**1.4. Research and Development in Energy Efficiency and Conservation**

**1.4.1. Policies on Energy Efficiency Research, Development, and Demonstrations**

**a) Level of government**

Central.

**b) Name of policy**

Strategy for Energy Efficiency and Conservation Technologies

**c) Responsible department/agency**

The Ministry of Economy, Trade and Industry (METI) and the New Energy and Industrial Technology Development Organization (NEDO)

**d) Applicable sectors**

Energy supply, residential/commercial, industrial, and transport sectors as well as cross sectors.

**e) Financial resources (total amount, unit USD)**

No information is available.

**f) Outputs**

Research and Development (R&D) is performed and relevant assistant measures are provided.

**g) Outcomes**

Become the world's most energy-efficient and conservational economy through the steady reduction of energy consumption toward 2030.

**h) Description**

Among the wide range of energy efficiency and conservation technologies, fourteen key technologies are identified:

- 1) Energy supply sector
  - High-efficiency thermal power-generation/next-generation supply and distribution technology.
  - Cogeneration/heat utilization system.
- 2) Residential/commercial sector
  - ZEB and ZEH.
  - Energy efficiency and conservation information technology devices/systems.
  - Comfort and energy efficiency and conservation human factors.
- 3) Industrial sector
  - Energy efficiency and conservation technologies for production processes.
  - Energy efficiency and conservation systems and processing technologies.
  - Technologies for accelerating realization of energy efficiency and conservation products.
- 4) Transport sector
  - Next-generation vehicles, etc.
  - Intelligent transport systems.
  - Smart logistics systems.
- 5) Cross sector
  - Next-generation energy management systems
  - Power electronics.
  - Next-generation heat pump systems.

#### 1.4.2. Programs on Energy Efficiency and Conservation Research, Development, and Demonstrations

**a) Level of government**

Central.

**b) Name of program**

Several R&D programs have been conducted on the basis of strategies such as the Strategy for Energy Efficiency and Conservation Technologies.

**c) Responsible department/agency**

The METI and other relevant ministries, the NEDO, the National Institute of Advanced Industrial Science and Technology (AIST), and relevant companies, universities, and colleges.

**d) Objectives and period**

Each project includes its own objective and R&D period.

**e) Applicable sectors**

All relevant sectors.

**f) Financial resources (total amount, unit USD)**

A certain portion of these projects is funded by the METI or relevant ministries.

**g) Outputs**

Relevant R&D reports will be published and uploaded to websites of the responsible organizations.

**1.4.3. Research, Development, and Demonstration as a Driver for Continuous Energy Efficiency Improvement**

The Japan Revitalization Strategy (Growth Strategy) 2015 (June 2015) emphasizes science and technology as a priority investment for the future and sets the amount of more than 4% of the GDP for investments by the public and private sectors by fiscal year 2020. Based on the fact that innovations in science and technology are important pillars supporting the revitalization of Japan, investment targets and key performance indicators (KPIs) will be considered in the Fifth Science and Technology Basic Plan in order to effectively promote science and technology policies. In this process, severe fiscal conditions and the characteristics of R&D will be taken into consideration.

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**2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS****2.1. Government Laws, Decrees, and Acts****a) Name**

Law Concerning the Rational Use of Energy (the Act on the Rational Use of Energy)

**b) Level**

Central.

**c) Purpose**

The law was enacted in 1979 to ensure effective use of fuel resources (in response to the economic and social environments surrounding energy issues), and promote the rational use of energy by industries, business establishments, and others. The law was revised in May 2013 and enacted in April 2014.

**d) Applicable sectors**

Industrial, transport, residential, and commercial.

**e) Outline**

See Section 2.2 below.

**2.2. Regulatory Measures**

A number of programs have been implemented to ensure effective use of fuel resources (in response to the economic and social environments surrounding energy issues) and promote rational use of energy by industries, business establishments, etc.

**2.2.1. Business Energy Reporting**

Business organizations (manufacturers, service companies, etc.) of which the energy usage in each fiscal year amounts to 1,500 kiloliters (crude oil equivalent) or more are required to do

the following: report annually on the amount of energy they actually consume, prepare and submit medium-term (365 year) plans for the rational use of energy, and assign responsible persons for energy management. The measure aims to reduce energy consumption intensities by 1% or more a year (on average) over the medium term.

The headquarters of franchise chain business operators in whose stores the energy usage in each fiscal year totals 1,500 kiloliters (crude oil equivalent) or more are also required to perform the abovementioned activities.

### 2.2.2. Minimum Energy Performance Standards (MEPS) and Labeling

#### a) Name

Top Runner Program

#### b) Purpose

To improve energy efficiency of machinery, equipment, and other items.

#### c) Applicable sectors

Machinery, equipment, and other items.

#### d) Outline

The Top Runner Program sets target standard values for energy-using machinery, equipment, and other items in order for manufacturers and importers to enhance the energy efficiency of their products. Manufacturers are required to achieve such targets (by a weighted average method) for all of their products per category for each predetermined target year. This is one way of setting energy efficiency target values for machinery, equipment, and other items. It is also based on the concept that manufacturers should produce/import products that have better energy efficiency performance than all the products in the same category currently available on the market.

The following 31 categories of products are designated in the program, as of March 2015: passenger vehicles; freight vehicles; air conditioners; electric refrigerators; electric freezers; electric rice cookers; microwave ovens; lighting equipment; electric toilet seats; TVs; video cassette recorders; DVD recorders; computers; magnetic disk units; copy machines; space heaters; gas cooking appliances; gas water heaters; oil water heaters; vending machines; transformers; routers; switching units; multifunction devices; printers; electric water heaters; air-conditioner motors; self-ballasted LED lamps; insulation materials; sashes, and multi-paned glazing. For more information, see: [http://www.enecho.meti.go.jp/category/saving\\_and\\_new/saving/data/toprunner2015e.pdf](http://www.enecho.meti.go.jp/category/saving_and_new/saving/data/toprunner2015e.pdf).

#### e) Financial resources and budget allocation

No information is available.

#### f) Expected results

No information is available.

#### a) Name

Energy Saving Labeling Program

#### b) Purpose

To provide consumers with energy efficiency information.

#### c) Applicable sectors

Machinery and equipment.

#### d) Outline

The Energy Saving Labeling Program was introduced to provide consumers with necessary information concerning the energy efficiency performance of products covered by the Top Runner Program. The labels affixed to the products indicate the achievement ratio of the energy efficiency and conservation standards. The scope of products under the system has been expanded, and 19 categories of products are subject to the labeling, as of March 2015.

The Uniform Energy Saving Label, another labeling program that applies to retailers, indicates a multistage rating of energy-saving performance based on an achievement ratio. Currently, six categories of products (air conditioners, TVs, electric refrigerators, electric freezers, electric toilet seats, and lighting equipment for fluorescent lamps) are covered by this program.

**e) Financial resources and budget allocation**

No information is available

**f) Expected results**

No information is available

**2.2.3. Building energy codes**

Construction business organizations are required, when they construct, extend, reconstruct or repair a large house/building with a floor area of 2,000 square meters or more (newly defined as Type 1 House/Building), to report their energy conservation measures to the relevant authority beforehand, and periodically (every three years) report on the state of maintenance of the house/building. The relevant authority is able to give orders or penalties (in addition to official announcements) to the construction business organizations, especially when they are unable to achieve satisfactory performance on energy conservation.

Construction business organizations are also required, when they construct, extend, reconstruct or repair a house/building with a floor area of 300 to 2,000 square meters (newly defined as Type 2 House/Building), to report their energy conservation measures to the relevant authority beforehand, and periodically (every three years) report on the state of maintenance of the building. Note that there is no need to periodically report on the state of maintenance regarding a house.

**2.2.4. Transport**

Transport business organizations (freight-transport companies, passenger-service companies, and consignors) that are larger than a certain size (i.e., freight-transport companies with 300 railway cars or more, 200 trucks or more, 200 buses or more, 350 taxis or more, gross tonnage of ships of 20,000 tons or more, and a maximum takeoff weight of 9,000 tons or more for aircrafts) are defined as Specified Carriers. Such carriers are required to prepare and submit energy conservation plans as well as an annual report on their energy consumption amounts and other related matters.

Business organizations that consign their own freights with 30 million ton-kilometers are defined as Specified Consignors. Such consignors are required to prepare and submit energy conservation plans as well as annual report on their energy consumption amounts.

**2.3. Voluntary Measures**

**a) Name**

Keidanren Voluntary Action Plan

**b) Level**

N/A.

**c) Purpose**

As stated earlier, on September 11, 2015, the Keidanren Action Plan toward Low-Carbon Society was presented. Its goals, such as CO<sub>2</sub> reduction targets, were individually formulated for 54 industries in the industrial, commercial, transport, and energy-conversion sectors (see Section 1.1.).

**d) Applicable sectors**

N/A.

**e) Outline**

The Keidanren Action Plan set a goal of reducing average CO<sub>2</sub> emissions from targeted businesses towards fiscal year 2030. The plan also set different goals according to business types, and it encouraged voluntary actions by different industries.

**f) Financial resources and budget allocation**

No information is available.

**g) Expected Results**

No information is available.

## 2.4. Financial Measures Taken by the Government

### 2.4.1. Tax Scheme

**a) Name**

**1) Tax scheme to promote investments in structural reforms of energy supply and demand**

The business operators (industrial and commercial sectors) that introduce the building energy management systems (BEMS) are able to choose either of the following options:

A) A tax exemption that is equivalent to 7% of the equipment acquisition cost for small- and medium-sized companies.

B) A special depreciation of 30% of the equipment acquisition cost in the year of acquisition, in addition to ordinary depreciation. This applies to all companies including large-sized companies.

**2) Vehicle greening tax scheme**

The vehicle greening tax scheme is composed of the following taxation measures for automobiles:

- Reductions of automobile taxes, based on emission levels and fuel efficiency.
- Imposition of heavy taxes on automobiles that have been used for several years since receiving their new car registration, and are becoming harmful to the environment.
- The owner of the target automobile would pay an automobile tax in the year following its acquisition.

In fiscal year 2015, the following tax benefits will be granted (in the case that the automobiles are registered in fiscal year 2014):

- For electric vehicles, fuel-cell vehicles, and plug-in hybrid vehicles, the automobile tax is reduced by 75%.
- For natural-gas vehicles with a weight of less than 3.5 tons (which have achieved at least a 75% reduction of exhaust gas, compared to 2005), the automobile tax is reduced by 75%.

- For natural-gas vehicles with a weight of more than 3.5 tons (which have achieved at least a 10% reduction of nitrogen oxide (NO<sub>x</sub>) or particulate molecular (PM), compared to 2005), the automobile tax is reduced by 75%.
- For gasoline and liquefied petroleum gas (LPG) vehicles (which have achieved at least a 75% reduction of exhaust gas and a fuel-efficiency target of 25% or higher, compared to 2005), the automobile tax is reduced by 75%.
- For gasoline and LPG vehicles (which have achieved at least a 75% reduction of exhaust gas (compared to 2005) and a fuel efficiency target of 10% (compared to 2015)), the automobile tax is reduced by 50%.
- For diesel vehicles (which have achieved at least a 75% reduction of exhaust gas and a fuel efficiency target of 25%, compared to 2005), the automobile tax is reduced by 50%.
- For diesel vehicles (which have achieved at least a 75% reduction of exhaust gas (compared to 2005) and a fuel efficiency target of 20% (compared to 2020)), the automobile tax is reduced by 25%.

### 3) Eco-car tax reduction

When purchasing automobiles with excellent exhaust-gas performance and high fuel-efficiency, the automobile acquisition tax and automobile tonnage tax is exempted or reduced in the following conditions:

- The conditions for exemption (100% reduction) of the automobile acquisition and automobile tonnage tax include the following:
  - Electric vehicles, fuel-cell vehicles, and plug-in hybrid vehicles.
  - Natural-gas vehicles with a weight of more than 3.5 tons, which have achieved at least a 10% reduction of nitrogen oxide (NO<sub>x</sub>), compared to 2010.
  - Hybrid vehicles with a weight of less than 3.5 tons, which have achieved at least a 75% reduction of exhaust gas (compared to 2015) and a fuel efficiency target of 15% or higher (compared to 2010).
  - Hybrid vehicles with a weight of less than 3.5 tons, which have achieved at least a 10% reduction of NO<sub>x</sub> or PM (compared to 2005), and a fuel efficiency target of 2015.
  - Diesel passenger vehicles with a weight of less than 3.5 tons.
- The conditions for a 75% reduction of the automobile acquisition and automobile tonnage tax include the following:
  - Diesel vehicles with a weight of more than 3.5 tons, which have achieved both the target of regulation of exhaust gas emissions for fiscal year 2014-2015 and the fuel efficiency target for fiscal year 2020.
  - Trucks and buses (diesel-driven) with a weight of 2.5-3.5 tons, which have achieved both the target of exhaust gas emissions for fiscal year 2014-2015 and the fuel efficiency target for fiscal year 2020.
  - Truck and buses (gasoline-driven) with a weight of 2.5-3.5 tons, which have achieved both 75% reduction or more of exhaust gas emissions for fiscal year 2014-2015 and the fuel efficiency target for fiscal year 2020. In this case, the automobile tonnage tax is reduced by 50%.
- The conditions for a 50% reduction of the automobile acquisition and automobile tonnage tax include the following:
  - Diesel vehicles with a weight of more than 3.5 tons, which have achieved both 10% reduction or more of NO<sub>x</sub> or PM and the fuel efficiency target for fiscal year 2020.

- Trucks and buses (gasoline-driven) with a weight of 2.5-3.5 tons, which have achieved both 50% and more of exhaust emissions and the fuel efficiency target for fiscal year 2020.

Unlike the vehicle greening tax scheme, the eco-car tax reduction is applied for purchasing both new and used vehicles.

**a) Name**

A tax scheme to promote investments for housing renovation in order to improve energy efficiency and conservation

**b) Level**

Central.

**c) Purpose**

To promote investments and various efforts aimed at realizing energy efficiency and conservation (in response to the economic and social environments surrounding energy issues), and to further promote the rational use of energy by relevant sectors.

**d) Applicable sectors**

Residential sector.

**e) Outline**

When renovating a house aimed at improving energy efficiency and conservation at a certain level (e.g., thermal insulation of windows, thermal insulation of floors, walls, and ceilings or installation of solar photovoltaic facilities), 10% of the renovation cost (maximum amount of the cost: JPY 2.5 million or JPY 3.5 million when installing solar photovoltaic facilities) will be deducted from that year's income tax.

**f) Financial resources and budget allocation**

No information is available.

**g) Expected Results**

No information is available.

**2.4.2. Low-Interest Loans**

**a) Name**

Environment and Energy Measures Loans

**b) Level**

Central.

**c) Purpose**

To provide low-interest loans to small- and medium-sized businesses planning to install energy efficiency and conservation equipment or designated pollution-control equipment.

**d) Applicable sectors**

Industrial.

**e) Outline**

Low-interest loans to a maximum amount of JPY 72 million are provided to small- and medium-sized businesses planning to install high-efficiency energy conservation equipment in their facilities.

**f) Financial resources and budget allocation**

No information is available.

**g) Expected Results**

No information is available.

**2.4.3. Subsidies and Budgetary Measures**

**a) Name**

- 1) Subsidy project for business operators promoting the rational use of energy.

The introduction of energy-saving facilities (as a replacement for existing facilities) by business operators are subsidized if the new facilities are considered highly significant in terms of three aspects: the possibility of the technology becoming widely used in the future and the advanced nature of the technology; the effectiveness in energy conservation; and cost-effectiveness. Priority is given to the introduction of leading-edge facilities and technologies as well as efforts by small- and medium-sized companies. Budget allocation is JPY 41.0 billion (for fiscal year 2015).

- 2) Subsidy project for promoting the introduction of energy-efficient systems into houses and buildings.

In order to help achieve net-zero energy in houses and buildings by 2030, subsidies are provided to those who plan to introduce high energy-efficient systems and/or high-performance insulating materials (capable of reducing annual energy consumption by at least half) for non-residential buildings. In the case of houses, subsidies are provided to those who plan to archive a net-zero energy house by introducing high-performance insulation and energy-efficient materials/equipment. In addition to the above, subsidies are provided to those who plan to renovate existing houses using high-performance insulation and windows. Budget allocation is JPY 15.7 billion for fiscal year 2015.

- 3) Support for the dissemination and promotion of solar photovoltaic equipment.

Subsidies are provided for the introduction of solar photovoltaic equipment in residential houses and buildings for which JPY 70,000 per kW is subsidized under this scheme. This scheme was updated to accelerate the dissemination of solar photovoltaic equipment for residential houses and buildings. Budget allocation is JPY 22.0 billion for fiscal year 2009.

- 4) Promotion of the development of energy conservation technology.

This project pursues energy conservation technology development over a medium- and long-term basis, with three phases consisting of the incubation phase, the practical application phase, and the demonstration phase. The overall goal is to contribute to the reduction of total energy consumption. Budget allocation is JPY 7.5 billion for fiscal year 2015.

**b) Level**

Central.

**c) Purpose**

To promote investments and various efforts aimed at realizing energy conservation (in response to the economic and social environments surrounding energy issues), and to further promote the rational use of energy by relevant sectors.

**d) Applicable sectors**

Industrial, transport, residential, and commercial.

**e) Outline**

See above.

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

See above.

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

No information is available.

#### **2.4.4. Other Incentives**

No information is available.

### **2.5. Energy Pricing**

#### **Outline of electricity prices**

JPY 25.51 (USD 0.21) per kWh (for the households sector) and JPY 18.86 (USD 0.15) per kWh (for the industrial sector) (fiscal year 2014 averages).

As for those in the contract category of 50 kW or larger, the electricity rates are freely decided between the customers and the suppliers. As for the customers in the contract category of less than 50 kW, it is necessary to receive the approval of the central government in order to raise their electricity rates, and submit a notification to the central government to reduce their electricity rates. Moreover, the fuel cost adjustment system is introduced to reflect fossil fuel price fluctuations in the electricity rates. While promoting demand leveling by discounting the electricity rates during slow-demand hours and periods with optional time-of-use lighting services, the electricity usage is divided into three tiers by the three-tier rate system. In addition, energy conservation is promoted by imposing higher rates on customers with large electricity usage.

#### **Outline of gasoline prices**

JPY 133.9 (USD 1.09) per liter of regular gasoline (as of October 2015).

Gasoline prices are decided by the oil price (A) (which is decided by price components other than taxes, such as crude oil prices and refining and distribution costs), the petroleum tax and coal tax (B = JPY2.54 per liter), the gasoline tax (C = JPY53.8 per liter), and the tax on transactions of gas oil (D = JPY32.1 per liter).

- Gasoline = (A + B + C) x 1.08\*
- Gas oil = (A + B) X 1.08 +D
- Kerosene = (A + B) x 1.08

\* Consumption tax = 8%

### **2.6. Other Efforts for Energy Efficiency Improvements**

#### **2.6.1. Cooperation with Non-Government Organizations**

N/A.

#### **2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes**

N/A.

#### **2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements**

N/A.

# KOREA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The 2<sup>nd</sup> National Energy Master Plan (NEMP) (201462035), published in 2014, stipulates that Korea will reduce its final energy consumption to 216.4 Mtoe (million tons of oil equivalent) by 2035 from 249.4 Mtoe, compared to business-as-usual (BAU). This is a reduction of more than 13%.

### 1.2. Sectoral Energy Efficiency Improvement Goals

As part of the NEMP, the government set interim sectoral energy efficiency improvement goals for 2017 (compared to BAU) as follows:

- Industrial sector: reduction in energy use of 5.3 Mtoe.
- Transport sector: reduction in energy use of 2.5 Mtoe.
- Buildings sector: reduction in energy use of 1.2 Mtoe.
- Public sector and others: reduction in energy use of 0.3 Mtoe.

### 1.3. Action Plans for Promoting Energy Efficiency

The 5<sup>th</sup> Energy Use Rationalization Plan (201362017) is the action plan arising from the NEMP to promote energy efficiency.

#### a) Objectives

The 5<sup>th</sup> Energy Use Rationalization Plan aims for a 4.1% reduction of the final energy consumption and an improvement in energy intensity of 3.8% by 2017 (compared to BAU).

#### b) Applicable sectors

Industrial, transport, residential and commercial, public, and others.

#### c) Outline

The plan is designed to cope with high global oil prices and climate change as well as to improve the balance of trade. Sectoral energy-saving programs have been implemented using various incentives and regulation policies, such as financing, tax reductions, research and development (R&D) subsidies, and certification.

New demand-side management (DSM) technologies supporting policies and market schemes in the electricity sector are expected to help achieve the targets.

The plan also aims to improve coal thermal efficiency and utilize heat recovery to reduce conversion losses. It will redesign power market mechanisms in order to reduce prices, improve market efficiency, and provide consumers with effective price signals. In addition, it will increase the availability of energy information, thus raising public awareness.

Other initiatives in the plan include supporting R&D on demand-side management, improving financing and energy service company (ESCO) programs, re-inspecting and maintaining the three major energy efficiency programs, and enhancing security for thermal equipment to obtain energy efficiency improvements.

#### d) Method for monitoring and measuring the effects of action plans

The Ministry of Trade, Industry and Energy (MOTIE) and the Korea Energy Agency (KEA) are responsible for monitoring and reporting on their individual programs, which are conducted through the activities of energy efficiency program evaluation, statistics (information gathering), and benchmarking. Monitoring projects usually rely on R&D budgets from the MOTIE to some extent. These efforts are compiled into the Report to the National Energy Committee.

**e) Expected results**

Savings of 9.3 Mtoe of final energy consumption and the creation of 10,200 jobs by 2017.

**f) Future tasks**

Included is the establishment of an annual comprehensive action plan integrating regional energy efficiency schemes. The government is also looking to enhance the reporting scheme for individual and sectoral energy consumption, either statistically or using a sample survey.

**1.4. Institutional Structure****a) Name of organization**

The MOTIE, the KEA, and the Ministry of Land, Infrastructure and Transport (MOLIT) are responsible for energy efficiency improvements in Korea.

**b) Status of organization**

The MOTIE and the MOLIT are the policymaking bodies, while the KEA is the policy implementer.

**c) Roles and responsibilities**

The overall energy efficiency policy is driven by the MOTIE. In addition, energy-saving activities in the industrial and building sectors are managed by the MOTIE, while construction-related work for energy efficiency in the transport and building sectors is managed by the MOLIT. The Prime Minister has coordinated overall economy-wide energy efficiency programs through the National Energy Committee. The KEA's role is to improve energy efficiency, diffuse renewables, and reduce greenhouse gases across various sectors. For this purpose, the KEA implements various projects aimed at rationalizing energy use. The KEA has 12 regional offices.

Local governments have promoted energy efficiency by setting up regional energy basic plans for a five-year period. Regional energy efficiency programs can be partially supported by the MOTIE, especially those focusing on public sector innovation and demonstrations for energy efficiency.

The KEA's regional offices have cooperated with regional non-government organizations and research institutes in order to implement regional energy efficiency activities based on the plan.

For more information on the KEA, see [http://www.energy.or.kr/renew\\_eng/main/main.aspx](http://www.energy.or.kr/renew_eng/main/main.aspx).

**d) Covered sectors**

Industrial (including agriculture), transport, residential and commercial, public, and others.

**e) Established date**

The KEA was established in 1980.

**f) Number of staff members**

The KEA included 489 staff members in 2015.

**1.5. Information Dissemination, Awareness Raising, and Capacity Building****a) Information Dissemination**

A wide range of energy efficiency information is readily available to Korean energy consumers through the KEA's website and other media. A mandatory procurement guideline on purchasing energy-efficient products has been applied to public institutions.

**b) Awareness Raising**

Awareness campaigns have been undertaken with specific initiatives such as energy-saving campaigns (Heating 2018 in winter, Energy Minus Love Plus in summer), National Energy Efficiency Awards, designation of November as Energy Saving Month, public relations (PR) activities through the media (television, radio), a prize contest for PR materials (poster, catch phrases), an economy-wide exhibition (Korea Energy Show); mobile exhibitions, and early education in elementary and middle school.

### **c) Capacity Building**

Capacity-building programs have been undertaken for various actors, such as energy managers in high energy-consuming industries or buildings above 2,000 toe per annum, boiler and pressure vessel operators, local government officials, and energy auditors.

## **1.6. Research and Development in Energy Efficiency and Conservation**

The government recognizes the role of new technology and R&D in achieving its energy objectives. In May 2006, it announced the Basic Scheme for National Energy Resource Technology Development (200662015), which includes the promotion of R&D in energy efficiency and conservation.

The 2<sup>nd</sup> National Energy Master Plan (201462035) also reinforces technological development. Korea will increase its support for R&D to improve the energy efficiency of industrial equipment and facility upgrades as well as provide support for companies that invest in energy efficiency.

The Korea Institute of Energy Technology Evaluation and Planning (KETEP) was established in December 2007, with the key missions of advancing energy technology R&D and supporting the MOTIE in formulating energy technology policies. The Energy Efficiency R&D Program has been undertaken by the KETEP with the objective of securing additional energy saving potential of 5% of the total primary energy supply during 200662015. The seven Runner Programs that focus on typical energy consuming end-use devices have been prioritized in energy efficiency R&D. The seven objects identified for R&D that cover approximately 41% of total final energy consumption include super boilers, premium electric motors, HVACs, industrial furnaces, dryers, lighting, and home appliances. Individual R&D projects are generally undertaken in cooperation with enterprises, and R&D subsidies can be provided in part for the required total investment.

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## **2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENT**

### **2.1. Government Laws, Decrees, and Acts**

#### **a) Name**

Energy Use Rationalization Act (EURA)

#### **b) Purpose**

The EURA aims to stabilize energy demand and supply, increase rational and efficient energy use, and reduce environmental damage caused by energy consumption.

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

The EURA is applied to all energy end-use sectors.

#### **d) Outline**

In the wake of the second oil shock in 1979, the Ministry of Energy and Resources (later incorporated with the Ministry of Trade, Industry and Energy) was established to exclusively administer the planning and enforcement of energy policies. In the following year, the EURA was promulgated in an attempt to ensure energy security and promote energy efficiency and conservation.

The purpose of the act is to contribute to the sound development of the economy and the promotion of welfare and international efforts in order to minimize global warming, stabilize demand and supply of energy, increase the rational and efficient use of energy, and reduce the environmental damage caused by the consumption of energy.

The EURA is comprised of the following chapters: General Provisions; Plans and Measures for Rationalization of Energy Use; Policies for Rationalization of Energy Use; Management of Heat-Using Machinery/Equipment or Materials; Organization of Constructors; Energy Management Corporation; Supplementary Provisions; and Panel Provisions.

Since its enactment, the EURA has been amended several times, with the latest amendment passed in January 2010. The full text is available at <http://elaw.klri.re.kr> by typing Energy Use Rationalization Act in the search menu.

## 2.2. Regulatory measures

### 2.2.1. Minimum Energy Performance Standards (MEPS) and Labeling

#### a) Name

Energy Efficiency Label and Standard Program

#### b) Purpose

To save energy by enabling consumers to easily identify high-efficiency products and encouraging manufacturers (importers) to produce (import) and sell these products. It employs a label that indicates the energy efficiency grade of each product on a 1 to 5 grading scale.

The labeling scheme works in tandem with the minimum energy performance standard (MEPS) scheme, which bans low-efficiency products from entering the market. It also promote the manufacturers' technical development by setting up and controlling the minimum required efficiency standard.

#### c) Applicable sectors

Appliances, lighting, and equipment in the residential, commercial, and industrial sectors.

#### d) Outline

The Energy Efficiency Labeling and Standard Program enables consumers to easily identify energy-efficient products through the use of mandatory energy efficiency labels, mandatory reporting, and the application of MEPS.

The efficiency scale of the labels includes five grades with Grade 1 products being the most efficient. In fact, Grade 1 products are 30% to 40% more efficient than a Grade 5 product. In order to keep the scheme current and to incentivize further development, the MOTIE and the KEA constantly revise the requirements. If the standard is strengthened, then different grades can be seen, even among the same products.

The MEPS bans the production, importation, and sale of low energy-efficient products that fall below the MEPS. Those that fail to reach the MEPS are not allowed to be manufactured and sold. The MEPS is applied to 35 items.

#### e) Financial resources and budget allocation

No information is available.

#### f) Expected results

No information is available.



### 2.2.2. Building Energy Codes

#### a) Name

Energy Saving Design Criteria for Buildings

#### b) Purpose

To improve energy efficiency in the design and construction of new buildings.

#### c) Applicable sectors

Residential and non-residential.

#### d) Outline

The MOLIT developed the building energy codes, while local government building officials enforce the codes as part of the building permitting process for new buildings. The property owner must fill out an energy saving worksheet and submit it to the local government in order to obtain a building permit.

The submission of energy saving plans has become mandatory for buildings larger than certain sizes in order to reinforce insulation, increase the supply of high-efficiency and new/renewable energy facilities, and promote the energy saving mindset among building owners.

#### e) Financial resources and budget allocation

No information is available.

#### f) Expected results

No information is available.

### 2.2.3. Fuel Efficiency Standards

#### a) Name

Average Fuel Economy (AFE) Program

#### b) Purpose

To manage the fuel efficiency of passenger vehicles by requiring manufacturers to achieve an average fuel efficiency for all vehicles sold by each manufacturer (calculated by dividing the sum of the fuel efficiencies of the vehicles sold during the previous year by the quantity sold).

#### c) Applicable sectors

Transport

#### d) Outline

If a manufacturer's average fuel efficiency does not satisfy the limit set by the government, then it may order the improvement of fuel efficiency by a certain time period. If the improvement order is not performed, then a corresponding announcement may be published through the press.

Average fuel efficiency standard:

- 1) 2013  $\geq$  16.0 km/l
- 2) 2015  $\geq$  17.0 km/l
- 3) By 2020  $\geq$  24.3 km/l

### 2.2.4. Energy Auditing

#### a) Name

Energy Process Auditing

**b) Purpose**

To improve the energy efficiency of businesses that use large amounts of energy.

**c) Applicable sectors**

Industrial and commercial.

**d) Outline**

Energy auditing started in 1990 as a voluntary program. In 2007, it was made mandatory for businesses using more than 2,000 toe in order to improve the efficiency of large energy consumers. This was in response to the implementation of the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

The KEA has implemented energy auditing for more than 30 years in domestic industrial and building sites. It has also conducted important research activities to find energy distribution optimization models and other related opportunities.

The KEA achieved the ISO 9001 Quality Management System certification for the energy auditing service.

**2.3. Voluntary Measures**

The main voluntary measures include certification for high-efficiency products, eco-driving, the ōno car once-a-weekō initiative, demand-side management by energy suppliers, and community energy supply systems.

**2.3.1. Building Energy Efficiency Rating****a) Name**

Building Certification System

**b) Purpose**

To provide objective information regarding the energy performance of buildings such as energy consumption, carbon dioxide emissions, and energy-saving opportunities that could benefit relevant stakeholders, including construction companies, building owners, building managers, and building users.

**c) Applicable sectors**

Office and residential.

**d) Outline**

Building companies apply for certification of new buildings based on design information after which preliminary certification may be awarded. Final certification of the energy efficiency grade is provided after completion of an evaluation using final design drawings and field surveys.

**2.3.2. Energy Service Company (ESCO)****a) Name**

Energy Service Company

**b) Purpose**

To encourage investments in energy-saving facilities through ESCOs that provide a broad range of energy-saving solutions with investment costs covered by energy bill reductions.

**c) Applicable sectors**

Industrial and commercial.

**d) Outline**

The ESCO program was launched in 1993. In the beginning, there were only three registered ESCOs and by 2011, the number increased to 209. ESCOs mainly focus on high-efficiency lighting, waste heat recovery, heating and cooling systems, and manufacturing process improvement.

When energy users want to replace/improve existing facilities or are unable to do so due to technical or financial problems, they can make a contract with ESCOs. After the terms of the contract are set, the ESCOs will make the investment on behalf of the energy users after which the ESCOs profit from the energy cost savings.

The legal grounds for ESCOs were established under the Energy Use Rationalization Act in 1991. ESCOs have been registered and in operation since 1992.

The scopes of the projects include the following:

- 1) Projects related to energy-saving plant investments.
- 2) Management/service projects for saving energy in energy-using facilities.
- 3) Projects related to energy saving such as energy management, diagnosis, etc.

## 2.4. Financial Measures Taken by the Government

### 2.4.1. Tax Scheme

#### a) Name

Tax Reduction and Exemption Act (by National Tax Service)

#### b) Purpose

To strengthen the competitiveness of business enterprises by promoting investments in energy-saving facilities.

#### c) Applicable sectors

Industrial and building (commercial).

#### d) Outline

In case of investments in the installation of specified energy-efficient facilities, 10% of the relevant investment amount shall be deducted from the total income tax or corporate tax. This scheme started in 1982, and it has been temporarily applied during designated time periods.

### 2.4.2. Soft Loans

#### a) Name

Energy Use Rationalization Fund (1980)

#### b) Purpose

To strengthen the competitiveness of business enterprises by promoting investments in energy-saving facilities

#### c) Applicable sectors

Industrial and building (commercial).

#### d) Outline

Since 1980, the government has provided long-term, low-interest loans for energy efficiency and conservation investments, along with tax incentives. The KEA is in charge of operating and monitoring the loan. The rate of the loans is 1.75% per year, as of the first quarter of 2015.

#### e) Financial resources and budget allocation

USD 454 million is allocated to the fund from a government financial source called the Special Accounts for Rational Energy Utilization.

**f) Expected results**

No information is available.

### 2.4.3. Other Incentives

**a) Name**

Incentives for small-sized vehicles.

**b) Purpose**

To promote low energy-consuming, lightweight passenger vehicles.

**c) Applicable sectors**

Transport

**d) Outline**

Several incentives such as tax exemptions for purchasing, registration and acquisition, 50% discounts on parking fees and tolls, and congestion charges, are provided.

## 2.5. Energy Pricing

The consumer price of oil products is determined by market-based pricing systems, but the major part of the price includes taxes. Prices of electricity, city gas, and thermal energy supply can be influenced by the government by adjusting the corporate-investment maintenance ratio that is required by each tariff structure.

Currently, progressive electricity pricing, according to the amount of use, has been applied to the residential sector. However, a pricing system that exposes consumers to the full cost of energy (or high costs) in order to stimulate energy efficiency or greenhouse gas emission reductions is unfeasible, since it would be a difficult process with low social acceptance. Until now, subsidies and tax incentives have been used to promote consumer behavior for energy efficiency.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organizations (NGOs)

Energy efficiency campaign programs, which require the participation of the private sector, have been performed in cooperation with NGOs. NGOs act as a representative voice of the attitude or behavior regarding citizens' energy efficiency.

### 2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes

Korea has been actively participating in international cooperative activities such as IEA 4E, APEC EGEE&C, IPEEC, etc., to develop policies to enhance energy efficiency in the facilities and equipment sectors as well as strengthen international cooperation systems.

IEA 4E (Implementing Agreement on Efficient Electrical End-Use Equipment) is one of the implementation agreements of the International Energy Agency (IEA), which seeks to promote the adjustment and development of policies of various economies through collaborative research and forums aimed at enhancing machine efficiency.

In cooperation with the IEA 4E, the MOTIE and the KEA are participating in the main annex, Mapping & Benchmarking (M&B). The overall goal of the M&B annex is to provide policymakers with a single source of knowledge on product performance and associated policies employed by economies across the world, thus enabling more informed policymaking at the economy and regional levels.

APEC EGEE&C (Expert Group on Energy Efficiency and Conservation) is one of the expert groups under the Energy Working Group (EWG), which targets energy saving as well as the development of energy efficiency policies and technologies. Established in 2002 to exchange information on energy efficiency standards and labeling systems, it is operated using funds shared by all of the economies. Korea hosted the 49<sup>th</sup> APEC EWG meeting in Gyeongju on June 2015.

The EGEE&C has maintained the Energy Standards Information System (ESIS) since 2002. The ESIS provides the latest information about energy standards and regulations for appliances and equipment. The MOTIE and the KEA funded USD 10,000 for this ESIS project in 2007 and both organizations continue to take an active role in this system.

IPEEC (International Partnership for Energy Efficiency Cooperation) is an international partnership for energy efficiency cooperation among the European Union, the G8 countries (United States, United Kingdom, France, Germany, Italy, Canada, Japan, and Russia), and seven additional countries (China, India, Brazil, Mexico, Korea, Australia, and South Africa).

# MALAYSIA

## 1. GOALS ON EFFICIENCY IMPROVEMENT

### 1.1. Overall energy efficiency improvement goals

Various efforts have been undertaken by the Malaysian Government to utilize energy efficiently. A number of key energy efficiency programs were initiated in the Eighth Malaysia Plan (2001-2005). This plan aimed at strengthening the Utilization Objective of Malaysia's Energy Policy (1979), which sought to promote the efficient utilization of energy and the elimination of wasteful and non-productive patterns of energy consumption. The Ministry of Energy, Green Technology and Water (MEGTW) is now finalizing a National Energy Efficiency Action Plan (NEEAP), with clear goals to coordinate and implement energy efficiency and energy conservation. Scheduled to be implemented in 2016, the National Energy Efficiency Action Plan aims to reduce electricity consumption by 8% (compared to business-as-usual (BAU)) by the tenth year.

The NEEAP initiatives include the following:

- a) Promotion of five-star energy-efficient appliances (air conditioners, refrigerators, and lamps).
- b) Energy audits and management in the government, industrial, and commercial sectors.
- c) Introducing MEPS for electric motors.
- d) Promotion of cogeneration.
- e) Promotion of the ISO 50001 standard for energy-efficient buildings.

### 1.2. Sectoral energy efficiency improvement goals

There are no specific sectoral targets.

### 1.3. Action plans for promoting energy efficiency

The Economic Transformation Programme (ETP) identified a few national key economic areas (NKEAs) in order to achieve a high-income economy by 2020. An Entry Point Project (EPP) on energy efficiency was designed under the oil, gas, and energy NKEAs that is known as EPP9: Improving Energy Efficiency. It is also known as the Sustainability Achieved via Energy Efficiency (SAVE) program that focuses on the following initiatives:

- a) Government leading by example
  - To promote and implement efficient energy management systems and practices in government buildings.
- b) SAVE Program:
  - The SAVE program focuses on increasing sales of energy-efficient appliances by offering rebates for five-star rated appliances.
  - Rebates for the purchase of efficient five-star rated refrigerators (100,000 units) and air conditioners (65,000 units) are offered to domestic users, while rebates for replacing energy-efficient chillers (72,000 refrigerant tons) are offered to private commercial building owners.
- c) Promotion of building insulation.
- d) Promotion of more economically viable cogeneration for industries.
- e) Efficiency in transport by energy-efficient vehicles.

**Objectives:**

Energy efficiency measures will be intensified to harness energy savings potential and reduce Malaysia's carbon emissions and dependence on fossil fuels. Intrinsic barriers to energy efficiency that pose challenges in capturing this opportunity will also be addressed.

**a) Applicable sectors:**

Buildings, industrial, and transport.

**b) Outline:**

- i) Phasing out incandescent light bulbs.
- ii) Increasing energy performance labeling from four to 10 electrical appliances.
- iii) Introducing guidelines for green townships and rating scales according to carbon footprint baselines.
- iv) Increasing the use of energy-efficient machines and equipment, such as high-efficiency motors, pumps, and variable speed drive controls.
- v) Introducing minimum energy performance standards (MEPS) for selected appliances. Regulations to enforce MEPS in Malaysia were gazetted on May 3, 2013. Five domestic electrical appliances, namely, air conditioners, refrigerators, TV sets, domestic fans, and lamps were subject to MEPS requirements before the products could be sold in the market. The MEPS value for Malaysia has been set at a two-star rating.
- vi) Revision of the Uniform Building By-Laws to incorporate the Malaysian Standard: Code of Practice on Energy Efficiency and Renewable Energy for Non-Residential Buildings (MS1525).
- vii) Wider adoption of the Green Building Index.
- viii) Increasing the use of thermal insulation for roofs in air-conditioned buildings.

**c) Financial resources and budget allocation**

The SAVE program was created and administered by the MEGTW and funded by the government in the Economic Transformation Program (ETP) with RM 44.3 million allocated for rebates and promotional campaign activities. The budget should cover the purchases of up to 100,000 refrigerators, 65,000 air conditioners, and 72,000 energy-efficient chillers for eligible domestic consumers and private companies. The total energy saved from this equipment for 2011 to 2013 was 306.9 GWh, while avoiding the emissions of 208,705 tons of CO<sub>2</sub>.

**d) Method for monitoring and measuring the effects of action plans**

The progress and achievement is monitored through an outcome-based assessment method. The assessment report is prepared twice (at half way and at the end of the plan). The reports will be submitted to the Economic Planning Unit of the Prime Minister's Department.

**e) Achievements****Industry**

The Efficient Management of Electrical Energy Regulation 2008 is formulated under the Electricity Supply Act. Under the regulation, all installations that consume three million kWh or more of electricity over a period of six months will be required to employ an energy manager to analyze the total consumption of electricity, advise on measures to improve energy efficiency, and monitor the effectiveness of the measures taken.

The Energy Efficiency and Conservation Guidelines Part 1: Electrical Energy-use Equipment: The guidelines have been framed to encourage industries to adopt energy-efficient practices as well as manage and improve their energy utilization and environmental management.

The Energy Efficiency and Conservation Guidelines Part 2: Thermal Energy-use Equipment: The guidelines are to encourage industries to adopt energy-efficient practices as well as manage and improve their energy utilization and environmental management.

The Industrial Energy Audit Guidelines: The guidelines are based on 54 energy audits in eight energy-intensive industrial subsectors, namely, iron and steel, cement, wood, food, glass, pulp and paper, ceramics, and rubber, which were carried out under the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP).

Energy-use benchmarks for eight energy-intensive industrial subsectors, namely, iron and steel, cement, wood, food, glass, pulp and paper, ceramics, and rubber.

Increasing the use of energy-efficient machines and equipment, such as high-efficiency motors, pumps, and variable speed drive controls.

Introduction of Minimum Energy Performance Standards (MEPS) for selected appliances in order to restrict the manufacture, import, and sale of inefficient appliances to consumers.

To accelerate the transformation of the consumer appliances market in order to increase the share of energy-efficient models, phase out inefficient models from the local market, and reduce the price premium for energy-efficient products.

To introduce the MEPS for selected equipment, such as motors, chillers, cooling towers, and compressors. Currently, the development of a standard for motors is underway.

### **Building**

Energy efficiency requirements under the MS1525, which is the Code of Practice on the Use of Renewable Energy and Energy Efficiency in Non-Residential Buildings, were incorporated in the amendments to the Uniform Building By-Laws (UBBL).

The wider adoption of the Green Building Index to benchmark energy consumption in new and existing buildings.

Increasing the use of thermal insulation for roofs in air-conditioned buildings in order to save energy.

In 2010, the MEGTW also launched the "Government Leads by Example" (GLBE) initiatives to encourage energy-efficient practices and ensure the productive use of energy while minimizing waste within the public sector. The MEGTW also conducted energy audits and performed retrofitting in selected government buildings. This initiative is being carried out to more government buildings since 2015.

The introduction of a circular regarding no-cost measures for implementing energy efficiency by setting the temperatures of all government buildings to be no lower than 24 degrees Centigrade. This was one of the efforts undertaken to demonstrate the government's commitment in reducing overall electricity consumption in an easy and cost-effective manner.

Energy Performance Contracting (EPC) was launched in January 2013 to promote energy efficiency in the government. Under the EPC concept, government buildings are allowed to engage energy services companies (ESCOs) to improve energy efficiency. This initiative can help develop an ESCO industry in Malaysia.

In 2014, the government took another step under the GLBE initiatives by monitoring the electricity consumption of 25 ministry buildings. Such actions were expected to reduce their total electricity consumption by 5% in 2014 (compared to the previous year).

The government also expanded the GLBE initiatives by implementing two new initiatives under the 2014 budget. The initiatives include solar panel installations on the rooftops of selected government buildings and the installation of LED lights in selected ministry buildings, both of which are ongoing projects.

#### **Residential**

Dissemination of information and awareness to create a voluntary behavioral shift in residential energy users.

Increasing MEPS and labeling from five (air conditioners, refrigerators, TVs, fans, and lamps) to 11 electrical appliances with the six additional appliances including rice cookers, electric kettles, washing machines, microwaves, clothes dryers, and dishwashers.

Phasing out incandescent light bulbs by 2014 to reduce carbon dioxide emissions by an estimated 732,000 tons and energy usage by 1,074 gigawatts a year.

Under the SAVE program, a rebate of RM100 to RM200 is offered to domestic consumers to purchase refrigerators and air-conditioning units that are energy efficient (five-star rated).

#### **f) Future tasks**

To carry out energy efficiency projects under the Eleventh Malaysia Plan (RMK-11), which covers the industrial sector as well as commercial and government buildings. The projects are aimed at creating an energy-efficient community in which both the deployment of technology and capacity building are given priority.

### **1.4. Institutional structure**

#### **a) Name of organization**

The key agencies involved in energy efficiency include the following: the Energy Section of Economic Planning Unit (EPU) of the Prime Minister's Department, the Ministry of Energy, Green Technology and Water (MEGTW), the Energy Commission (EC), and the Sustainable Energy Development Authority (SEDA Malaysia).

#### **b) Status of organization**

All agencies perform their duties for the central government.

#### **c) Roles and responsibilities**

The role of the MEGTW is to formulate an energy efficiency policy, in coordination with the EPU. The EPU provides the general direction, strategies, and determines the level of implementation, while the EC is the regulatory agency for the electricity and piped gas supply industry. The commission's main tasks are to provide technical and performance regulations for the electricity and piped gas supply industry (as the safety regulator for electricity and piped gas) and advise the minister on all matters related to electricity and piped gas supply, including energy efficiency and renewable energy issues. SEDA Malaysia is the executing agency for the Entry Point Project (EPP) on energy efficiency.

#### **d) Covered sectors**

Industrial, building, residential (appliances), and government sectors.

#### **e) Established Date**

The MEGTW was established in April 2009. It was formerly known as the Ministry of Energy, Water and Communications in 2004 and the Ministry of Energy, Communications

and Multimedia in 1998. The EC was established in 2001 after replacing the Department of Electricity and Gas Supply (DEGS). SEDA Malaysia was established in September 2011.

#### **f) Number of Staff**

There are five officers in the MEGTW in charge of renewable energy and energy efficiency, 11 officers in the EC who handle energy efficiency matters, and 12 officers in SEDA Malaysia who deal with renewable energy with one officer in charge of energy efficiency.

### **1.5 Information dissemination, awareness raising, and capacity building**

A large number of information-dissemination seminars and workshops have been held for energy users by organizations involved in promoting energy efficiency. The government has successfully implemented various activities related to renewable energy and energy efficiency through mass media, competitions, and exhibitions. Capacity-building programs, such as the Promotion of Energy Efficiency and Conservation (PROMEEC) ó Energy Management and ASEAN Energy Management Accreditation Scheme (AEMAS), has been successfully conducted by energy auditors, energy managers, and various government agencies in order to gain knowledge of efficient energy management in their own premises, while recognizing the vast business opportunities that lie ahead.

### **1.6 Research and development in energy efficiency and conservation**

Technical research on energy efficiency and conservation are mainly conducted by government-sponsored universities. The research is funded by the government through the Ministry of Science, Technology and Innovation.

## **2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS**

### **2.1. Government laws, decrees, and acts**

#### **a) Name**

Electricity Supply Act 1990 and the Electricity Supply Act (amended) 2001 (or Act A1116)

#### **b) Purpose**

To regulate the electricity supply industry. Act A1116 also includes provisions on the efficient use of electricity.

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

All electricity users are bound under the act.

#### **d) Outline**

Part VA of the act provides the following provisions on the efficient use of electricity:

Section 23A: The minister may, from time to time, prescribe the standards, specifications, practices, and measures to be adopted as well as any other matters in regard to the efficient use of electricity.

Section 23B: No person shall use or operate any installation unless the installation meets such requirements, as may be prescribed in regard to the efficient use of electricity.

Section 23C: No person shall manufacture, import, sell or offer for sale (or lease) any equipment unless the equipment meets such requirements, as may be prescribed in regard to the efficient use of electricity.

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

Annual budget from the government.

#### **f) Expected results**

Electricity saving and better electrical load management.

## 2.2. Regulatory measures

### g) Name

The Efficient Management of Electrical Energy Regulations 2008 (EMEER 2008)

### h) Purpose

To promote the efficient use of electrical energy through better energy planning and management.

### i) Applicable sectors

Industrial and commercial.

### j) Outline

The Efficient Management of Electrical Energy Regulations 2008 was gazetted on December 15, 2008, which required any installation with total electricity consumption of three million kWh or more over six consecutive months to appoint electrical energy managers and implement efficient electrical energy management.

### k) Financial resources and budget allocation

Annual budget from the government

### l) Expected results

Better energy management.

### a) Name

Minimum Energy Performance Standards (MEPS) and Labeling

### b) Purpose

To regulate the efficiency of electrical appliances available in the market.

### c) Applicable sectors

Residential and commercial.

### d) Outline

Five domestic electrical appliances (air conditioners, refrigerators, TVs, domestic fans, and lamps) are subject to MEPS requirements. MEPS values were set at a two-star rating. Increasing MEPS and labeling from five to 10 electrical appliances (rice cookers, electric kettles, washing machines, microwaves, clothes dryers, and dishwashers).

### e) Financial resources and budget allocation

Annual budget from the government

### f) Expected results

Eliminating inefficient electrical appliances from the local market.

## 2.3. Voluntary measures

The Green Building Index Malaysia (GBI Malaysia) certification is a profession-driven initiative to lead the Malaysian property industry to become more environmentally friendly. The energy efficiency of a building is one of the criteria for this certification.

The High-Efficiency Motor (HEM) program is a voluntary program to promote greater use of high-efficiency motors in Malaysia. The Energy-Efficient Refrigerator (EER) and Labeling Program is a voluntary program to promote energy-efficient refrigerators by introducing labels that highlight their energy use.

The Energy Efficiency and Conservation Guidelines Part 1: Electrical Energy-use Equipment: These guidelines encourage industries to adopt energy-efficient practices as well as manage and improve their energy use. The guidelines, covering a number of commonly used equipment, such as fans, motors, pumps, chillers, transformers, and air compressors, also highlight the best practices in the selection, design, operation, and maintenance of the equipment.

The Energy Efficiency and Conservation Guidelines Part 2: Thermal Energy-use Equipment: These guidelines encourage industries to adopt energy-efficient practices as well as manage and improve their energy utilization and environmental management. The guidelines, covering a number of commonly used equipment, such as boilers, thermal oil heaters, industrial furnaces, absorption chillers, heat exchangers, and cogeneration systems, also highlight the best practices in the selection, design, operation, and maintenance of the equipment.

## **2.4. Financial measures taken by the government**

### **2.4.1. Tax scheme**

The tax scheme for energy efficiency improvements are as follows:

Companies providing services for energy efficiency improvement are eligible for the following:

- Pioneer Status with an income tax exemption of 100% of the statutory income for 10 years.
- Investment Tax Allowance (ITA) of 100% on the qualifying capital expenditure incurred within a period of five years. The allowance to be set-off against 100% of the statutory income for each year of assessment.
- Import duty and sales tax exemption on energy-efficient equipment that are not produced locally, and sales tax exemption on the purchase of equipment from local manufacturers.

Companies that incur capital expenditures for improvements of their energy consumption are eligible for the following:

- Investment Tax Allowance of 100% of the qualifying capital expenditure incurred within five years.
- Import duty and sales tax exemption on energy-efficient equipment that are not produced locally, and sales tax exemption on the purchase of equipment from local manufacturers.

The Pioneer Status scheme and tax allowances expired in December 2015.

Companies that import energy-efficient products are eligible for the following:

- Exemption of import duty and sales tax is given on energy-efficient equipment, such as high-efficiency motors and insulation materials, to importers (including authorized agents approved by the Energy Commission).

Owners of buildings with a Green Building Index certificate are eligible for the following:

- Tax exemption equivalent to 100% of the capital expenditure incurred to obtain the certificate. New buildings and retrofitted buildings are also eligible for this incentive.

The buyers of buildings and residential properties with Green Building Index certificates are eligible for the following:

- Stamp duty exemption on instruments regarding the transfer of ownership of such buildings. The amount of stamp duty exemption is on the additional cost incurred to obtain the Green Building Index certificate.

The Green Building Index incentive expired in 2013.

#### 2.4.2 Low-interest loan

##### a) Name

Green Technology Financing Scheme (GTFS)

##### b) Level

Federal government.

##### c) Purpose

To provide financial support to local, green-technology industries, encourage local industries to embark on green technology, and help incorporate green-technology elements into specific projects related to the identified sectors.

##### d) Applicable sectors

Energy, waste and water, building, and transport sectors.

##### e) Outline

The fund provides soft loans to companies that supply or utilize green technology. The maximum financing for companies who are producers and users of green technology is RM 50 million and RM 10 million, respectively. The government will bear 2% of the total interest/profit rate. In addition, the government will provide a guarantee of 60% on the financing amount via the Credit Guarantee Corporation Malaysia Berhad, with the remaining 40% financing risk to be borne by participating financial institutions. Loan applications can be made through the Malaysian Green Technology Corporation (GreenTech Malaysia), an agency under the Ministry of Energy, Green Technology and Water.

Companies are required to submit their project proposals for technical evaluation to GreenTech Malaysia. Upon passing the technical evaluation, companies may apply for financing from any participating financial institution.

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

Participating financial institutions ó RM 3.5 billion.

##### g) Expected results

By the end of November 2015, 210 companies received loan approvals from financial institutions with a total amount of RM 2.4 billion. This will further spur green-technology development, especially regarding market creation and penetration of green technology in the economy.

#### 2.5. Energy pricing

The electricity tariff in Peninsular Malaysia is determined through the Incentive Based Regulation (IBR) framework and the Imbalance Cost Pass-Through (ICPT) mechanism implemented in January 2014. The ICPT allows the government to review the electricity tariff every six months, based on changes in fuel and generation costs. The ICPT mechanism is adopted to promote transparency and enable subsidy rationalization to occur in order for the economy to be more competitive and resilient. The ICPT takes into account gradual reductions in piped gas subsidies as well as changes in the market price of liquefied natural gas, coal, medium fuel oil, distillates, and other generation costs such as those related to the PPAs, displaced costs from renewable energy, and the cost of importing electricity.

## 2.6. Other efforts for energy efficiency improvements

### 2.6.1. Cooperation with non-government organizations

The government has developed cooperation with non-government organizations such as the Federation of Malaysian Consumers Associations, the Water and Energy Consumer Association, the Malaysia Association of Energy Service Companies (MAESCO), the Federation of Malaysian Manufacturers (FMM), the Association of Consulting Engineers *Malaysia* (ACEM), and the Electrical and Electronics Association of Malaysia (TEEAM) to promote energy efficiency activities. The promotional activities are mainly in the form of campaigns, workshops, seminars, and publications of energy efficiency-related materials.

### 2.6.2. Cooperation through bilateral, regional, and multi-lateral schemes

Malaysia is actively involved in regional and multi-lateral schemes on energy efficiency improvements. Malaysia and other South East Asian economies under the Association of South East Asia Nations (ASEAN) agreed to improve energy efficiency through the ASEAN Plan of Action for Energy Cooperation (APAEC). The APAEC outlines strategies such as ASEAN energy standards and labeling, the promotion of ESCOs, information sharing, and capacity-building to improve energy efficiency in the region.

In the East Asia Summit (EAS) in which Malaysia was involved, the members agreed to work together to improve energy efficiency in the region. As a member of the United Nations, Malaysia also hosted the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) with assistance and co-funding from the United Nations Development Program (UNDP) and the Global Environment Facility (GEF). The MIEEIP was aimed to address barriers to energy efficiency and energy conservation in the Malaysian industrial sector.

The Malaysian Chapter of the ASEAN Energy Management Accreditation Scheme (AEMAS), an initiative under the ASEAN Energy Efficiency and Conservation Sub-Sector Network (EE-SSN), was launched in 2011. The main objectives of the AEMAS are to reduce energy consumption in the industrial sector, reduce emissions of greenhouse gases, and increase the professional standing of accredited energy managers. The launch of the Malaysian Chapter of AEMAS marks an important milestone in the transition to an energy-efficient economy by placing high priority on human capital competency and drawing up of a code of practices to use technology more effectively.

The Promotion of Energy Efficiency and Conservation (PROMEEC) ó Energy Management for Malaysia was organized in November 2011. This program, under the EE-SSN, was jointly conducted with the ASEAN Centre for Energy (ACE) and funded by the Government of Japan. The PROMEEC is one of the capacity-building programs used to disseminate the energy data and reinforce the understanding and capabilities in managing energy more effectively.

The Building Sector Energy Efficiency Project (BSEEP), introduced in 2010, will last until the end of 2016. It is supported by the GEF and implemented by the UNDP and the Malaysia Public Works Department. The goal is to reduce the growth rate of greenhouse gas emissions in the building sector through improved energy efficiency in buildings, particularly in the commercial and government sectors. More specifically, it promotes energy-conserving designs for new buildings and related improvements in the operation of existing buildings.

Finally, the Industrial Energy Efficiency for the Malaysian Manufacturing Sector (IEEMMS), launched in April 2012, will last for five years. It was implemented by the United Nations Industrial Development Organization (UNIDO) and SME Corporation Malaysia. The project aims to improve energy efficiency in the manufacturing sector through the optimization of energy and production systems as well as the implementation of energy management systems based on the ISO 50001 standard.

# MEXICO

## 1. GOALS ON EFFICIENCY IMPROVEMENT

### 1.1. Overall energy efficiency improvement goals

Although there is no specific goal related to energy efficiency in Mexico, the National Program on Sustainable Energy Use (PRONASE) 2013-2018 aims at reducing overall energy intensity in order to protect the environment and achieve a low-carbon economy. These benefits are set in the Energy Sector Program 2013-2018 (PROSENER).

In addition, the objective of the PRONASE align with the goals set by the Climate Change Law, which aims at reducing greenhouse gas emissions in Mexico by conducting a set of mitigation actions that are defined (in the case of the public sector) in the Special Program on Climate Change (PECC).

The overall goals of the PRONASE and energy efficiency actions include the following:

- a) Achieve Mexico's energy security.
- b) The preservation and rational use of fossil non-renewable energy resources.
- c) Increase the productivity of the public and private sectors.
- d) Reduce the impact of climate change on the environment.
- e) Improve the living conditions of the Mexican population.

### 1.2. Sectoral energy efficiency improvement goals

#### a) Sector

The PRONASE is a program devoted to promoting and monitoring public policies, programs, projects, and actions that are conducted during its six-year period by different entities of Mexico's Government in order to achieve (directly or indirectly) optimal use of energy in the production sectors of the Mexican economy.

#### b) Goals

The PRONASE establishes six objectives, which address a number of strategies on energy efficiency in different sectors (see Table 1).

**Table 1.** The objectives and sectoral strategies of PRONASE

| Objectives  | Strategies  |
|---|---|
| <p><b>Objective 1. Design and develop programs and activities that promote the optimal use of energy in processes and activities of the energy chain.</b></p>   | <p>1.1. Implement energy efficiency actions in the processes of energy exploitation, processing, and distribution of state-owned energy companies.</p> <p>1.2. Increase energy efficiency in the residential, commercial, and services sectors as well as in agriculture and industrial processes by replacing technologies.</p> <p>1.3. Increase efficiency in energy consumption of the transport sector.</p> <p>1.4. Promote energy efficiency programs within the agencies and entities of the federal government's public administration.</p> <p>1.5. Continue and strengthen energy efficiency actions in the services provided by the states and municipalities.</p> |
| <p><b>Objective 2. Strengthen energy efficiency regulations for appliances and consumer energy systems manufactured and/or marketed in Mexico.</b></p>  | <p>2.1. Support the activities toward the implementation of energy efficiency standards.</p> <p>2.2. Support and strengthen the system of conformity assessment for energy efficiency mandatory standards.</p>  |
| <p><b>Objective 3. Strengthening governance systems and instances of energy efficiency at the federal, state, and municipal levels by integrating public, private, academic, and social institutions.</b></p> | <p>3.1. Promote and support the establishment of institutional arrangements for the design and execution of policies, programmes, and energy efficiency projects in the states and municipalities.</p> <p>3.2. Promote institutional arrangements for the implementation of programs and energy efficiency projects for large energy users.</p> <p>3.3. Promote the development of frameworks for financing energy efficiency projects and programs.</p> <p>3.4. Develop mechanisms for government coordination regarding the formulation and implementation of policies and programs to improve energy efficiency.</p>   |

| Objectives   | Strategies  |
|--|---|
| <b>Objective 4. Foster the development of technical and technological capacities related to the sustainable use of energy.</b> | <p>4.1. Expand and improve the training of personnel dedicated to the design, implementation, and operation of energy efficiency projects and programs.</p> <p>4.2. Strengthen and expand the range of consulting firms and development projects.</p> <p>4.3 Disseminate information to support professionals and companies engaged in energy efficiency.</p> |
| <b>Objective 5. Contribute to the formation and dissemination of an energy-saving culture among the population.</b>            | <p>5.1. Identify and assess the positive impacts of sustainable energy use in the context of households and businesses.</p> <p>5.2. Disseminate information on sustainable energy use.</p>  |
| <b>Objective 6. Promote energy efficiency research and development.</b>  | <p>6.1. Strengthen domestic capacities of research related to energy efficiency.</p> <p>6.2. Promote research that generates knowledge for the development of energy efficiency actions.</p>  |

Source: PRONASE 201362018, Ministry of Energy, Mexico, 2013.

### 1.3. Action plans for promoting energy efficiency

#### a) Name

CONUEE's Annual Work Plan (PAT)

#### b) Objectives

The Law on Sustainable Energy Use (LASE) provides The National Commission for the Efficient Use of Energy (*Comisión Nacional para el Uso Eficiente de la Energía*) (CONUEE) with the mandate to elaborate annual work plans that serve to establish the programs and actions for achieving sustainable energy use in Mexico. This annual work plan (PAT) is approved by the Minister of Energy and the Advisory Council on Sustainable Energy Use, which is mandated by the LASE and integrated by a selected group of experts from Mexican academic institutions.

The programs in the PAT focusing on energy efficiency standards, the federal government's public administration, and states and municipalities, also contribute to the mitigation of greenhouse gas emissions as set in the Special Program on Climate Change.

The PAT is based on the following principles:

- a) Working with all stakeholders to develop energy efficiency actions.
- b) Serve as a support platform and point of reference for energy efficiency activities to provide direction, incorporate stakeholders, and be an access window to information on energy efficiency.

- c) Facilitate third-party initiatives on energy efficiency.
- d) To provide more comprehensive and structured support to states and municipalities on capacity building.

The structure of the PAT follows a set of guidelines, which refer to the PRONASE's objectives:

- a) Strengthen the application of energy efficiency standards.
- b) Propose, articulate, and where appropriate, operate modifications to regulations or policies.
- c) Linking energy users with consultants, financial institutions, manufacturers, and other institutions.
- d) Support the integration of energy management systems for large energy users.
- e) Support state and municipal authorities.
- f) Integrate information on the sustainable use of energy.
- g) Cooperate with universities and research institutions.
- h) Strengthen Mexico's participation in the international context.
- i) Promotion of an energy-saving culture among end-users.

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

Programs and actions of the PAT are directed to end-users and state-owned productive enterprises.

The plan's activities have been organized to assist sectors in particular (sectoral programs), conduct actions that cross sectors (cross-cutting programs) and support the activities of CONUEE (support programs and actions).

**Figure 1. Structure of CONUEE's action plan**

#### d) Outline

The objectives and guidelines of CONUEE's main programs are as follows:

#### Federal Government

**Objective:** Promote the efficient use of energy in buildings, industrial facilities, and the vehicle fleets of the agencies and entities of the federal public administration through the implementation of best practices and technological innovation as well as the use of tools for operating, controlling, and monitoring energy efficiency actions.

CONUEE attends 251 energy efficiency committees as participants in the program. These committees include 2,300 officials.

In addition, CONUEE established a monitoring program for 2,430 buildings, 11 industrial facilities, and 1,026 fleet vehicles, among the 268 units and entities of Mexico's Federal Government.

#### Guidelines:

- a) Promote the implementation of institutional programs of energy efficiency as well as energy management systems within the agencies and entities.
- b) Improve the centralized control and monitoring system for specific actions, thus ensuring compliance with established goals.
- c) Facilitate the participation of the private sector in conducting actions of energy efficiency in the program through performance contracts or other mechanisms according to existing applicable regulations.
- d) Permanently train officials and operators of buildings and energy-consuming systems.

- e) Provide technical assistance, binding opinions, and/or recommendations for buildings and vehicle fleets of Mexico's Federal Government.
- f) Encourage agencies and entities of Mexico's Federal Government to pursue energy efficiency through the implementation of best practices and innovative technology.
- g) Incorporate energy efficiency criteria in government procurement, related equipment, and consumers' energy systems.

### States and municipalities

**Objective:** Promote the efficient use of energy by supporting the development of projects and the institutional capacities of states and municipalities for the identification, quantification, and implementation of programs and actions in the field of sustainable energy use.

CONUEE provides technical advisories, binding opinions and/or recommendations to the 32 states and 2,456 municipalities in Mexico.

#### Guidelines:

- a) Operate the economy-wide project of energy efficiency in municipal street lighting.
- b) Implement energy efficiency in state and municipal water-pumping systems.
- c) Promote and support the efforts to obtain and apply funds from public or private sources for the implementation of energy efficiency actions in the states and municipalities.
- d) Identify, document, and disseminate information, electronic tools, and methodologies through a web-based platform that will facilitate the implementation of programs and actions.
- e) Promote the development of technical and technological capacities linked to the sustainable use of energy in the state and municipal context.
- f) Strengthen the implementation and dissemination of mandatory and voluntary minimum energy performance standards (MEPS) among state and municipal authorities.
- g) Facilitate cooperation with domestic and international institutions that contribute to the sustainable use of energy in the context of states and municipalities.
- h) Assist the implementation of a economy-wide program for energy management systems.

### State-owned energy companies

**Objective:** Promote the improvement of energy efficiency in the facilities and processes of energy companies by implementing programs and measures that increase their competitiveness and production efficiency in the exploitation, processing, transport, and marketing of their products and services.

The program covers more than 600 installations in state productive enterprises (PEMEX and the Federal Electricity Commission (CFE)), thus giving timely follow-up to 380 facilities.

#### Guidelines:

- a) Promote and support the implementation of integrated energy management systems in state productive enterprises.

- b) To promote the incorporation of energy efficiency criteria in purchases of systems, transformers, and other equipment.
- c) Facilitate the participation of the private sector in conducting energy efficiency actions, through performance contracts or other financial mechanisms.
- d) Provide technical advice, binding opinions, and/or recommendations for facilities of state productive enterprises.
- e) Facilitate access to tools and information in order to identify and evaluate energy-saving potential.

### Large energy users

**Objective:** Support large energy users in timely and correct delivery of energy information and the development of their capabilities by providing energy management systems that allow them to increase their competitiveness through the sustainable use of energy.

The program covers 3,500 large energy users.

#### **Guidelines:**

- a) Promote the implementation of energy management systems.
- b) Support users of high consumption of energy (UPAC) with timely and correct delivery of information related to energy consumption and energy efficiency measures.
- c) Promote courses and materials to train specialized staff who design and operate programs and energy efficiency systems.
- d) Link to large corporate companies with energy service companies.
- e) Promote the use of clean energy and cutting-edge technologies.
- f) Promote the incorporation and operation of efficient co-generation.
- g) Facilitate access to tools and information in order to identify and evaluate energy savings.

### Energy management systems

**Objective:** To provide advice and tools that strengthen the implementation of energy management systems, increase competitiveness, and continuously improve the energy performance of end-users in their facilities.

#### **Guidelines:**

- a) Promote capacity-building courses on the design and implementation of energy management systems.
- b) Facilitate partnerships between large energy users and energy research and management institutions (universities, research centers, certification organizations) to develop energy management systems.
- c) Support the development of human capital in energy management.

- d) Facilitate access to tools and information to support the design of energy management systems.
- e) Facilitate access to international mechanisms that support energy management actions.

## Transport

**Objective:** Promote the efficient use of energy in the transport sector, the development of the best practices and the promotion of new technologies for motor vehicles, and the use of alternative fuels. In addition, promote the incorporation of modern public transport systems in cities to reverse the long-term trend of individual transport.

### Guidelines:

- a) Assess and propose the implementation of administrative provisions and regulations related to energy efficiency for motor vehicles.
- b) Encourage the use of efficient vehicles and alternative fuels and, in general, the implementation of technologies that improve energy efficiency in transport.
- c) Provide technical assistance to managers of vehicle fleets (both public and private) as well as to chambers, associations, and trucking companies.
- d) Promote links between users and stakeholders of transport with different public and private institutions (domestic and international), and foster the development of energy-saving measures in this sector.
- e) Design and propose strategies to improve the energy efficiency of transport systems that contribute to urban mobility.
- f) Establish, in conjunction with other units, a program of support to improve energy efficiency in small businesses (e.g., the "Hombre-Camión" initiative).
- g) Continue with the development, integration, and dissemination of information gathered in guides, manuals or technical specifications as well as the development of tools that support methodologies aimed at the efficient use of energy in transport.

## Buildings

**Objective:** Promote the efficient use of energy in commercial buildings and services by implementing good practices, incorporating practices of design, applying appropriate materials and efficient technologies as well as using tools to operate, control, and monitor energy efficiency actions.

The program covers office and commercial private buildings (in construction and in operation).

### Guidelines:

- a) Support in full compliance of the energy efficiency standards that apply to residential and commercial buildings.
- b) Support the integration and dissemination of information and tools that promote the efficient use of energy and the use of renewable energy in buildings.
- c) Promote and support the development of codes in buildings to promote the quality and energy efficiency in their construction and operation.

- d) Promote and support the development of courses and degree programs to promote the training of human resources in this area and in related specialties.
- e) Strengthen the information systems and energy indices related to commercial buildings.
- f) Strengthen actions that promote the use of efficient equipment and materials as well as the bioclimatic architecture, construction, and/or renovation of buildings.
- g) Encourage the linking of building owners with consultants, suppliers of products and services, and other actors related to the efficient use of energy in buildings.

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

CONUEE's budget is allocated by the Ministry of the Treasury (SHCP).

#### f) **Method for monitoring and measuring the effects of action plans**

Monitoring is carried out every six months (or annually) and the results are reported in the following documents: Activities Report of the Ministry of Energy; Government Report; Sector Outlook; and National Energy Balance. In addition, CONUEE provides a detailed report to the Ministry of Energy and the Ministry of Finance on the accomplishment of its objectives, strategies, action lines, goals, and indicators for each fiscal year.

### 1.4. Institutional structure

#### 1.4.1 Central Institutional Structure

##### a) **Name of organization**

CONUEE (formerly known as National Commission for Energy Saving (CONAE)) is Mexico's public organization in charge of gathering and implementing the efforts from the federal government on energy efficiency. It aims to promote energy efficiency and establish itself as a technical body, especially in terms of the sustainable use of energy. CONUEE is an agency within the Secretariat of Energy (SENER), with technical and operative autonomy.

The main attributions of CONUEE include the following:

1. Implement a economy-wide registry of end-users certified as energy responsible.
2. Issue mandatory opinions to public agencies and federal government bodies on the best practices for sustainable energy use.
3. Issue recommendations on the best practices for sustainable energy use for state and municipal authorities as well as the private sector.
4. Develop a program directed toward private sector end-users in order to support and provide follow-ups on the implementation of energy efficiency improvements.
5. Conduct and order visits to those end-users who carry out sustainable energy-use measures in order to verify compliance of existing laws and regulations.
6. Elaborate and issue greenhouse gas emissions quantifying methodologies in energy production, transformation, distribution, and end-use as well as those to quantify the implementation of sustainable energy-use measures.
7. Elaborate and issue methodologies and procedures to quantify energy use, and determine the economic value of end-use and the avoided processes resulting from sustainable energy use.

8. Provide technical assistance on sustainable energy use to the entities and agencies of the federal government as well as state and municipal authorities.
9. Implement an economy-wide information system of sustainable energy use.
10. Implement and update information on resources and trust funds directed toward financing sustainable energy use, either partially or completely by the federal government.

**b) Status of organization**

The technical branch of the Ministry of Energy, with technical and operative autonomy. The body in charge of articulating policies and programs regarding the sustainable use of energy in the economy.

**c) Roles and responsibilities**

- Promote the sustainable use of energy through the adoption of measures and the best practices regarding the efficient use of energy in the different sectors of the economy and the population.
- Position itself as the representative technical body of public policies on sustainable use of energy in order to achieve technological and behavioral changes of energy end-users, with the participation of public, social, and private sectors.

**d) Covered sectors**

In order to achieve broader participation from different sectors as well as to make efficient use of available resources. This Work Program has organized its activities according to the sectors to which they are directed:

Programs by Sector

- Federal government.
- Local governments.
- Government corporations.
- Large corporations.
- Small- and medium-sized enterprises (SMEs).
- Residential sector.

Cross-cutting Programs

- Standardization.
- Capacity building.
- Transport.
- Buildings.
- Distributed generation.
- Energy management systems.

Support Programs

- National Sustainable Energy Use Program (PRONASE).
- Information from the energy sector.
- International cooperation.
- Promotion and dissemination.

**e) Established date**

CONUEE arises from the institutional structure of the National Commission for Energy Saving (CONAE), which was created on September 28, 1989, as a consultative technical body of the departments and agencies of Mexico's Federal Government, the governments of the states and municipalities as well as the private sector.

On September 20, 2009, a decree was published in the Official Gazette, thus establishing the CONUEE as an administrative body within the Secretariat of Energy, and replacing CONAE.

**f) Number of staff**

130 employees.

**1.4.2 Activities on energy efficiency improvement.**

Detailed activities on this subject are described in the outline of CONUEE's work plan.

**1.5. Research and development in energy efficiency and conservation**

PRONASE, in order to identify the potential of the sustainable use of energy, requires collaborative actions between multiple organizations. These actions must be translated into public policy, enforceable in the short and medium term.

The group of actions to be undertaken include the following:

1. Institutional strengthening.
2. Inter-agency coordination.
3. Education, training, information, and communication.
4. Linking with outside sources.

These groups focus on research and development in energy efficiency through actions such as the following:

1. Establishing formal education and researcher's development program.
2. Creating new institutional programs for all education levels.
3. Creating a standardization program for energy efficiency.
4. Obtaining accurate information regarding the public's energy consumption.
5. Preparing and publishing books, catalogs, manuals, articles, and technical manuals about energy efficiency works.
6. Promote technology application and the use of energy-efficient equipment, appliances, and vehicles.

**2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS****2.1. Government Laws, Decrees, and Acts****a) Name**

LASE - Law on Sustainable Use of Energy.

LFMN ó Federal Law on Metrology and Standardization.

LGCC ó General Law on Climate Change.

RLASE ó Regulatory Framework of the Law on Sustainable Use of Energy.

**b) Purpose**

These legal and regulatory instances provide the general framework that set the overall energy efficiency objectives that must be reached as well as the technical means to achieve them.

**c) Applicable sectors**

Regarding energy efficiency, they apply to federal and local governments, government corporations, large corporations, SMEs, the residential sector, transport, buildings, standardization, and capacity-building-related activities as well as other sectors that CONUEE may identify as priority sectors.

**d) Outline**

Published on July 1, 1992 (LFMN).

Published on November 28, 2008 (LASE).

Published on September 11, 2009 (RLASE).

Published on June 6, 2012 (LGCC).

**e) Financial resources and budget allocation**

These legal and regulatory frameworks do not have specific financial resources or allocated budgets. They depend on the availability of resources in each fiscal year.

**f) Expected results**

The Mexican Government expects the fulfillment of the energy efficiency legal and regulatory framework through compliance with the PRONASE.

**2.2. Regulatory measures****2.2.1. Minimum Energy Performance Standards (MEPS) and Labeling****a) Name**

Energy Efficiency Standards

**b) Purpose**

Promote the efficient use of energy through the energy efficiency standards of products and systems manufactured and marketed in Mexico. Ensure compliance with official Mexican energy efficiency standards, and maintain and strengthen the infrastructure for conformity assessment.

**c) Applicable sectors**

Industrial, residential, commercial and services, and government.

**d) Outline**

Mexico's mandate for Energy Efficiency Standards comes from a generic law, the Federal Metric and Standardization Law (*Ley Federal sobre Metrología y Normalización*) of July 16, 1992, which defines the Official Mexican Standards (NOMs) (*Normas Oficiales Mexicanas*). The NOMs are enacted by the Federal Secretariats, according to their areas of expertise. In the case of energy efficiency, it is the Ministry of Energy, through CONUEE, which enacts the mandatory standards.

**Figure 3.** Official Mexican Standards (NOMs) logo

# NOM

Mexico adopted energy standards in 1995, and since then, it has established standards for 25 products or systems. Many of their standards are modeled on those of the United States, but they have been adapted to local situations and experiences from their own programs.

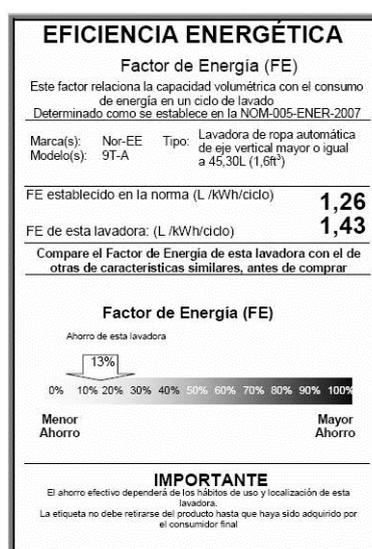
The following table presents the NOMs on energy efficiency in force for 2012:

**Table 2. Mandatory energy efficiency standards in Mexico**

| Standard Code                          | Product   |
|--|---|
| <b>NOM-001-ENER-2000</b>               | Pumps (vertical)  |
| <b>NOM-002-SEDE/ENER 2014</b>          | Security and energy efficiency for distribution transformers  |
| <b>NOM-003-ENER-2011</b>               | Water Heaters (gas)   |
| <b>NOM-004-ENER-2014</b>               | Pumps (centrifugal)   |
| <b>NOM-005-ENER-2012</b>               | Clothes Washers   |
| <b>NOM-006-ENER-1995</b>               | Pumps (deep well)   |
| <b>NOM-006-ENER-2015</b>               | Existing Pumps (deep well)                                    |
| <b>NOM-007-ENER-2014</b>               | Non residential Lighting System (indoor)                      |
| <b>NOM-008-ENER-2001</b>               | Envelope (commercial buildings)                               |
| <b>NOM-009-ENER-2014</b>               | Thermal Insulation (industrial)                               |
| <b>NOM-010-ENER-2004</b>               | Pumps (submersible)   |
| <b>NOM-011-ENER-2006</b>               | Central Air Conditioner (packaged terminal, split-type)       |
| <b>NOM-013-ENER-2013</b>               | Lighting System (outdoor)                                     |
| <b>NOM-014-ENER-2004</b>               | Motors (1-phase induction)                                    |
| <b>NOM-015-ENER-2012</b>               | Domestic Refrigeration  |
| <b>NOM-016-ENER-2010</b>               | Motors (3-phase induction)                                    |
| <b>NOM-017-ENER/SCFI-2012</b>          | CFLs  |
| <b>NOM-018-ENER-2011</b>               | Thermal insulation materials for buildings                    |
| <b>NOM-019-ENER-2009</b>               | Tortilla mechanical machines                                  |
| <b>NOM-020-ENER-2011</b>               | Envelope (domestic buildings)                                 |
| <b>NOM-021-ENER/SCFI-2008</b>          | Room Air Conditioners (packaged terminal, window-type)        |
| <b>NOM-022-ENER/SCFI 2014</b>          | Commercial Refrigeration                                      |
| <b>NOM-023-ENER-2010</b>               | Air Conditioners (ductless)                                   |
| <b>NOM-024-ENER-2012</b>               | Glazing systems (buildings)                                   |
| <b>NOM-025-ENER-2013</b>               | Stoves (gas)  |
| <b>NOM-028-ENER-2010</b>               | Lamps   |
| <b>NOM-030-ENER-2012</b>               | LEDs (indoor)   |
| <b>NOM-031-ENER-2012</b>               | LEDs (outdoor)  |
| <b>NOM-032-ENER-2014</b>               | Standby devices   |
| <b>NOM-163-SEMARNAT/ENER/SCFI 2013</b> | CO <sub>2</sub> emissions and energy performance for vehicles |

Sources: CONUEE, 2015, [http://www.conuee.gob.mx/wb/Conuee/normas\\_de\\_eficiencia\\_energetica\\_vigentes](http://www.conuee.gob.mx/wb/Conuee/normas_de_eficiencia_energetica_vigentes).

Under Mexican law, and as an element of the standards, CONUEE also implements a mandatory (as shown in Figure 3) comparative labeling program for room and central air conditioners, refrigerators and/or refrigerator-freezers, clothes washers, centrifugal residential pumps, gas water heaters, commercial refrigeration, and non-residential building envelopes.

**Figure 3. Example of an energy efficiency label for a washing machine**

Labeling is mandatory for the following electrical products offered for sale in Mexico:

- Central air conditioners (packaged terminal)
- Central air conditioners (split type)
- Clothes washers
- Freezers
- Pumps (centrifugal)
- Room air conditioners (packaged terminal)
- Room air conditioners (window)
- Refrigerators
- Refrigerator-freezers
- Refrigerators (commercial)
- Water heaters (gas)
- Glazing systems

#### e) Financial resources and budget allocation

For 2012, the budget considered for the National Commission for the Efficient Use of Energy was MXN 92.08 million (equivalent to USD 7.08 million USD).<sup>13</sup>

### 2.3. Voluntary measures

#### 2.3.1 Voluntary Certification Program for Products, Processes, and Services

LASE establishes that CONUEE will develop a program to promote the voluntary certification of processes, products, and services. Therefore, CONUEE will perform the following:

<sup>13</sup> At an average currency rate of 13 MXN per 1 USD (as of 2012).

- Develop a methodology for the certification of processes, products, and services.
- Establish an accreditation system of auditors, and determine the procedures and requirements that will have to be met by those interested in being part of the process.
- Develop training programs in audits and other areas of the energy sector.
- Create a system that identifies the enterprises that have certified their processes, products, and services.
- Promote the creation of regional centers that provide support to SMEs, with the purpose of facilitating the certification of processes, products, and services.

### 2.3.2 Mexican Standards (NMX)

The Federal Law on Metrology and Standardization (LFMN) defines the framework of the voluntary standards or Mexican Standards (NMX) (*Normas Mexicanas*). In Mexico, the Standardization and Certification Association (ANCE) (*Asociación de Normalización y Certificación*) is in charge of developing the NMX related to the electrical industry. It can also certify other sectors, while it has its own laboratory for conducting various standardized tests.

Although the NMX are voluntary, if the NOM makes reference to one NMX, then it becomes mandatory to comply with the standard.

### 2.3.3 Sello FIDE (FIDE Stamp/seal)

Sello FIDE or FIDE Stamp/seal is a voluntary energy efficiency endorsement that has been granted by the Trust Fund for Energy Saving (FIDE) since 1995. Manufacturers have to submit certified test results on their products in order to confirm that these comply with Sello FIDE requirements. If so, then manufacturers sign an agreement with FIDE stipulating the time frame of the Sello FIDE endorsement, how it can be displayed, renovated, and/or cancelled. Manufacturers can then display the Sello FIDE (as shown in Figure 4) on their products. FIDE advertises the Sello FIDE in order for consumers to see them when purchasing electrical equipment.

**Figure 3.** FIDE brand logo



## 2.4. Financial measures taken by the government

### 2.4.1. Tax scheme

There is tax scheme related to energy efficiency in Mexico.

### 2.4.2. Low-interest loans

The Eco-credit Business Program (PAEEEM) is designed to support the business sector by providing low-interest loans for the replacement of obsolete equipment for high-efficiency technologies approved by FIDE. This program targets all economic sectors.

### 2.4.3. Trusts and Funds

#### a) Level of Government (central/regional):

Central.

#### b) Name of Policy:

The following are the most representative trusts and funds targeting the promotion of energy efficiency in Mexico:

- Energy Sustainability Sectorial Fund (FSE): It allocates resources to finance projects of which their main objectives include scientific research and development of applied technology on renewable energy sources; energy efficiency; use of clean technologies; diversification of primary sources of energy; and the adoption, innovation, assimilation, and technological development in the these areas. This fund receives financial resources from the annual payment made by PEMEX (the government owned oil company), which is equivalent to a percentage of the annual crude oil and natural gas sales.
- Fund for Energy Transition and Sustainable Use of Energy (FOTEASE): It aims to promote the use, development, and investment in renewable energies and energy efficiency by allocating resources for projects and programs in these areas.
- Trust Fund for Energy Saving (FIDE): It is a public-private body created to finance projects and programs in the field of energy efficiency, certify efficient products, provide technical assistance, and disseminate the culture of energy saving.
- Trust Funds for Rural Development (FIRA): They support access to credit for projects related to agriculture, livestock, poultry farming, agribusiness, fishing, and other similar activities carried out in rural areas.

#### c) Responsible Department/Agency:

FSE - Ministry of Energy (SENER), National Council on Science and Technology (CONACYT).

FOTEASE - Ministry of Energy (SENER).

FIDE - Federal Energy Utility (CFE).

FIRA - Ministry of Finance (SHCP) and the Central Bank (BANXICO).

#### d) Applicable Sectors:

FSE - Research and higher education institutions engaged in scientific research and applied technology in clean energy.

FOTEASE - Public and private sectors as well as households have been supported thus far.

FIDE - Households, industrial, commercial, and agricultural sectors as well as services, local governments, and SMEs.

FIRA - Agriculture, livestock, poultry farming, agribusiness, fishing, and other similar activities carried out in rural areas.

## 1.2. Energy pricing

Prices and tariffs of electricity, natural gas, and liquefied natural gas are regulated by the Ministry of Finance (SHCP) and the Energy Regulatory Commission (CRE).

## 1.3. Other efforts for energy efficiency improvements

### a) Cooperation with non-government organizations

The Mexican Government cooperates with non-government organizations (NGOs) to stimulate energy efficiency. Some of these organizations are listed below:

- Asociación de Empresas para el Ahorro de Energía en la Edificación
- Asociación de Técnicos y Profesionistas en Aplicación Energética, A.C.
- Asociación Nacional de Energía Solar
- Centro Mexicano de Derecho Ambiental
- Centro Mexicano para la Producción más Limpia
- Foro para el Desarrollo Sustentable, A.C.
- Mexico ó United States Foundation for Science (FUMEC)
- Fundación para el Desarrollo Sustentable, A.C.
- Greenpeace ó Mexico
- Grupo de Estudios Ambientales
- Centro Mario Molina
- International Center on Clean Transport, among others.

### b) Cooperation through bilateral, regional, and multi-lateral schemes

Throughout the more than 25-year history in energy efficiency, Mexico has participated in all major international forums on this subject.

The development of policies aimed at the public sector, energy efficiency standards, and other activities that cater to the productive sectors have allowed Mexico to position itself as a point of reference in the field of energy efficiency, especially in Latin America and the Caribbean.

In addition, international cooperation has supported the consolidation of partnerships with domestic and international bodies:

- a) It supports the activities set in the Annual Work Plan.
- b) It contributes to the achievement of the energy efficiency priorities of Mexico:
  - a. Technical certainty
  - b. Capacity building
  - c. Decision-making information on energy efficiency
- c) It facilitates the access to financial resources and technical exchanges with the more developed countries.

The following table summarizes the different international cooperation actions of Mexico on energy efficiency issues, with the international agencies involved and the specific projects:

**Table 3. Mexico's international collaboration activities on energy efficiency**

| Collaboration area   | Agency/Body   |
|--|---|
| States and municipalities: <ul style="list-style-type: none"> <li>✓ Street lighting</li> <li>✓ Water pumping</li> <li>✓ Capacity building</li> </ul>   | Super Efficient Appliance Deployment Initiative (SEAD), Clean Energy Ministerial (CEM), Carbon Trust, GIZ, ICLEI, U.S. Agency for International Development (USAID) |
| Standardization: <ul style="list-style-type: none"> <li>✓ Technical support in the development of standards</li> <li>✓ Impact analysis of mandatory standards (NOMs)</li> </ul>  | SEAD (IPEEC), CEM, Collaborative Labeling and Appliance Standards Program (CLASP), Lawrence Berkeley National Laboratory (LBNL), USAID                              |
| Industry: <ul style="list-style-type: none"> <li>✓ EnMS (guidelines, capacity building, and pilot projects)</li> <li>✓ Cool roofs</li> </ul>   | Global Superior Energy Performance Initiative (GSEP), CEM, Denmark, GIZ, USAID  |
| Buildings: <ul style="list-style-type: none"> <li>✓ EnMS (guidelines, capacity building and pilot projects)</li> <li>✓ Benchmarking</li> <li>✓ Cool roofs</li> <li>✓ Standards for buildings</li> <li>✓ Building codes strengthening</li> <li>✓ Measurement systems strengthening</li> <li>✓ Implementation guideline for NOM-020-ENER-2011</li> </ul> | IPEEC (GSEP and Building Energy Efficiency Task Group - BEET), CEM, United Nations Development Program (UNDP), GIZ, Denmark   |
| Solar water heating: <ul style="list-style-type: none"> <li>✓ Legal framework and financial schemes</li> <li>✓ Capacity building</li> <li>✓ Promotion</li> <li>✓ Development of tools</li> </ul>   | UNDP, GIZ   |
| Cogeneration: <ul style="list-style-type: none"> <li>✓ Development of a NAMA</li> <li>✓ Promotion</li> </ul>   | UNDP, GIZ   |
| ESCO scheme and Energy Performance Contracting (EPC): <ul style="list-style-type: none"> <li>✓ Development of the general contract</li> <li>✓ Pilot projects</li> </ul>  | GIZ   |
| SMEs: <ul style="list-style-type: none"> <li>✓ Development of financial scheme</li> <li>✓ Handbook of energy efficiency technologies</li> </ul>  | Carbon Trust  |

| Collaboration area   | Agency/Body   |
|--|---|
| Energy information and indicators: <ul style="list-style-type: none"> <li>✓ Energy Efficiency Indicators Database (BIEE)</li> <li>✓ Energy statistics</li> </ul> | Economic Commission for Latin America and the Caribbean (ECLAC), GIZ, International Partnership for Energy Efficiency Cooperation (IPEEC) |

|  |   |
|--|---|
| <p>Capacity building and triangular cooperation:</p> <ul style="list-style-type: none"> <li>✓ Workshops, seminars and exchange missions in Latin America and the Caribbean</li> <li>✓ Training abroad</li> <li>✓ Capacity building through webinars</li> </ul> | Energy and Climate Partnership of the Americas (ECPA), Clean Energy Solutions Center, Japan (JICA), GIZ, Mexican International Cooperation Agency (AMEXCID) |
| <p>Digital communities of practice:</p> <ul style="list-style-type: none"> <li>✓ Development of platform</li> <li>✓ Knowledge management process</li> </ul>  | GIZ, UNDP   |
| <p>Television Digital Transition:</p> <ul style="list-style-type: none"> <li>✓ Technical specifications</li> </ul>   | SEAD, CEM, LBNL   |

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# NEW ZEALAND

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The New Zealand Government's economy-wide energy efficiency target is for New Zealand to continue to achieve a rate of energy intensity improvement of 1.3% per annum.<sup>14</sup>

### 1.2. Sectoral Energy Efficiency Improvement Goals

A number of sector-specific goals are in place to help achieve the overall energy efficiency improvement goals set out in the New Zealand Energy Efficiency and Conservation Strategy (NZECS):

- **Transport** – By 2016: The efficiency of light vehicles entering the fleet has further improved from 2010 levels.
- **Business**
  - By 2016: An improvement in the energy intensity levels of the commercial and industrial sectors.
  - By 2025: To utilize up to 9.5 PJ per year of energy from woody biomass or direct-use geothermal in addition to that used in 2005.
- **Residential**
  - By 2016: Insulate 46,000 homes with high health-risk occupants under the new 'Warm Up New Zealand: Healthy Homes' program (in addition to the 241,000 houses insulated under the 'Warm Up New Zealand: Heat Smart' program that operated from 2009 to 2014).
- **Appliances** – By 2016: Extend minimum energy performance standards, labeling, and Energy Star product coverage to remain in line with major trading partners.
- **Electricity System** – By 2025: 90% of electricity will be generated from renewable sources, thus providing supply security.
- **Public Sector** – By 2016: Improve energy use per full-time staff member compared to the 2010 baseline.

### 1.3. Action Plans for Promoting Energy Efficiency

The NZECS 2011-2016 is the main program for promoting energy efficiency in New Zealand.

#### a) Objectives

The use of energy-efficient technology and practices, energy conservation, and renewable sources of energy can achieve the following:

1. Enhance economic growth through increased productivity.
2. Improve energy security by reducing energy demand, including imported sources of energy.
3. Assist with energy affordability by reducing consumer energy costs.
4. Defer the need for a more expensive energy supply by making better use of existing energy.

<sup>14</sup>[The New Zealand Energy Efficiency and Conservation Strategy 2011-2016.](#)

5. Reduce greenhouse gas emissions from energy.
6. Improve people's health, wellbeing, and productivity through warmer and more energy-efficient homes.

As such, the NZEECS contributes to the delivery of the government's energy priorities set out in the New Zealand Energy Strategy.

#### **b) Applicable sectors**

Transport, business, residential, products, electricity, and government.

#### **c) Outline**

The NZEECS was completed as a requirement of the Energy Efficiency and Conservation Act 2000 and released in August 2011. The NZEECS replaced the second Energy Efficiency and Conservation Strategy released in 2007. The Strategy is written as a companion document to the New Zealand Energy Strategy (NZES), and it presents the government's policies and actions on energy efficiency, energy conservation, and renewable energy. It also gives effect to the energy efficiency, energy conservation, and renewable energy objectives set out in the NZES.

The NZEECS promotes the careful use of a combination of government measures, which can be grouped as follows:

- Information to target consumer and business needs.
- Incentives to funding or financial products to help build capability and leverage investment.
- Codes and standards to underpin confidence in energy-efficient products and practices.
- Research and development to support innovative capability.

These measures may often be delivered in partnership with industry associations, not-for-profit energy trusts, and other parties. The exact combination of measures adopted by relevant government agencies to deliver the NZEECS will vary according to the scale of the opportunities and the specific needs of the stakeholders.

The NZEECS is due for review in 2016.

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

Actions in the NZEECS are funded by a wide range of sources, including the government, private sector, voluntary sector, and individuals. In fiscal year 2013/14, \$89 million was allocated for the Energy Efficiency and Conservation Authority (EECA) in order to promote energy efficiency. This figure is revised on an annual basis.

#### **e) Method for monitoring and measuring the effects of action plans**

The Minister of Energy and Resources is accountable for the overall performance of the strategy. The Ministry of Business, Innovation and Employment (MBIE) reports on the implementation of the strategy to the minister.

#### **f) Expected results**

To achieve the goals outlined in Sections 1.1 and 1.2.

#### **g) Future tasks**

The strategy is amplified in the EECA's Statements of Intent, Output Agreements, and Annual Reports.

### **Institutional Structure**

**a) Name of organization**

The EECA is the principal energy efficiency program delivery agency.

**b) Status of organization**

The EECA is a Crown entity, established under the Energy Efficiency and Conservation Act 2000 and subject to the Crown Entities Act 2004. The EECA is governed by a chairman and board members (up to a maximum of eight) who report to the Minister of Energy and Resources. The EECA acts as a policy maker, regulator, program funder, and implementer.

**c) Roles and responsibilities**

The EECA's function is to encourage, promote, and support energy efficiency, energy conservation, and the use of renewable energy sources in New Zealand. The EECA works closely with government operational and policy agencies in order to help them design, implement, and monitor policies related to energy efficiency.

The MBIE has the responsibility of providing high-level energy efficiency policy advice to the Minister of Energy and Resources and monitoring progress towards the NZEECS objectives.

The Ministry of Transport and the New Zealand Transport Agency are responsible for most of the transport-related energy efficiency initiatives with the exception of vehicle fuel-consumption labels (see Section 2.2.3 below). The EECA has a Letter of Understanding with the New Zealand Transport Agency regarding the management of fuel-consumption information.

Other agencies that share responsibility for energy efficiency include the following: the Ministry of Agriculture and Forestry (renewable fuels, industry), the Housing New Zealand Corporation (state housing improvement programmes), Standards New Zealand (for energy efficiency in products/equipment), and the Ministry of Foreign Affairs and Trade (WTO, mutual recognition arrangements, APEC forums, etc.). The New Zealand government also works closely with the Australian Government on product and appliance standards and labeling.

There are 17 regional government authorities (11 regional councils and six unitary councils) in New Zealand. Each regional council is required to produce a regional policy statement that covers all natural resources, including energy. The NZEECS must be taken into consideration in the preparation of regional policy statements. Land transport strategies must also be consistent with the NZEECS.

**d) Covered sectors**

Industrial, business, commercial buildings, transport (fuels), residential households, products, and equipment.

**e) Established date**

In 2000, as part of the Energy Efficiency and Conservation Act.

**f) Number of staff members**

As of June 30, 2014, the EECA includes 83 permanent staff members.

**1.4. Information Dissemination, Awareness Raising, and Capacity Building****a) Information Collection and Dissemination**

The New Zealand Government conducts monthly surveys to monitor the public's awareness, willingness, and commitment to energy efficiency. Brand association and energy use behavior change are also monitored. Survey results are published on a monthly and quarterly basis. The business sector also publishes case studies to promote energy technologies and behavioral changes in the industry.

### b) Awareness Raising

Information about energy efficiency is provided to New Zealanders through a number of channels, the main mechanisms of which include the following:

- The following websites focus on the EECA's three distinct audiences (i.e., people at home, businesses, and our corporate stakeholders):
  - EECA (corporate website) [www.eeca.govt.nz](http://www.eeca.govt.nz).
  - ENERGYWISE (consumer-focused website) [www.energywise.govt.nz](http://www.energywise.govt.nz).
  - EECA Business (all businesses) [www.eecabusiness.govt.nz](http://www.eecabusiness.govt.nz).
- The Energy Spot television programs that cover topics such as hot water wastage, energy-efficient renovation, saving fuel in business, and choosing efficient lighting. There are currently more than 30 programs available for viewing at <http://www.energywise.govt.nz/resource-centre/videos/>.
- Mandatory labeling of appliances and vehicles (including second-hand vehicles) plus voluntary labeling, i.e., Energy Star.
- The EECA Awards (held every two years) that celebrate and promote energy efficiency practices in communities, businesses, and industries. This includes a wide range of marketing and advertising campaigns for print, radio, and TV.

### c) Capacity Building

Capacity building for the energy services sector that helps businesses identify and implement cost-effective efficiency measures is seen as the key to achieving the government's energy saving targets.

Capacity-building interventions in the business sector have traditionally been delivered by universities and technical institutes, mostly as part of wider engineering courses. More recently, the focus has intensified on developing specific energy management training in the following areas of high-economic potential:

- Commercial buildings: Courses are in place to improve electricity management and efficiency in the commercial building services industry (targeting energy specialists, facilities managers, and commercial property valuers). Courses are delivered by the Energy Management Association New Zealand (EMANZ), which is an industry association of energy management experts, including energy auditors, energy managers, and suppliers of energy-efficient products and services.
- Industrial sector: The University of Waikato provides training and accreditation programs in energy efficiency for pumps, fans, and compressed-air systems.
- Transport: The EECA's Heavy Vehicle Fuel Efficiency Program is designed (among other things) to improve the fuel efficiency of heavy-vehicle fleets through expert advice and driver training. The EECA trains independent and in-company fuel advisors and trainers.

Under the "Warm Up New Zealand: Heat Smart" and "Warm Up New Zealand: Healthy Homes" programs, service providers have been required by the EECA to provide proof that they have the internal capacity and capability to deliver the programs and meet the required standards. Applicants have been assessed on these criteria by an independent evaluation panel

that makes annual reviews to ensure that they have the ongoing capacity to deliver the program while meeting the standards.

The EECA financially supports the Insulation Association of New Zealand (IAONZ), which has developed a four-stage training module for insulation installers.

#### **d) Research and Development in Energy Efficiency and Conservation**

The lead agency for the government's policy on research and development is the Science, Skills, and Innovation Division of the MBIE. It includes the mandate to transform New Zealand by driving science and innovation to improve the economic, environmental, and innovation sectors.

In New Zealand, 70% of energy is consumed by businesses. In this sector, the EECA's stated objective is to support enhanced business competitiveness and lower CO<sup>2</sup> emissions. This objective of the New Zealand Energy Efficiency and Conservation Strategy supports the 2025 targets of improved industrial and commercial energy intensity and the 9.5 PJ per year of energy from woody biomass or direct-use geothermal (in addition to that used in 2005). The EECA Business Program is designed to overcome market barriers across the three groups related to the scale of energy use, and to that end, it includes the following capability initiatives: training and accreditation programs for service providers and training programs for end-users and key influencers.

The EECA also administers an internal research program that focuses on the following areas:

- Better information on energy-efficient technology research.
- Research energy end-use in industrial, commercial, and residential buildings.
- Primary production and manufacturing sector energy end-use research.
- Macro-economic modeling of energy efficiency potentials.
- Behavior change research and understanding end-user service needs.

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## **2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS**

### **2.1. Government Laws, Decrees, and Acts**

#### **a) Name**

Energy Efficiency and Conservation Act 2000

#### **b) Purpose**

To promote energy efficiency, energy conservation, and renewable energy in New Zealand. The act can be found at [www.legislation.govt.nz/act/public/2000/0014/latest/whole.html#d1m54948](http://www.legislation.govt.nz/act/public/2000/0014/latest/whole.html#d1m54948)

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

Undefined.

#### **d) Outline**

This act established the Energy Efficiency and Conservation Authority (EECA) as a stand-alone Crown entity with the responsibility of promoting energy efficiency, energy conservation, and renewable energy across all sectors of the economy. It empowers the preparation of regulations implementing product energy efficiency standards and labeling as well as the disclosure of information to compile statistics on energy efficiency, energy conservation, and renewable energy. This act also provides the enabling legislation for the NZEECS.

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

The funds allocated vary each year. The EECA's budgeted figures are confirmed by its Statement of Intent, which is published on an annual basis. Funding comes from several sources including the government, the private sector, the voluntary sector, and individuals. These funds cover all costs including administration, grants, and financial assistance. The budgeted figures are as follows: NZD 22,697,000 in 2006/07; NZD 36,361,000 in 2007/08; NZD 52,124,000 in 2008/09; NZD 83,173,000 in 2009/10; NZD 150,960,000 in 2010/11; NZD 155,761,000 in 2011/12; NZD 116,040,000 in 2012/13; and NZD 89,000,000 in 2013/14.

#### **f) Expected results**

To promote energy efficiency, energy conservation, and the use of renewable energy sources in New Zealand.

## **2.2. Regulatory Measures**

### **2.2.1. Minimum Energy Performance Standards (MEPS) and Labeling**

#### **a) Name**

Energy Efficiency (Energy Using Products) Regulations 2002

#### **b) Purpose**

To reduce energy demand, enhance economic growth through improved productivity, provide savings to end-users by improving the energy efficiency of a product class. This will be achieved through setting MEPS that result in improvements to the most energy-intensive models for sale in a product class and category, and requirements to display energy performance labels. The program stimulates the production and purchase of more energy-efficient products, while ensuring that a wide range of products are available to meet consumers' needs. It is a joint Australia-New Zealand program that offers industries in both economies improved economies of scale and reduced business-compliance costs.

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

All energy-using products, especially appliances, lighting, and equipment in the residential, commercial, and industrial sectors.

#### **d) Outline**

Energy Efficiency (Energy Using Products) Regulations were first published in 2002. The New Zealand Government entered into the Equipment Energy Efficiency Program (E3) with Australia in 2004-05. MEPS and labeling are the main mechanisms that the E3 uses to improve product efficiency in which requirements are set out in energy performance standards. The standards set out the testing method to establish a product's energy performance and consumption. All covered products must meet or exceed this standard before they can be sold to consumers. The E3 jointly funds the following:

- The profiling of products and technologies on the market, and assessments of their energy efficiency potential.
- Cost-benefit analysis of options for intervention.
- Consultation documents and regulatory impact statements.
- Development and publication of joint Australia/New Zealand standards.
- Compliance testing of products.
- Marketing and communications.

Labeling is mandatory for the following electrical products for sale in New Zealand:

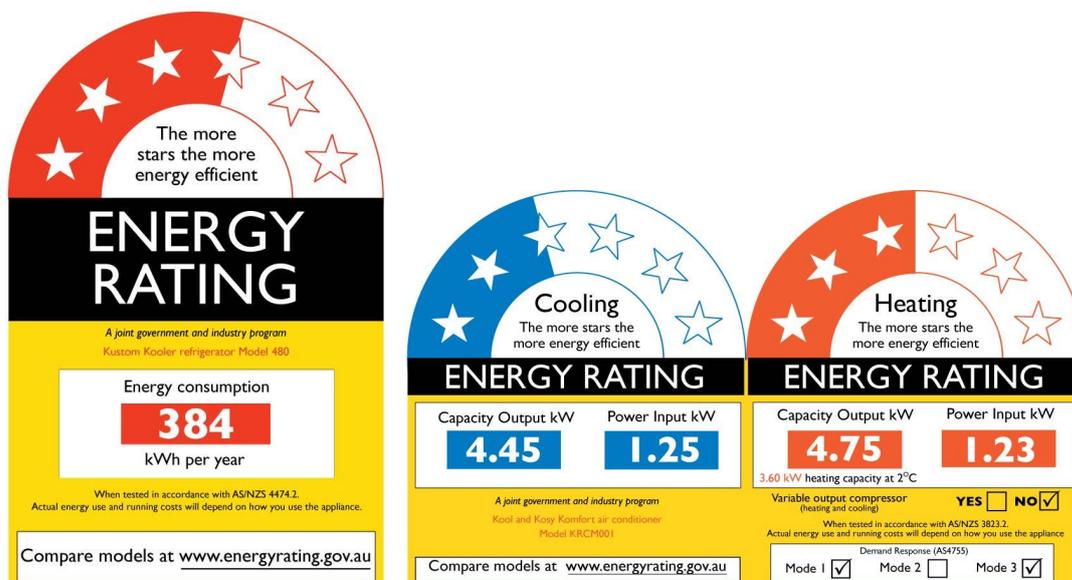
- Refrigerators and freezers
- Clothes washers
- Clothes dryers

- Dishwashers
- Air conditioners
- TVs
- Monitors

The following products are also regulated on the basis of MEPS:

- Refrigerators and freezers (revised 2011).
- Mains pressure electric storage water heaters (from 2002).
- Small mains pressure electric storage water heaters (< 80L) and low pressure and heat exchanger types (from October 1, 2005).
- Three-phase electric motors (0.73kW to < 185kW) (from October 1, 2001, revised April 2006).
- Single-phase air conditioners (from October 1, 2004, revised April 1, 2006, 2007, 2011, 2013, and 2014).
- Three-phase air conditioners up to 65kW cooling capacity (from October 1, 2001, revised October 1, 2007, 2011, 2013, and 2014).
- Distribution transformers (from October 1, 2004).
- Ballasts for linear fluorescent lamps (from March 1, 2003). In addition to MEPS, ballasts also have to be marked with an energy efficiency index (EEI).
- Linear fluorescent lamps from 550mm to 1500mm inclusive with a nominal lamp power > 16W (from October 1, 2004).
- Commercial refrigeration (self-contained and remote systems) (from October 1, 2004).
- Compact fluorescent lamps (from 2012).
- External power supplies (from 2011).
- Set-top boxes (from 2011).
- TVs (from 2012).
- Commercial building chillers (from 2011).
- Close-control air conditioners (from 2011).
- Gas water heaters (from 2011).
- Computers and monitors (2014).
- Multi-split air-conditioner systems (2014).

The plan also identifies other products for investigation or review, including electric and heat pump water heaters; solar water heaters; residential, commercial, and LED lighting; commercial air conditioners; commercial and household refrigeration; and three-phase motors.



### e) Financial resources and budget allocation

NZD 4.8 million a year is allocated to MEPS and labeling, Energy Star, and Vehicle Fuel Economy Ratings.

### f) Expected results

The energy saved in 2014/15 by residential products sold under the Efficient Products Program was 2.4PJ. In relation to the level of compliance with mandatory energy performance labeling regulations by retail stores, 95% compliance was achieved in 2014-15.

## 2.2.2. Fuel Efficiency Standards

### a) Name

Vehicle Fuel Economy Labeling

### b) Purpose

To achieve reductions in fossil fuel demand and emissions, and savings to end-users by improving the average fuel efficiency of the vehicle fleet.

### c) Applicable sectors

Transport.

### d) Outline

The Energy Efficiency (Vehicle Fuel Economy Labeling) Regulations were first published in 2007. The Vehicle Fuel Economy Labeling scheme came into effect in April 2008, which made it compulsory for vehicle traders and online vendors to display information about the fuel economy of their vehicles. The aim of the program is to allow consumers to make more informed decisions when purchasing a vehicle, and place appropriate values on fuel economy. In addition, it allows consumers to consider the effect that fuel efficiency will have on the environment and their fuel costs. This is designed to stimulate the supply and purchase of more fuel-efficient vehicles. The regulations also require that fuel-economy information labels be displayed on all new and used passenger vehicles (manufactured after 2000) at the point of sale, provided that the information is available. The seller should use the information provided on the vehicle fuel-economy label generator page (see <http://www.eeca.govt.nz/vehicle-fuel-economy-labels/label-generator#970>). These regulations



apply to any vehicle sold by a motor vehicle trader or on Internet trading websites. The fuel economy information is expressed as follows:

- e) Fuel economy cost per year.
- f) Fuel economy rating out of six stars.
- g) Fuel economy liters per 100 km.
- h) This policy contributes to the New Zealand Energy Efficiency and New Zealand Strategy 2011-16, which includes an economy-wide, energy-efficiency target for New Zealand to achieve a rate of energy intensity improvement of 1.3% per annum, and the transport sector target that states, "By 2016: The efficiency of light vehicles entering the fleet should have further improved from 2010 levels."

**i) Financial resources and budget allocation**

See Section 2.2.1 (e).

**j) Expected results**

The level of compliance with the Vehicle Fuel Economy Label regulations by new and used car dealers is 93% (95% for new and 91% for used).

### Voluntary Measures

**a) Name**

Energy Star

**b) Purpose**

To achieve reductions in energy demand and energy-related greenhouse gas emissions as well as savings to end-users through the uptake, demand, and marketability of high-efficiency products.

**c) Applicable sectors**

Residential and commercial.

**d) Outline**

The Energy Star concept was developed by the U.S. Environmental Protection Agency in 1992 as a voluntary labeling program designed to promote energy-efficient products and reduce greenhouse gas emissions. It provides an independent endorsement mark for high-efficiency products that can be used by industry/retail partners in product labeling, promotional materials, and advertising.

Energy Star was launched in New Zealand in 2005, and by 2015, coverage had been extended to 20 product categories, including white ware, windows, home electronics, office equipment, air conditioners (heat pumps), solar water heating, and different types of lighting.

**e) Financial resources and budget allocation**

See Section 2.2.1 (e).

**f) Expected results**

Energy Star awareness is high at 80% and the overall market share of Energy Star products sold (compared to the rest of the market) is increasing. As of 2015, it has reached 41%.

#### *NABERS NEW ZEALAND (NABERSNZ)*

**a) Purpose**

Improve energy performance in commercial buildings

**b) Applicable sectors**

Commercial buildings.

**c) Outline**

In May 2013, EECA Business, in collaboration with the New Zealand Green Building Council (NZGBC), launched a scheme to measure and rate the energy performance of commercial buildings in New Zealand. The New Zealand scheme, NABERSNZ, is based on the successful National Australian Built Environment Rating System (NABERS). NABERSNZ is a voluntary scheme that aims to assist owners and tenants to reduce energy use and costs as well as reduce greenhouse emissions. Under NABERSNZ, qualified assessors measure and score the energy performance of office buildings, giving tenants and owners rating of up to six stars.

Since the inception of the program, nearly 600 self-assessments have been completed and 29 certified ratings have been processed. A total of 14 certified ratings were processed in 2014/15.

### 2.3. Financial Measures Taken by the Government

#### 2.3.1. Tax Scheme

New Zealand does not have a tax scheme for stimulating energy efficiency improvements.

#### 2.3.2. Low-Interest Loans

**a) Name**

Crown Energy Efficiency Loan Scheme

**b) Purpose**

The EECA-administered Crown loans scheme supports capital investment for public sector agencies.

**c) Applicable sectors**

Government (central).

**d) Outline**

The scheme, introduced in 1989, provides funds to government agencies in order to encourage investment in energy efficiency measures in their building, facilities, and vehicle fleets. The loans are repaid by the recipient department/agency over a calculated time period. The enduring energy savings accrue to the recipient for the remaining life of the project or measure.

**e) Financial resources and budget allocation**

The EECA provides baseline funding of NZD 2 million per year for Crown loans to government organizations (public sector, including health and local government), which are applied to energy efficiency, technology or renewable energy initiatives.

**f) Expected results**

The aim of these loans is to achieve annual savings of no less than 20% of the capital cost of the energy-efficient projects. Projected annual cost savings are at least 20% of the full cost of the project. The figures regarding such Crown loans are as follows: NZD 1.92 million in 2011/12; NZD 1.32 million in 2012/13; and NZD 1.92 million in 2013/14 of which the annual cost saving figure stood at 25%.

#### 2.3.3. Subsidies and Budgetary Measures

**a) Name**

Warm Up New Zealand: Heat Smart Program

**b) Purpose**

To improve energy efficiency in the residential sector; to improve the health of people living in cold, damp houses; to stimulate the market for energy efficiency services, including employment in the insulation, manufacturing, and installation industries; and to reduce economy-wide energy demand.

**c) Applicable sectors**

Residential.

**d) Outline**

The New Zealand Insulation Fund was announced by the New Zealand Government on May 28, 2009 after which it came into effect on July 1, 2009 as Warm Up New Zealand: Heat Smart. Initially the centerpiece energy program in the residential sector, it was eventually replaced by a new insulation program: Warm Up New Zealand: Healthy Homes (see below). Funding under this program was provided to fit homes with insulation and clean-heating devices, such as heat pumps and approved wood burners, and to remove or decommission non-compliant (dirty) burners.

The program met 33% of the cost (up to NZD 1300, including tax) of installing ceiling and under-floor insulation to all houses built before 2000. Houses with sufficient ceiling and under-floor insulation were also eligible for clean-heating device funding of up to NZD 500. Lower-income households (i.e. Community Services Cardholders) were eligible for more funding; that is, 60% of the total cost of insulation and NZD 1200 toward a clean-heating appliance (provided that the home was insulated). Landlords with Community Services Cardholder tenants could also receive the 60% subsidy and up to NZD 500 for the clean-heating device (again, provided that the home was insulated).

The program also worked on a co-funding basis with a wide range of partners: local government; Iwi (Maori); service providers; local public health providers; charitable trusts; and energy retailers. With these partners, the EECA retrofitted more than 230,000 houses over the four years of the program, which ceased in September 2013. Between NZD 15 million and NZD 20 million per annum in private sector, third-party funding raised under the program assisted low-income households.

Generally, third-party funding applies to low-income households to cover the 40% of the costs of insulation not provided by the program. Various funders provided different mechanisms and eligibility criteria for their funding. For example, some territorial local authorities provided funding via a targeted rate on a rateable property for all households, not only low-income households. Other funders offered direct contributions via service providers for low-income households such as health referrals from local doctor's offices.

The program included a two-year independent evaluation program that measured the effectiveness and efficiency of its energy, health, and economic outcomes. The long-term goals for the fund included energy savings, health benefits, and stimulating the supply and demand side for energy-efficient upgrades.

**e) Financial resources and budget allocation**

The government allocated NZD 323 million over four years in the 2009 budget. In November 2009, the government announced that the program would be enhanced by an additional NZD 24 million, targeted exclusively at low-income families.

**f) Expected results**

A total of 241,000 houses were insulated by the program's conclusion. An independent evaluation of the Warm Up New Zealand: Heat Smart program by Motu<sup>1</sup> showed that two types of people benefited the most: low-income individuals and those facing a higher risk of health issues. Among the positive outcomes, there was the following: improved health (due to warmer, drier conditions after the insulation was installed; reduced mortality of approximately 74%; a drop in hospitalization rates and costs, particularly in relation to asthma,

respiratory, and circulatory illnesses; lower pharmaceutical costs; reduced absenteeism from school and/or work; and fewer medical visits.

The evaluation of the program also found that 85% of the insulation uptake was additional to the background market rate and thus, it is directly attributable to the program. This equates to an additional 6.6 million m<sup>2</sup> of insulation and an additional NZD 35-53 million in producer surplus per year, which is worth NZD 192 million (NPV 4% discount rate) over the four years of the program.

**a) Name**

Warm Up New Zealand: Healthy Homes

**b) Purpose**

To improve energy efficiency in the residential sector, and improve the health of people living in cold, damp houses by targeting low-income households for home insulation, particularly families with children and individuals with high health needs.

**c) Applicable sectors**

Residential.

**e) Outline**

In May 2013, the government announced an investment of NZD 100 million to insulate 46,000 homes through a new three-year insulation program. This program targeted low-income households, particularly those with children, the elderly, and those at high risk of developing cold-related illnesses. Unlike its predecessor, Warm Up New Zealand: Heat Smart, the new program does not provide any funding to general-income households or for clean-heating devices. The government's investment of up to 60% of the cost of a home's insulation is augmented by significant levels of funding from trusts and other third parties. This makes insulation available to those households in most need, at low or no cost.

As of September 2015, 41,000 houses had been insulated under the program.

**f) Financial resources and budget allocation**

The government is investing NZD 100 million over three years. In addition, more than NZD 50 million is expected to come from project partners, such as trusts, Iwi, and other community organizations.

**g) Expected results**

Approximately 46,000 homes will be insulated under the program.

### 2.3.4. Other Incentives

**a) Name**

Efficient Lighting/The Right Light Program

**b) Purpose**

To encourage the uptake of efficient lighting technologies.

**c) Applicable sectors**

Residential and commercial.

**d) Outline**

The EECA's efficient lighting program supports the Right Light information and capability building program.

**e) Expected results**

The Right Light campaign encourages consumers to invest in energy-efficient lighting by focusing on the savings that can be made over the lifetime of the bulbs. To date, the success of the campaign has been measured via supermarket sales of efficient lighting. This year, 25% volume market share was achieved.

The value share (dollar sales) was found to be a better proxy for market shift as people transition from cheaper incandescent light bulbs to longer-lasting efficient lighting. As of June 30, 2015, the value share was 59.8% compared to the target of 60%.

**a) Name**

Heavy Vehicle Fuel Efficiency Program

**b) Purpose**

To improve the vehicle efficiency of the heavy-vehicle fleet.

**c) Applicable sectors**

Commercial.

**d) Outline**

The Heavy Vehicle Fuel Efficiency Program, which started in 2012, helps heavy-vehicle fleets develop systems and disciplines that save fuel, reduce CO<sup>2</sup> emissions, and leads to greater road safety. The focus of the program is on working alongside fleet managers to put fuel management action plans in place. This involves driver behavior change, vehicle selection, and better management systems. Realistic fuel savings of approximately 7% per fleet are possible, especially when strong leadership is demonstrated by company management.

**e) Expected results**

The tons of CO<sup>2</sup> emissions avoided from the fuel use of heavy vehicles should lead to a savings of 2,000 tons of carbon emissions per annum.

**a) Name**

EECA Business Program

**b) Purpose**

Support enhanced business competitiveness and lower CO<sup>2</sup> emissions.

**c) Applicable sectors**

Commercial.

**d) Outline**

The EECA Business Program is designed to overcome market barriers across three groups related to the scale of energy use:

- Top 200 energy users ó the program is for direct engagement with senior decision-makers to create long-term, company-wide energy management partnerships.
- Large energy users (1,000) ó where engagement is led by accredited service providers, industry associations, and sector groups.
- Medium and small energy users (200,000+) ó where targeted EECA information campaigns are used to influence change.

The program ensures that the right combination of information, incentives, and standards are in place, and targets priority sectors in which there is the potential for energy-efficient

improvements (e.g., meat and dairy, pulp and paper, and commercial buildings). The components of the program include the following:

- Information and influencing ó long-term, multi-site energy management partnerships.
- Capability initiatives ó training and accreditation programs for service providers, and training programs for end-users and key influencers.
- Information initiatives ó business information programs, rating/labeling programs.
- Co-funding energy audits to identify opportunities and co-funding energy-efficient equipment options (for electricity savings only) with priority on changing procurement policies and leveraging future investments.
- Commercial building design advice targeting lighting, HVAC, and refrigeration.
- NABERSNZ (National Australia Building Energy Rating Scheme: New Zealand) ó voluntary energy rating scheme to help owners and tenants reduce energy use and costs (see separate entry for details).
- Industrial energy efficiency improvements through targeting motorized systems and processed heat. Process heat is New Zealand's second-largest area of energy use, with only one-third of fuels in this area coming from renewable sources (such as wood and geothermal).
- Demonstration projects and feasibility funding to test new, replicable technology focusing on energy-intensive industries. Case studies are produced to encourage replication throughout the industry.

Crown loans program

- The EECA-administered Crown loans scheme supports capital investment for public sector agencies.

Carbon dioxide reduction

Energy efficiency business case development in meat and dairy heat plants

- Implement the direct use of renewable heat and an EECA-led partnership to establish a òrenewable heat hubö in Southland.

## 2.4. Energy Pricing

New Zealand's energy sector is guided by free market principles. As an independent Crown entity, the Electricity Authority regulates the operation of the electricity market.

Since New Zealand's pricing is market-based, its effect on energy efficiency improvement programs varies with fluctuating supply and demand for energy. Generally, when energy prices increase, due to weather conditions (e.g., a drought decreases hydroelectricity generation, New Zealand's primary source of electricity) or global fuel prices, people are more likely to adopt more energy-efficient behaviors.

## 2.5. Other Efforts for Energy Efficiency Improvements

### 2.5.1. Cooperation with other Government Organizations

The MBIE and the EECA work closely with the following government organizations: the Ministry of Health; the Ministry of Social Development; the Ministry for the Environment; the Ministry of Transport; the Ministry of Agriculture and Forestry; Housing New Zealand; and Statistics New Zealand. The EECA also works closely with local government and district health boards.

### 2.5.2. Cooperation with Non-Government Organizations

In general, non-government organizations (NGOs) and community energy groups in New Zealand have sufficient knowledge and awareness of energy efficiency improvement programs implemented by the central government under the NZEECS. NGOs have also established partnerships with central agencies to realize the goals of the NZEECS in certain areas. The central government agencies have been providing financial and technical support

to local governments in implementing energy efficiency and renewable programs. Local governments are currently focused on energy efficiency improvement efforts to lower or maintain their energy expenditures, while NGOs are focused on alleviating fuel poverty and improving health outcomes among lower-income families. Through the EECA, NGOs, community and energy groups are implementing the Warm Up New Zealand: Healthy Homes program and using local networks to assist in reaching more participants.

### 2.5.3. Cooperation through Bilateral, Regional, and Multilateral Schemes

The New Zealand Government cooperates with other economies and New Zealand agencies on energy efficiency, which include the following:

- The Australian Department of Resources, Energy, and Tourism (DRET) and Australian State Regulators (through the E3 committee) to set joint standards and regulatory requirements for appliances and equipment.
- APEC and International Energy Agency (IEA) membership and forums.
- Energy Regulators Advisory Council (Australia and New Zealand) to align regulations for energy-using products such as gas/electrical safety and radio spectrum management.
- The Commonwealth Scientific and Industrial Research Organization (CSIRO, Australia).
- RegulatorsøForum.
- The World Trade Organization (WTO) Technical Barriers to Trade (TBT) notification.

### 2.5.4. Other Cooperation/Efforts for Energy Efficiency Improvements

Through the Warm Up New Zealand: Heat Smart and the Warm Up New Zealand: Healthy Homes programs, the EECA has had, and will have, contractual agreements with private service providers to safely install insulation and clean-heating measures into homes.

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# PERU

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The National Energy Plan 2014-2025 (NEP) includes the key target of reducing energy demand by 12.5% (if the GDP grows at 6.5%) or by 14.8% (if the GDP grows at 4.5%) by 2025 compared to business-as-usual (BAU).

### 1.2. Sectorial Energy Efficiency Improvement Goals

This plan considers energy efficiency programs in four sectors: residential, public, productive, and service and transport. The NEP does not consider a specific goal for each sector, but it estimates an expected reduction in energy demand after implementation for each sector from 2014 to 2025 (see Table 1).

**Table 1. Reduction of energy demand by sectors**

| Sector                     | Reduction (PJ) |
|----------------------------|----------------|
| Residential and commercial | 18.7           |
| Manufacturing and services | 22.7           |
| Public                     | 0.09           |
| Transport                  | 187.6          |
| TOTAL                      | 229.2          |

Source: PEN 2014-2025.

### 1.3. Action Plans for Promoting Energy Efficiency

The key document for promoting energy efficiency is the National Energy Plan 2014-2025. Under this document, the Referential Plan for the Efficient Use of Energy 2009-2018 was approved in 2009 by The Ministry of Energy and Mines (MINEM). By 2012, the MINEM developed a strategic review of energy for Peru from which two important documents emerged: the New Sustainable Energy Matrix for Peru (NUMES) and the Strategic Environmental Assessment (SEA). The NUMES includes nine policy objectives with the 2040 vision of having an energy system that meets energy demand in a reliable, regular, and efficient way that is supported by planning, ongoing research, and technological innovation. This study updated the Referential Plan for the Efficient Use of Energy 2009-2018.

#### 1.3.1 Energy Efficiency Monitoring and Reporting

The General Direction of Energy Efficiency (GDEE) implemented the reports on energy efficiency. At the macro level, the GDEE prepares the annual energy balance, whereas at the micro level, the GDEE prepares statistical information regarding market trends and projections in home appliances, air conditioners, refrigerators, laundry appliances, etc.

### 1.4. Institutional Structure

#### 1.4.1 Central Institutional Structure

##### h) Name of organization

The Ministry of Energy and Mines (MINEM) ó Energy Efficiency General Directorate

##### i) Status of organization

The Ministry of Government.

**j) Roles and responsibilities**

The MINEM has the overall responsibility for the energy policy in Peru, while the General Directorate of Energy Efficiency is in charge of the following:

- Proposing the energy policies.
- Proposing the energy efficiency policies.
- Promoting the culture regarding the rational and efficient use of energy.
- Designing and proposing energy efficiency programs.
- Incentivizing the energy efficiency and renewable energy market.
- Other aspects indicated in DS N° 026-2010-EM.

**k) Covered sectors**

All economic sectors.

**l) Date of establishment**

2010.

**m) Number of staff members**

The General Directorate of Energy Efficiency includes 20 staff members. More government staff members carry out energy efficiency activities in regional offices and project implementation teams.

**n) Description of the Ministry of Energy**

The Ministry of Energy and Mines aims to develop and evaluate policies of economy-wide scope regarding the sustainable development of mining and energy activities. It is also the competent authority in environmental issues related to mining and energy activities. The Deputy Minister of Energy directs, monitors, reports, and proposes policies for the sustainable development of the energy sector. In addition, the Deputy Minister directs and evaluates the activities of the energy sector at the economy-wide level according to the directives given by the Minister of Energy and Mines.

**1.4.2 Implementing Institution Structure****h) Name of organization**

The Energy Efficiency Directorate.

**i) Status of organization**

See Section 1.4.1.

**j) Roles and responsibilities**

See Section 1.4.1.

**k) Covered sectors**

See Section 1.4.1.

**1.4.3 Information Dissemination, Awareness Raising, and Capacity Building****d) Information collection and dissemination**

According to the NEP, during the next 10 years, Peru will implement a standard and labeling scheme for household appliances, including water heaters, lighting, electric motors, and boilers.

**e) Awareness raising**

The Energy Efficiency Directorate is carrying out an educational campaign through media, including newspapers, television, and radio. The campaign titled, "The Power of Change is in You" (*La Energía del Cambio está en Ti*), promotes the responsible use of energy. This program is aimed toward residential consumers and school-aged children.

**f) Capacity building**

No information is available.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts

**a) Name**

Promotion Law of Efficient Use of Energy (Law No. 27345) (released on September 8, 2000)

**b) Purpose**

National involvement in energy efficiency promotion in order to guarantee energy supply, protect the final consumer, encourage the competitiveness of the economy, and mitigate negative environmental impacts from energy consumption.

**c) Applicable sectors**

All economic sectors.

**d) Outline**

Law No. 27345 gave power to the Ministry of Energy and Mines and made it responsible for the following energy efficiency issues in Peru:

- Promote the establishment of a culture that focuses on the efficient use of energy resources in order to enhance the sustainable development of the economy and find equilibrium between environment conservation and social and economic development.
- Promote the creation of Energy Service Companies (ESCOs).
- Coordinate with the rest of the sector and public and private entities to develop energy efficiency policies.
- Other applicable aspects.

According to Law No. 27345, all equipment sold in Peru must include energy consumption information (promotion of eco-labeling), under the responsibility of producers and importers.

Currently, the General Directorate of Energy Efficiency is responsible for Energy Efficiency and all matters indicated in Law No. 27345.

**e) Financial resources and budget allocation**

Law No. 27345 does indicate budgetary allocations.

**f) Expected results**

Utilization of energy efficiency to contribute to energy security, improve competitiveness, mitigate environmental impacts, protect the energy consumer, and raise people's awareness on this subject.

### 2.2. Regulatory Measures

#### 2.2.1. Energy Efficiency – Regulatory Measures

**a) Name**

Regulatory Measures of Law No. 27345, Law for the Promotion of the Efficient Use of Energy – Supreme Decree No. 053-2007

**b) Purpose**

To promote energy efficiency, secure the energy supply over the long term, improve international competitiveness in all sectors, mitigate the environmental impact from energy production and demand, protect energy users, and raise awareness regarding the efficient use of energy.

**c) Applicable sectors**

The measures are applicable to the production, transport, transformation, distribution, trading, and consumption of energy. It also involves the economic sectors.

**d) Outline**

In order to develop a culture that efficiently uses energy, the MINEM will organize activities to promote awareness of such use, in coordination with public and private institutions. These actions are aimed at all educational levels, including teachers.

The MINEM organizes activities to create awareness of energy efficiency in the different segments of students and populations in various regions. For instance, October 21 has been designated "National Saving Energy Day." The MINEM also coordinates with Peruvian universities about the development of undergraduate and postgraduate courses related to energy efficiency and the development of programs about scientific and technological research applied to energy efficiency.

Energy efficiency must be applied in four main sectors:

- Residential sector: Improve efficient consumption and equipment use, release publicity, organize informative and demonstrative campaigns related to energy efficiency, conduct surveys, and utilize other methods of obtaining information.
- Productive sector: Promote the creation of an energy efficiency market, form ESCOs, elaborate energy efficiency indicators, and establish energy efficiency limits through productive activities in order to avoid obsolete technology.
- Public Sector: Approve the criteria to develop energy audits in public entities with bills over 4 UIT (tributary unit), focus on regions where there is natural gas for vehicles, suggest that public vehicles have to shift its fuel from gasoline to natural gas, and develop energy indicators in the sector to evaluate the best practices of energy efficiency.
- Transport Sector: Provide incentives for the best practices and programs that promote energy-efficient use in vehicles; promote training in driving habits, engines, and fuel use for taxi drivers, public transport drivers, and truck drivers; and improve traffic management.

The MINEM will implement these actions in coordination with regional governments.

**e) Financial resources and budget allocation**

According to Law No. 27345, the Ministry of Energy and Mines will coordinate funding with participating domestic and international entities in the development of energy efficiency projects. Furthermore, the law allows the MINEM to gather donations and international cooperation on energy efficiency and renewable energy issues.

**f) Expected results**

Energy efficiency culture improvement.

**2.2.2. Promotion with Renewable Electricity Production****a. Name**

Promotion of Electricity Generation with Renewable Energy through Legislative Decree No. 1002

**b. Purpose**

To promote energy renewable resources that can generate electricity.

**c. Applicable sectors**

All energy sectors.

**d. Outline**

Declare, as a security interest, the participation of renewable energy in the electricity generation matrix. Every five years, the MINEM establishes the share (percentage) for the electricity generated from renewable resources, with this percentage being fixed at 5% for the first five years. Renewable resources to be considered include biomass, wind, solar, geothermal, and tidal energy. As for hydro energy, it is only considered for power plants whose capacity is equal or less than 20 MW. Electricity from renewable energy has priority in the daily electric dispatch planned by the COES (responsible for the operations of the electricity system), and its variable cost is considered to be zero.

**e. Financial resources and budget allocation**

In order to sell (total or partial) electricity production, owners have to offer the energy in the short-term market at its price, plus a premium (in case the marginal cost is less than the tariff determined by OSINERGMIN, the regulatory body of the system). The tariff and premiums are determined in a way that guarantees the profitability established in the Concessions Law (Law No. 25844).

**f. Expected results**

The National Council of Science and Technology (CONCYTEC), in coordination with the MINEM and the regional governments, encourage research projects in order to increase the share of renewable energy in the energy matrix.

### 2.2.3. Minimum Energy Performance Standards and Labeling

The Law for the Promotion of the Efficient Use of Energy (Law No. 27345 in the year 2000) requires energy efficiency labeling for all energy-consuming equipment and appliances. The MINEM aims to develop and implement energy efficiency standards and labeling for a wider range of end-use appliances, and to develop and implement a comprehensive market transformation strategy, based on mandatory energy efficiency labeling, minimum energy performance standards (MEPS), and the development of testing infrastructure, procedures, and consumer awareness. There is a project (supported by the United Nations Development Program (UNDP) and the Global Environment Facility (GEF)) that provides assistance in developing and implementing all measures that are necessary to overcome the institutional, technical, and awareness-related barriers that prevent the implementation of this strategy. In particular, we have the following:

- 1) Increase the awareness and strengthen the technical and managerial capacities of the government and other key public and private agents.
- 2) Carry out a market study in order to establish a comprehensive and detailed database of energy end-uses and end-use technologies.
- 3) Develop a market transformation strategy for the introduction and dissemination of energy efficiency standards and labeling.
- 4) Design and implement market transformation instruments (additional technical and energy efficiency labeling standards and MEPS).
- 5) Foster the development of the required infrastructure and procedures for product testing and certification, especially test laboratories.

- 6) Develop and implement a legal and regulatory framework, especially government regulations for mandatory energy efficiency labeling and MEPS.
- 7) Develop a consumer communication strategy, including awareness campaigns, incentives to consumers, and training of equipment sales personnel.
- 8) Develop and implement an appropriate monitoring and evaluation system.

Furthermore, the establishment of the Regional Energy Efficiency Standards and Labeling Committee and the Regional Energy Efficiency Standards and Labeling Information System will foster exchanges of experiences and coordinate economy-wide programs with other economies in the region.

### 2.2.4. Energy Efficiency Labeling

#### a) Name

Guideline for Labeling

#### b) Level

Central.

#### c) Purpose

To gather information on the energy efficiency of households and their minimum performance standards, with the goal of promoting energy-efficient consumption.

#### d) Applicable sectors

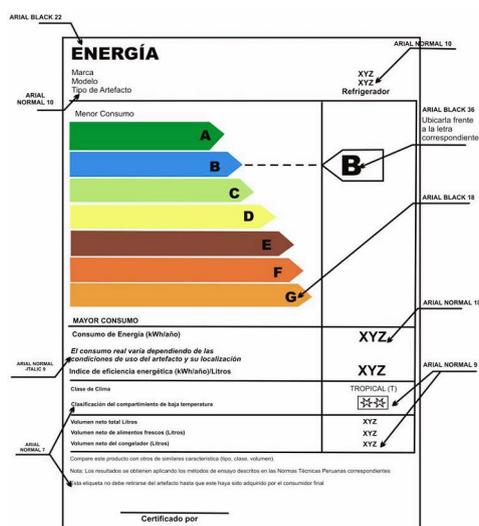
Appliances.

#### e) Outline

It is a voluntary measure that came into effect in January 2009.

The development of test procedures and energy efficiency labeling standards in Peru began in 1996 by the Technical Committee of Standardization for Rational and Efficient Use of Energy (CTNUREEE) and its respective subcommittees as well as the participation of relevant public and private agents. To date, energy efficiency test procedures have been developed for refrigerators and freezers, lighting equipment (lamps and ballasts), electric motors, electric water heaters, industrial boilers, and solar thermal and photovoltaic systems. Energy efficiency labeling standards are in place for refrigerators and freezers, household lamps, and electric motors, in addition to MEPS for compact fluorescent lamps (CFLs).

Figure 6. Energy efficiency label for appliances



### 2.2.5. Energy Saving in the Public Sector

**a) Name**

Supreme Decree on Energy Savings in Public Sector; D.S. No. 034-2008-EM.

**b) Level**

Central government.

**c) Purpose**

To encourage the public sector to reduce its energy demand through energy efficiency campaigns, and promote the use of more efficient equipment.

**d) Applicable sectors**

Public sector.

**e) Outline**

A mandatory measure that was published in June 2008. However, it is under review since it includes technology that is becoming obsolete.

**f) Financial resources and budget allocation**

Funding from the Ministry of Energy and Mines.

**g) Expected results**

Implemented with public entities, while a new supreme decree is being issued. This activity is implemented since it is part of the Law on Promotion of Energy Efficiency and its Regulations (legal dispositions approved in 2007).

### 2.2.6. Technical Standards on Energy Efficiency

**a) Name**

Technical Standards on Energy Efficiency (Essays, Limits, and Labels)

**b) Level**

Central.

**c) Purpose**

To provide minimum energy efficiency standards (especially norms, limits, and labels) for lighting, water heaters, heater boilers, motors, solar energy, etc.

**d) Applicable sectors**

All economic sectors.

**e) Outline**

There are 59 voluntary norms (standards), all of which have been approved and published from 2000 to the present.

**f) Financial resources and budget allocation**

Funding from the Ministry of Energy and Mines and the National Institute of Quality.

**g) Expected results**

Increased knowledge of those interested who can apply the information for different purposes.

## 2.3. Financial Measures Taken by the Government

### 2.3.1. Tax Scheme

No information is available.

### **2.3.2. Low-Interest Loans**

The Financial Corporation for Development (COFIDE) has a Bio-business Program with capital funded from the German Kreditanstalt für Wiederaufbau (KfW) institution. This program aims to foster energy efficiency and renewable energy projects by giving low-interest loans to project promoters and developers. The loans will be given through Peruvian commercial banks and all sectors are included.

### **2.3.3. Subsidies and Budgetary Measures**

No information is available.

### **2.3.4. Other Incentives**

No Information is available.

## **2.4. Energy Pricing**

Pricing is based on marginal costs in the electricity market.

## **2.5. Other Efforts for Energy Efficiency Improvements**

### **2.5.1 Cooperation with Non-Government Organizations**

In July 2014, the Mining Council and Codelco signed energy efficiency agreements with the Ministry of Energy on measures toward continuous and systematic advancements in energy efficiency. The mining industry will subject itself to independent energy audits that will identify opportunities for greater energy efficiency related to operational and maintenance improvements as well as equipment replacement and instruction of new technologies. Based on the results of these audits, energy efficiency plans will be prepared and implemented in the short, medium and long term, and the progress will be publically reported.

### **2.5.2 Cooperation through Bilateral, Regional, and Multilateral Schemes**

Peru undertakes cooperation through bilateral schemes with various international organizations, including the following:

- Japan International Cooperation Agency (JICA)
- German Technical Cooperation (GTZ)
- United Nations Development Program (UNDP)
- Inter-American Development Bank (IADB)
- The Global Environment Facility (GEF) Trust Fund of the UNDP.
- United States Agency for International Development (USAID)

### **2.5.3 Other Cooperation/Efforts for Energy Efficiency Improvements**

The Ministry of Housing has elaborated the Standard for Bioclimatic Building with Energy Efficiency. The MINEM and other relevant stakeholders also participated in this effort. The aim of the new standard is to increase comfort, save energy, and mitigate greenhouse gas emissions by designing buildings according to local climate and using local construction materials. The Peruvian Bioclimatic Map foresees nine bioclimatic regions.

## **2. PROJECTS UNDER EXECUTION**

### **2.1. Norms Project and Energy Efficiency Labeling**

The Regulations and Energy Efficiency Labeling project was initiated in 2013 with UNDP/GEF cooperation in order to make mandatory the use of energy labels on household appliances and other energy-consuming equipment. This project aims to provide consumer information regarding the energy consumption of appliances or equipment, along with ways

to reduce energy consumption in the economy, contribute to energy security, improve coverage in energy supply, and reduce emissions of greenhouse gases.

To date, nine drafts of technical rules have been pre-published and are awaiting approval. At the same time, a series of actions have been conducted to enable their implementation.

## 2.2. Lighting Market Transformation Project

The Lighting Market Transformation in Peru project was also introduced in 2013 with UNEP/GEF cooperation in order to accelerate the transformation of the lighting market in the economy through enhanced promotion and implementation of energy saving lamps (ESLs) and the phasing-out of incandescent lamp (ILs) imports and sales, thus reducing greenhouse gases emissions. It includes the following outcomes:

- 1) Reduced the peak demand of up to 484 MW in the best-case-scenario, which saved up to USD 600 million in investments toward new power plants.
- 2) Enhanced the sales of energy-saving lamps by 3.5 million for CFLs and 1.2 million for linear fluorescents. The use of energy-saving bulbs and LED lamps has resulted in the reduction of 282.8 ktCO<sub>2</sub>.

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# PHILIPPINES

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In 2014, the Philippine Department of Energy formulated a new comprehensive energy roadmap to guide the economy-wide and sectoral improvement: Philippine Energy Efficiency Roadmap 2014-2030. The overall vision, objectives, and targets of the roadmap include the following:

#### Vision

“The Energy Efficiency Roadmap shall guide the Philippines in building an energy-efficient nation, and in making energy efficiency and conservation a way of life for all Filipinos. Energy efficiency will advance economic development and help ensure energy security, protection of the environment, optimal energy pricing, and sustainable energy systems.”

#### Objectives

- Energy efficiency as a resource to bolster the energy security supply of the economy.
- Promote energy-efficient, cutting-edge technologies.
- Increase public awareness on energy efficiency and conservation measures and promote the best practices.
- Cushion the impact of oil price volatility on the economy.
- Curb the generation of greenhouse gases emissions to help mitigate climate change.

#### Targets

Targets are set in a context of strong economic and energy demand growth during the period. Demand has been forecasted to increase by 78% between 2014 and 2030, a 3.5% average annual rate. In this context, the action plan states a 24% energy saving by 2030, compared to business-as-usual (BAU). This is the result of a targeted 3% per year improvement in energy intensity (units of energy input per unit of GDP output).

Targets are based on an assessment of an achievable potential, grounded in international experience and knowledge of existing levels of efficiency in the economy. The targets are stated in terms of percentage improvements in energy intensity.

### 1.2. Sectoral Energy Efficiency Improvement Goals

The Philippine Energy Efficiency Roadmap 2014-2030 states the sectoral targets in order to guide specific actions in each sector (see Table 1).

**Table 1:** Philippine Energy Efficiency Targets to 2030

| Sector                                       | Implied annual % savings<br>(total savings by 2030) | Annual energy saved by<br>2030 (KTOE) |
|--|---|---------------------------------------|
| Transport                                    | 1.9% (25%)  | 4,861                                 |
| Industry                                     | 1.3% (15%)  | 3,088                                 |
| Residential buildings                        | 1.2% (20%)  | 1,432                                 |
| Commercial buildings                         | 1.9% (25%)  | 1,206                                 |
| Agriculture*                                 | 0.8% (10%)  | 78                                    |
| Total  | 1.6% (24%)  | 10,665                                |
| Economy-wide improvement in energy intensity | 3%  |                                       |

\* This level of efficiency improvement is assumed through endogenous technology advancement; no initiatives are proposed for the agricultural sector, given its small share of energy demand.

The National Energy and Conservation Program (NEECP) is a two-pronged program that focuses on power conservation, demand management, fuel efficiency, and fuel conservation. Through the NEECP, the goal is to make energy efficiency and conservation a way of life for every Filipino.

In line with this, the Energy Efficiency and Conservation Division (EECD), under the Department of Energy (DOE), implements a wide range of energy efficiency and conservation projects, programs, and activities involving various stakeholders. The aim is to facilitate an economy-wide approach of ensuring that access to cost-effective and quality energy is provided to Filipinos. The DOE pursues the aggressive implementation of existing energy efficiency and conservation programs by promoting awareness on the efficient energy utilization in the economy and rationalizing energy consumption, particularly of petroleum and electricity.

### 1.3. Action Plans for Promoting Energy Efficiency

The Philippine Energy Efficiency Action Plan for 2016-2020 per sector is shown in Table 2 below:

#### **INDUSTRIAL SECTOR:**

**Table 2:** Industrial Sector Energy Efficiency Initiatives 2016-2020

| Program  | Proposed Action   | By When | Responsibilities   |
|--|---|---------|--|
| <b><i>IND-A: Industry Energy Management and Opportunity Identification</i></b> | Create a mechanism for the DOE to have direct energy efficiency input into the Investment Priority Plan development process for 2017-2019. Assist the Department of Trade and Industry (DTI) in creating green industry roadmaps with energy efficiency measures. | 2016    | DOE, DTI-Board of Investments (BOI)  |
|  | Scale up and broaden the sectors targeted by the Philippines Industrial Energy Efficiency Project (PIEEP) and Health Emergency Management Staff (HEMS) projects to the priority sectors of cement, steel, semiconductor manufacturing, and sugar.                 | 2017    | United Nations Industrial Development Organization (UNIDO), European Union (EU), DOE |
|  | Provide technical assistance to the Philippine Economic Zone Authority (PEZA) on qualifying energy efficiency service providers and technologies.   | 2017    | DOE, PEZA  |
|  | Link energy efficiency incentive provision by the DTI to the establishment of a compliant data collection regime.   | 2018    | DOE, DTI   |
|  | Update and refresh existing DOE reference materials on industrial energy efficiency opportunities.  | 2017    | DOE, EU-SWITCH   |
| <b><i>IND-B: ESCO Development Program</i></b>                                  | Create coordinated platforms for the electric service company (ESCO) sector's capacity-building activities, and the consideration of guaranteed support.  | 2016    | DOE, ESCOPHIL, UNIDO, HEMS, other capacity providers                                 |
|  | Develop standard ESCO contracts for bidding.  | 2017    | DOE, industry partners   |
|  | Develop project measurement and verification (M&V) guidelines in line with the International Performance Measurement and Verification Protocol (IPMVP).   | 2017    | DOE, Efficiency Valuation Organization (EVO)   |
|  | Overhaul the ESCO accreditation process.  | 2017    | DOE, industry partners   |
|  | Create an ESCO pilot site for the industry.   | 2018    | DOE, ESCO, and site counterparties   |

|  |   |      |  |
|--|---|------|--|
| <b>IND-C: Demand Response and Demand-Side Management Program</b> | Prepare an analytical paper setting out the framework and regulatory steps necessary to implement a comprehensive demand response strategy. | 2017 | DOE, utility representatives, regulators, market operators |
|  | Establish a Power Sector Energy Efficiency Strategy.  | 2020 | DOE, utility representatives, regulators, market operators |

**TRANSPORT SECTOR:****Table 3:** Transport Sector Energy Efficiency Initiatives 2016-2020

| Program  | Proposed Action  | By When              | Responsibilities   |
|--|--|----------------------|--|
| <b>TRA-A: Vehicle Efficiency Improvement Program</b> | Complete baseline assessment for efficiency of new light-duty vehicles.  | 2016                 | DOE, Clean Air Asia  |
|  | Roll out new vehicle labeling for energy use.  | 2017                 | DOE, Chamber of Automotive Manufacturers of the Philippines (CAMPI)  |
|  | Vehicle inspection regimes <ul style="list-style-type: none"> <li>• Include fuel efficiency ratings with emissions compliance testing.</li> <li>• Investigate differentiated vehicle taxes for efficient vehicles.</li> </ul>  | 2018<br>2018         | Land Transportation Office (LTO), Land Transportation Franchising and Regulatory Board (LTFRB)<br>LTO, LTFRB   |
|  | Vehicle conversion programs <ul style="list-style-type: none"> <li>• Extend the liquefied petroleum gas (LPG program) for the taxi fleet.</li> <li>• Support technical and vocational education and training (TVET) for LPG-vehicle conversion</li> <li>• E-Trikes – focus on current delivery and consider further rollout in a mid-term review.</li> </ul> | 2016<br>2016<br>2018 | DOE<br>DOE, Technical Education and Skills Development Authority (TESDA)<br>DOE, Asian Development Bank (ADB)  |
|  | Formulate a transport and urban energy efficiency Inter-Agency Committee.  | 2017                 | DOE, Department of Transportation and Communications (DOTC), Metro Manila Development Authority (MMDA), Department of Public Works and Highways (DPWH), local government units |

|   |   |         |   |
|---|---|---------|---|
|   |   |         | (LGUs)  |
| <b>TRA-B: Vehicle Efficiency and Driver Awareness Program</b> | Re-launch the Fuel Economy Run initiative.  | 2016    | DOE, CAMPI, vehicle manufacturers, fuel suppliers                           |
|   | Driver training program rollout.  | Ongoing | Development Academy of the Philippines, UP National Engineering Center, DOE |
| <b>TRA-C: Freight Transport Energy Efficiency Partnership</b> | Form a partnership to develop a National Efficient Freight and Logistics Master Plan. | 2017    | EDC, DOE, DPWH, DTI   |
|   | Develop a National Efficient Freight and Logistics Master Plan.                       | 2020    | Energy Development Corporation (EDC), DOE, DPWH, DTI                        |

### **COMMERCIAL BUILDING SECTOR:**

**Table 4:** Commercial Building Sector Energy Efficiency Initiatives 2016-2020

| Program  | Proposed Action  | By When | Responsibility   |
|--|--|---------|--|
| <b>COM-A: Government Buildings Efficiency Program</b>  | Strengthen and extend the Government Energy Management Program (GEMP).                                   | 2017    | DOE  |
|  | New guidelines released for government procurement of energy efficiency services.                        | 2017    | DOE, procurement services                                |
|  | Complete a model ESCO procurement and implementation project at a high-profile government building site. | 2018    | DOE  |
| <b>COM-B: Building Codes Program</b>                   | Permanent coordination body established for energy efficiency input to Green Building Code development.  | 2017    | DPWH, DOE, International Finance Corporation (IFC), LGUs |
|  | Establish a building code training program for selected LGUs.  | 2017    | DPWH, DOE, IFC, LGUs                                     |
|  | Inclusion of energy efficiency in the three-year review process of Green Building Codes.                 | 2019    | DPWH, DOE  |
| <b>COM-C: Building Information and Ratings Program</b> | Develop an annual performance information tool as a benchmark for government building energy efficiency. | 2017    | DOE, private sector partners, EU-SWITCH                  |
|  | Incentive mechanism to link certification to eligibility for energy efficiency incentives.               | 2018    | DOE  |
|  | Mandatory disclosure of performance ratings on the sale or lease of buildings.                           | 2020    | DOE, DPWH, property agencies, LGUs                       |

### **RESIDENTIAL SECTOR:**

**Table 5:** Residential Sector Energy Efficiency Initiatives 2016-2020

| Program   | Proposed Action   | By When | Responsibilities   |
|---|---|---------|--|
| <b>RES-A: Appliance Standards and Labeling Program</b>                  | Reformulate the mechanism for energy efficiency input and cooperation on standards development.   | 2017    | DOE, DTI-Bureau of Product Standards (BPS)                       |
|   | Increase post-market surveillance programs.   | 2017    | DOE, DTI-BPS   |
| <b>RES-B: Large Employers Bulk Purchase and Staff Incentive Program</b> | Undertake the design of a scheme: <ul style="list-style-type: none"> <li>• Eligible organizations</li> <li>• Eligible products</li> <li>• Scheme mechanics</li> </ul> | 2016    | DOE, corporate sector, Business Process Outsourcing (BPO) sector |
|   | Roll out a scheme and establish the DOE support activities.   | 2017    | DOE  |
| <b>RES-C: Behavioral Information Program for Low-Income Groups</b>      | Investigate greater utilization of billing information programs and prepaid billing models.   | 2017    | DOE, utilities, private sector providers                         |
|   | Continue awareness-raising campaigns on energy efficiency, including those for housing design (e.g., insulation and cool roofs).                                      | ongoing | DOE, media partners  |

### **CROSS-SECTORAL:**

**Table 6:** Cross-Sectoral Energy Efficiency Initiatives 2016-2020

| Program  | Proposed Action  | By When | Responsibilities                               |
|--|--|---------|--|
| <b>CS-A: A New Vehicle for Public/Private Collaboration on Energy Efficiency</b>           | Gain agreements to establish a new entity.   | 2016    | DOE  |
|  | Formulate membership, composition, and activity plans.   | 2016    | DOE  |
|  | Establish resources for ongoing operation.   | 2017    | DOE, private sector partners, donors           |
| <b>CS-B: Energy Efficiency Revolving Fund and Finance Sector Capacity Building Program</b> | Approach donors for assistance with energy efficiency capacity-building for the finance sector.  | 2016    | DOE, donors                                    |
|  | Establish a dedicated revolving fund for energy efficiency projects, subject to funding availability, including parameters for a new fund for energy efficiency projects, such as sectors, funders, terms, and conditions. | 2017    | DOE, donors                                    |
|  | Create an Energy Efficiency Finance Program for the commercial bank sector.  | 2017    | DOE, Development Bank of the Philippines (DBP) |
|  | Coordinate an Energy Efficiency Finance Training Program for large energy users on investable projects.  | 2017    | DOE, private sector providers                  |
| <b>CS-C: Energy Efficiency Data Management, Monitoring, and Evaluation Program</b>         | Establish responsibility for energy efficiency data collection and sectoral frameworks containing agreed monitoring regimes and stronger energy-use data protocols.  | 2016    | DOE, data providers                            |
|  | Report on action plan implementation according to agreed indicators.   | 2017    | DOE  |

#### **1.4. Institutional Structure**

##### **a) Name of organization**

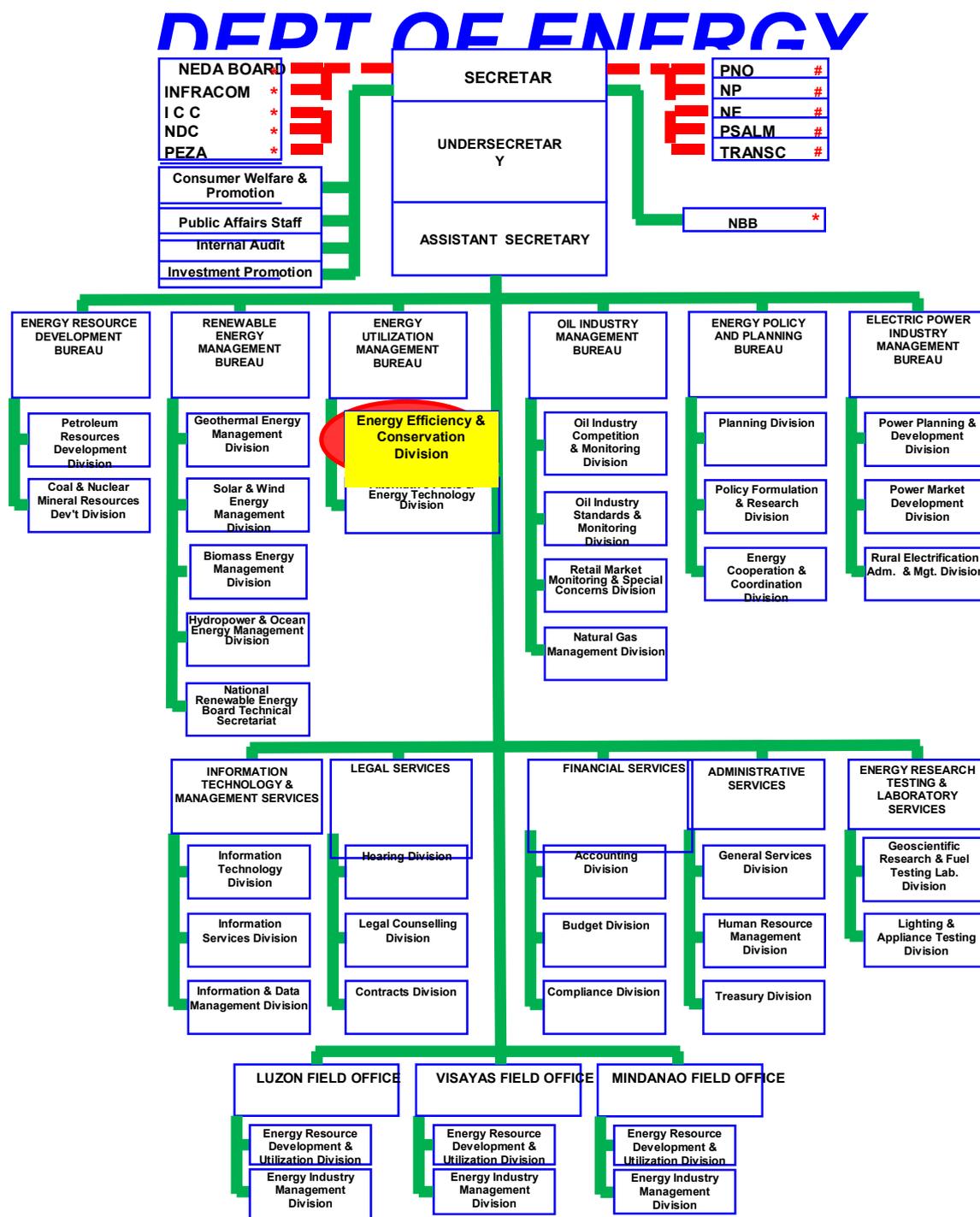
The DOE, as a National Government Agency (NGA), was created by the Department of Energy Act of 1992. The department's mandate is to prepare, integrate, coordinate, supervise, and control all plans, programs, projects, and activities of the government related to energy exploration, development, utilization, distribution, and conservation.

The DOE is one of the 24 NGAs under the Executive Office of the President of the Republic of the Philippines, which is headed by a department secretary.

The Energy Utilization Management Bureau-Energy Efficiency & Conservation Division (EUMB-EECD)

The Energy Efficiency and Conservation Division (EECD) under the Department of Energy-Energy Utilization Management Bureau was created to formulate policies, plans, and programs related to energy efficiency and conservation. The division's services cover all sectors, including government buildings, industrial/manufacturing, commercial, residential, transport, agriculture, and power. Thus, the EECD is the government's focal coordinator for energy efficiency and conservation that implements the National Energy Efficiency and Conservation Program (NEECP). In addition, the DOE includes three regional offices: the DOE-Luzon Field Office, the DOE-Vizayas Field Office, and the DOE-Mindanao Field Office. These offices also implement energy efficiency and conservation programs in conjunction with the plans and programs of the EUMB-EECD.

The chart below is the organizational structure of the Department of Energy:



**b) Status of organization**

As stated earlier, the DOE is one of the NGAs under the Executive Department of the Office of the President of the Republic of the Philippines, which is mandated to formulate, regulate, and implement plans and programs pertaining to energy matters of the economy.

In terms of staff involved in the implementation of energy efficiency and conservation in the economy, there were approximately 50 personnel in the Energy Efficiency and Conservation Division, with the remainder from the three regional field offices. However, for the entire organization, there were approximately 800 staff members who were distributed across various bureaus and services of the department.

Regarding energy efficiency and conservation programs nationwide, the roles and functions of the three field offices (Luzon Field Office, Vizayas Field Office and Mindanao Field Office) are crucial in attaining the DOE's goals. Reaching appropriate targets sectors in key cities around the economy have been achieved through intensified awareness information, education, and communication (IEC) campaigns.

Moreover, in order to widen the reach of IEC campaigns nationwide, the DOE tapped the services of other government offices, such as the Philippine Information Agency (PIA), the Development Academy of the Philippines (DAP), and the University of the Philippines-National Engineering Center (UP-NEC), to handle IEC matters targeting the household, industrial/manufacturing, commercial, transport, and power sectors.

Furthermore, the DOE's umbrella organization, commonly called the "Energy Family," was composed of the National Electrification Administration, the National Power Corporation, the National Grid Corporation of the Philippines, Power Sector Assets and Liabilities Management, the Philippine National Oil Company, and the Energy Regulatory Commission.

### **c) Roles and responsibilities of the Energy Efficiency and Conservation Division (EECD)**

The following are the roles and responsibilities of the EECD:

- 1) Promote energy efficiency and conservation awareness campaign programs in all energy demanding sectors.
- 2) Formulate appropriate policies that would promote energy-efficient technology for adoption and application in the economy as well as energy-service providers on energy efficiency, and recommend incentives.
- 3) Develop and implement energy efficiency and conservation programs for implementation by the government, industrial/manufacturing, commercial, residential, and transport sectors as well as the electric power industry.
- 4) Maintain and enhance a computerized energy database for the government, industrial/manufacturing, commercial, power, and transport sectors.
- 5) Conduct sectoral performance monitoring and evaluation of energy consumers on the basis of adopted/established parameters.
- 6) Develop and prepare energy utilization indices for the government, industrial/manufacturing, commercial, residential, power, and transport sectors.
- 7) Conduct a recognition award program on the best energy efficiency and conservation practices.
- 8) Promote Minimum Energy Performance Standards (MEPS) for equipment and devices and enhance Energy Management Standards (EMS) in industrial, commercial, and government buildings.

### **d) Covered sectors**

Households, commercial buildings, and government buildings as well as the industrial, transport, and power sectors.

### **e) Established date**

The EUMB-EECD was established after the enactment of Republic Act 7638 of 1992 - an act that created the DOE.

### **f) Number of staff members**

The EECD had a staff of 18 personnel. The EECD's organizational structure included two sections: the Energy Management and Consultancy Section (EMAS) and the Technology

Promotion and Assessment Section (TPAS), with eight personnel per section, including two supervisors, one clerk, and one division chief.

### 1.5. Information Dissemination, Awareness Raising, and Capacity Building

#### a) Information collection and dissemination

General information about the NEECP is readily available to consumers. For example, the Standards and Labeling Program of the DOE is available on its official website ([www.doe.gov.ph](http://www.doe.gov.ph)). For labels of selected appliances, such as refrigerators and freezers, a yellow label tag and specification of the unit inscribed on the box designate that it passed the government's minimum energy labeling requirements.

#### b) Awareness raising

The EUMB-EECD, as the implementing bureau of the DOE, had only 20 personnel on its roster. However, execution of energy efficiency and conservation activities have been augmented with the participation of additional personnel from the three field offices. The locations of these field offices have been crucial for the effective implementation of various energy efficiency and conservation programs and activities within their individual jurisdictions.

As mentioned earlier, to widen the reach of IEC campaigns nationwide, the EUMB-EECD utilized the services of other government offices, such as the PIA, the DAP, and the UP-NEC, to handle critical information, education, and communication campaigns targeting the household, industrial/manufacturing, commercial, transport, LGUs, and the power industry sectors.

Approaches in the conduct of nationwide information campaigns include the use of tri-media (print, radio and television), social media, infomercials, audio video presentations (AVP), seminars and workshops, training, jingles that include themes about energy conservation, forums/conferences, reproduction of energy efficiency and conservation campaign brochures, and other promotional materials.

#### c) Capacity building

A wide range of training courses, workshops, and published technical documents on energy efficiency have been developed and disseminated during seminars and training activities. These include: training courses on energy auditing, capacity-building on energy management standards, proper driving habits, etc. The recipients of these capacity-building activities were individuals from various industries, lawmakers, household owners, students, etc.

The personnel of the EUMB-EECD are also provided with local and overseas training programs. The areas of capacity development include energy auditing techniques, energy management, energy conservation opportunities, cogeneration, etc.

### 1.6. Research and Development in Energy Efficiency and Conservation

Research on various facets of energy efficiency and conservation projects have been conducted. These include the following:

- Energy Consumption Benchmarking in Government Buildings and Commercial Buildings, wherein project proposals are under review and consideration by EU-Switch Asia (under its Policy Support Program).
- Ongoing discussions in the establishment of project cooperation and formulation of Action Plan for the Development of Labeling Program on vehicle fuel efficiency for brand new light-duty vehicles.
- Ongoing technical assistance implementation on the Industrial Energy Efficiency Project for energy-intensive industries promoting the Energy Management System and Systems Optimization (steam systems, compressed air systems, pumping systems).

- Ongoing Survey of AC Units and Lighting Loads targeting 300 government buildings nationwide. The development of a Feasibility Study for the Retrofitting of AC and Lighting Loads in the government sector shall be the main output of this research.
- Joint cooperation with professional organizations in the updating of the “DOE Roadway Lighting Guidelines Manual.”

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts, and Circulars

The following are some of the related directives and issuances on energy efficiency and conservation being implemented as a matter of government policies:

- DOE Memorandum Circular No. 93-03-05 Series of 1993 (Energy Consumption Monitoring).
- Executive Order No. 123, Series of 1993 (Power Conservation and Demand Management).
- Executive Order No. 472, Series of 1998 (Fuel Conservation in Road Transport).
- Administrative Order No. 103, Series of 2004 (Adoption of Austerity measures - Fuel and Electricity).
- Administrative Order No. 110, Series of 2004 (Institutionalization of Government Energy Management Program).
- Administrative Order No. 126, Series of 2005 (Directing the Enhanced Implementation of the Government Energy Conservation Program).
- Administrative Order No. 183, Series of 2007 (Directing the Use of Energy Efficient Lighting/Lighting Systems in Government Facilities).
- Department Circular DC 2015-06-0003 Providing The Interim Manner of Declaring Bilateral Contract Quantities in the Wholesale Electricity Spot Market and Directing the Philippine Electricity Market Corporation to Establish Necessary Protocols to Complement the Interruptible Load Program.
- Department Circular No. DC 2014-08-0014 Enjoining All Electricity Consuming sectors to Implement Demand Side Management Program and Other energy Conservation Measures.
- Green Building Code as Referral Code of the National Building Code (2015, Dept. Of Public Works and Highway).

#### a) Applicable sectors

All of above-mentioned legal documents issued by the government apply to the government, commercial buildings, households, industrial facilities, and transport sectors.

#### b) Financial resources and budget allocation

For fiscal year 2015, the budget allocated for the EECD, which include Maintenance and Other Operating Expenses (MOOE), was approximately PHP 150 Million of which PHP 25 million was applied to locally funded projects.

#### c) Expected results

All of the policies indicated above are meant for massive IEC awareness campaigns, including project support implementation and program monitoring. Accomplishment reports and reporting compliance are submitted on a regular basis.

Under the Performance Based Evaluation System in the government, an agency and/or its bureaus are evaluated according to the Percentage Utilization of Funds and the number of implemented programs, projects, and activities conducted by the end of the year.

## **2.2. Regulatory Measures**

### **a) Name**

- 1) Mandatory Energy Efficiency Labeling is only applied to home appliances and devices and equipment, such as refrigerators and freezers, window-type air conditioners, compact fluorescent lamps, linear fluorescent lamps, etc.
- 2) Guidelines on the Energy Conserving Design in Buildings (2007, DOE).
- 3) Roadway Lighting Guidelines (2015, DOE).
- 4) Green Building Code (2015, Department of Public Works and Highways).
- 5) Government Energy Management Program ó 10% reduction on electricity and fuel consumption, based on 2004 average energy consumption (AO 103, 110, 110-A, 126).

### **b) Applicable sectors**

For the MEPS, it only applies to selected home appliances such as window-type air conditioners, refrigerators, and compact fluorescent lamps. Most of these are used in the household sector.

For the Guidelines on the Energy Conserving Design in Buildings, it only applies to the building sector. Other sectors that use this guideline include architectural firms and urban planners.

For the Roadway Lighting Guidelines, this shall be the main guidebook used by roadway lighting electrical plan designers. It contains information on the specifications and requirements when choosing an energy- efficient lighting system for use in particular locations. Users of these guidelines include: the Road Board, under the Department of Public Works and Highways; LGU Engineering Departments, urban planners and developers, and private engineering companies.

### **c) Outline**

The purpose is to establish compliance with mandatory labeling of selected home appliances; to adopt minimum design requirements in the design of buildings; and to specify minimum standard requirements for the design and construction of lighting on roadways.

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

For fiscal year 2015, the Regular Budget Fund allocated for MOOEs was approximately PHP 150 Million, whereas PHP 25 million was allocated for locally funded projects.

### **Expected results**

- Massive IEC campaigns promoting energy conservation measures and the best practices to all energy consuming sectors. All industries and individuals will be reached through tri-media, social media, seminars-workshops, trainings, forums/conferences, outdoor advertisements, brochures/flyers, infomercials, etc.
- Compliance by home appliance manufacturers and importers of air conditioners, refrigerators and freezers, compact fluorescent lamps, linear fluorescent lighting, etc.
- Compliance by building designers, architects, and users (consumers) of energy-using equipment and devices.
- Compliance by LGUs in rehabilitating inefficient roadway lighting, especially in parks and streets; passage of local ordinance regulating issuances of building permits that comply with the provisions set forth on energy efficiency guidelines in buildings.

### 2.3. Voluntary Measures

In early 2015, the DOE issued a Department Circular DC 2014 -08-0014 to enjoin commercial buildings to set air-conditioning thermostat settings at 25°C from 11:00 AM to 2:00 PM every day of the week.

Similarly, the Interruptible Load Program (ILP) was also implemented to address the looming power shortage from February to May 2015. This was a voluntary agreement between mall owners and the electric power company covering the entire Luzon region, wherein they were requested to operate their own generators, instead of having the electricity supply cut off from the grid. The operating costs (fuel costs and associated maintenance costs) were reimbursed by the power company to the mall owners, while the kWh produced will have a price agreed on by the power company and the mall owners under a buy-back scheme.

### 2.4. Financial Measures Taken by the Government

#### 2.4.1. Tax Scheme

According to the Department of Finance, tax incentives that cover 100% of the import duty by the Bureau of Customs are given for energy-efficient technology, especially for capital equipment.

Government banks, including other private banks with loan windows for energy efficiency projects do not provide a special loan scheme.

#### 2.4.2. Low-Interest Loans

Financial loans for energy efficiency improvement programs are being provided by local commercial banks, in cooperation with other foreign financial and lending institutions such as the World Bank-IFC, the Asian Development Bank, and local banks. However, interest loans remain at the prevailing commercial rate.

#### 2.4.3. Subsidies and Budgetary Measures

The DOE does not provide financial subsidies to any private or government entities for efficiency improvements or projects, except when the intention is to promote and show viability of an efficient technology, which can only be used for replication and commercialization at a very specific time period. Regarding the case of the Philippine Energy Efficiency Project, which was funded under a loan agreement with the Asian Development Bank amounting to USD 31 million, the objective was to promote LED traffic lights, CFLs, T5 linear fluorescent lights, and high-pressure sodium lights in government buildings, public parks, major city roadways, and households, where applicable.

#### 2.4.4. Other Incentives

**Fiscal Incentives.** Under the new guidelines of the Board of Investment (BOI) regarding its 2014–2015 Investment Priority Plan (IPP), companies that apply for tax incentives on pioneering energy projects will be given appropriate incentives. However, certain requirements must be accomplished such as an endorsement from the DOE attesting to the technology adopted. As stated earlier, tax incentives that cover 100% of the import duty are given for energy-efficient technology, especially for capital equipment.

**Non-Fiscal Incentives.** Companies that reduce their energy consumption through the application of appropriate energy efficiency and conservation measures, programs, and projects, were recognized under the Don Emilio Abello Energy Efficiency Award. Introduced

in 1980, this prestigious award is still offered today. Award categories include: the Secretary Award; the Hall of Fame Award; the Outstanding Award; the Special Award; and the Indigenous Award. There is also recognition for individuals under the category of the Energy Manager Award. In some cases, government offices were given a Special Award under the Government Energy Management Program (GEMP) in order to promote energy efficiency in the government sector.

## 2.5. Energy Pricing

Generally, energy pricing is market-based, while oil pricing is deregulated under the Philippine Oil Industry Deregulation Law. However, the pricing mechanism for electricity tariffs in the Philippines is regulated by the Energy Regulatory Commission.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organizations

The DOE cooperates with various local non-government organizations, including the Energy Practitioners Association of the Philippines (ENPAP); the Energy Development and Utilization Foundation, Inc.; the ESCOPhil Association; the Institute of Integrated Electrical Engineers of the Philippines (IIEE); and the Philippine Green Building Council (PhilGBC).

### 2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes

Project cooperation was established with the following international organizations.

| Organization   | Project Cooperation Initiated   |
|--|---|
| Japan International Cooperation Agency (JICA)              | Project cooperation on the Development Study of Energy Efficiency and Conservation in the Philippines.  |
| European Coalition for Corporate Justice (ECCJ)            | Cooperation sanctions under the ASEAN Japan Energy Efficiency Program (AJEEP).  |
| Japan External Trade Organization (JETRO)                  | Short-term cooperation on setting up business meetings with Japanese investors on EE/RE products and services.                                    |
| UNIDO-(Global Environment Facility (GEF))                  | Project cooperation on technical assistance provided under the Philippine Industrial Energy Project.  |
| United Nations Development Programme (UNDP)                | New project cooperation on the Integrated Low-Carbon Project (ongoing 2012-2016)  |
| EU-SWITCH  | Project cooperation on the Development of the Philippine Energy Efficiency Roadmap 2014-2030, and Energy Efficiency Action Plan 2016-2020         |
| International Copper Association Southeast Asia (ICASEA)   | Short-term project cooperation in the Establishment of Baseline Data of Air-Conditioning Units in the Government Building Sector in Metro Manila. |
| United States Agency for International Development (USAID) | Cooperation on capacity-building for personnel on greenhouse gas emissions and energy consumption forecasting.                                    |

### 2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements

There has been ongoing cooperation with the Clean Air Asia Initiative (CAI-Asia) regarding the establishment of an action plan for the Vehicle Fuel Efficiency Labeling Program for Passenger Cars and Light-Duty Vehicles. In addition, there has been non-binding cooperation with certification bodies or companies that provide services for the establishment of ISO standards in a particular company (e.g., the ISO 50001 standard).

# RUSSIAN FEDERATION

## INTRODUCTION

Russian economy's energy intensity continues to be considerably high in comparison with most of the developed economies. With the introduction of effective energy efficiency (hereafter EE) measures, experts estimate that the energy savings from the improvement of Russian energy intensity could reach 420 million tonnes of fuel equivalent (tfe), including more than 230 million tonnes in the energy-fuel complex which is considered the most energy-intensive sector of the Russian economy.

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The Russian government has made it a top priority to facilitate the achievement of its objectives of improved energy savings and energy efficiency. However, due to Russia's geography (climate, territory size and so on), low domestic energy prices (especially gas and electricity), inadequate and outdated energy infrastructure, as well as lack of transparent auditing, the Russian Government's efforts for the effective improvement of energy efficiency and encouragement of energy saving will continue to be hindered.

On 4 June 2008, President Medvedev issued Presidential Decree N. 889 titled "Concerning some measures for improving the energy and ecological efficiency of the Russian economy", which established a more ambitious energy efficiency goal of a minimum 40% reduction in the energy intensity of the Russian economy (defined as energy use, or total final energy consumption, per unit of GDP) by 2020 compared to 2007. The decree also identified several target areas, such as the introduction of measures for technical regulation in the power generation, construction, residential and transportation sectors in 2008-2009, and called for the finalising of the drafts of the laws and regulations, federal targeted programs, and other relevant legislative acts in the field of energy efficiency and ecological improvement.

In addition, energy efficiency has been identified as one of the key priority areas for the Russian government in the recently published "Energy Strategy of the Russian Federation up to the year of 2030" (hereafter ES2030), which was approved and adopted on 13 November 2009, in accordance with the Government Decree No.1715-p. Specifically, the ES2030, which will be put into effect in three stages, stressed that during the second stage (between 2015 and 2022), the goal will be to improve overall energy efficiency on the basis of innovative development of the fuel and energy industry. During the final stage of 2022-2030, the focus will shift to the efficient use of energy resources across the economy, paving the way for the transition to non-fuel types of energy. In addition, as the primary goal for the improvement of energy efficiency, the ES2030 identified a 50% reduction in energy intensity as well as a minimum 1.6 times reduction of electrical intensity in the Russian economy by 2030 compared to 2005. For this purpose, the strategy included a number of detailed policy recommendations and measures for the improvement of energy efficiency and conservation. In addition, it set forth the indexes of energy efficiency of the Russian economy (measured as the energy intensity of GDP) as a maximum 78% for the first stage (2010-2015), maximum 57% for the second stage (2015-2022), and 44% for the third stage (2022-2030).<sup>15</sup> Furthermore, in order to boost energy conservation, the strategy envisioned the USD 244-259

<sup>15</sup> ES2030, Appendix 2 "Indexes of energy security: Indexes of energy efficiency".

billion total budget for the period 2009-2030, constituting about 10% of the overall ES2030 budget during the same period.<sup>16</sup>

## 1.2. Sectoral Energy Efficiency Improvement Goals

Russia has no clearly-established sectoral goals. However, a number of measures and targets (both quantitative and qualitative) for energy efficiency improvement have been introduced across the sectors of the Russian economy upon the adoption of Federal Program 'Energy Conservation and Improvement of Efficient Efficiency for the period until 2020' (hereafter FP) on January 21, 2011.

The FP envisioned the following sectoral potential saving targets.

### *Power*

The FP envisages that successful adoption of energy saving technology and measures would result in 312.81 million tonnes fuel equivalent (hereafter 'tfe') total savings of energy resources in the entire Russian fuel and energy complex during 2011-2020.<sup>17</sup>

### *Public and Residential*

It is important to note that there is no clear distinction between the public and residential sectors in Russia, especially concerning the assessment of energy and heat efficiency of buildings, light fixtures, and appliances.

The Russian government has developed an economy-wide building code for energy efficiency that features various requirements for existing and new buildings in both commercial and residential sectors. Special emphasis is placed on refurbishing and upgrades of the existing buildings through the introduction of higher buildings standards, phasing out of inefficient lighting, water and heat systems. According to FP, following the successful implementation of the measures to improve energy saving and energy efficiency in heat supply in the public sector, would lead to 184.18 million tfe; and in the residential sector, focusing on efficient lightning and heat supply, to 97.83 million tfe in total energy savings during 2011-2020.<sup>18</sup>

In addition, Russia has recently announced a plan to phase out incandescent lighting by 2012 and has been developing an energy labelling scheme based on the European energy efficiency labelling standards.

### *Industry*

To date, a wide range of sectoral development programs and individual energy company investment programs have been developed and implemented. They include the Strategy of Metallurgy Development through 2015; the Strategy of Chemistry and Petrochemistry Development through 2015; the Set of Measures to Improve Competitiveness of the Forestry Industry; energy saving and investment programs of JSC Gazprom, JSC Lukoil, JSC Norilsk Nickel, Urals Mining and Metallurgical Company, JSC Severstal, and others.<sup>19</sup>

In addition, the government has been promoting a number of general energy efficiency measures especially in energy-intensive sectors of Russian economy (such as oil refining, steel, cement, cellulose-paper, aluminium, etc.), while putting a special emphasis on the promotion of high efficiency technologies for energy savings in these areas. In accordance with FP, the expected energy savings from the successful implementation of the program measures would lead to the total energy savings of 333.25 million tfe during 2011-2020.<sup>20</sup>

<sup>16</sup> Ibid, Appendix 4 'Estimates for Russia's fuel and energy balance up to the year of 2030: Forecast of necessary investment into the development of the fuel-energy complex and energy supply of the Russian economy up to the year of 2030'.

<sup>17</sup> Federal Program 'Energy Conservation and Improvement of Efficient Efficiency for the period until 2020', (in Russian only), p.18.

<sup>18</sup> Ibid, p. 20 and p. 26.

<sup>19</sup> PEEREA report, p. 36.

<sup>20</sup> FP, p.21.

### *Transport*

In accordance with the FP, due to the introduction of Western energy efficient technologies in the Russian domestic automobile production and overall improvement of energy efficiency in the transportation sector, total energy savings during 2011-2020 should reach 72.2 million tfe.<sup>21</sup> In addition, a number of qualitative measures and environmental requirements have been introduced for road vehicles and motor fuels.

### *Municipalities and Services*

It is expected that the improvements through introduction of higher building standards, phasing out of inefficient lighting, water and heat systems facilitated by the FP, the total savings in the consumption of energy and heat resources in the municipalities and services sector would be 115.95 million tfe during 2011-2020.<sup>22</sup>

### *Other*

In agriculture, the government adopted a special development program that encourages a gradual replacement of the energy-inefficient agricultural equipment and vehicles. According to the FP, these measures for the reduction of energy intensity should result in 7.94 million tfe in energy savings during the period of 2011-2020.<sup>23</sup>

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

One of the action plans for promoting energy efficiency and saving in Russia is The Federal Program "Energy Conservation and Improvement of Efficient Efficiency for the period until 2020" (hereafter FP), which was adopted on January 21, 2011.

### **a) Objectives**

The FP, in line with the ES2030, is aimed at helping the transition of the Russian economy to an energy-saving development path by decreasing the energy-output ratio of GDP on the basis of energy-saving policies across the economy. The key targets set in the program included the reduction of energy intensity at least by 7.4% (total final energy consumption/GDP) by 2015 and at least by 13.5% by 2020. Furthermore, the program aims to facilitate the creation of energy-efficient Russian society.

### **b) Applicable sectors**

The FP sets targets and outlines measures for energy efficiency improvements in various sectors of the Russian economy.

### **c) Outline**

The FP outlines concrete measures in all sectors of the economy with the aim to help achieve the federal target of a minimum 40%-decrease in energy intensity of the Russian economy by 2020 compared to 2007 through a rational use of energy resources and other measures to encourage EE and energy conservation. These measures include enhancement and coordination of federal, regional and municipal energy efficiency and energy saving programs; establishment of information dissemination, public awareness and promotion of education initiatives; introduction of various financial assistance measures for promotion of efficient use of energy and heat resources; 4.5%-target share of renewable energy resources in the total energy consumption balance by 2020; and others.

The FP consists of several sub-programs aiming for energy conservation and EE improvement in the following sectors of the Russian economy: electric power; heat supply in the public sector; industry; agriculture; transportation; municipalities and services; residential; regions and administrative units of the Russian Federation; and the energy sector as a whole.

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<sup>21</sup> FP, p. 23.

<sup>22</sup> Ibid, p. 25.

<sup>23</sup> Ibid, p. 22.

The program is to be implemented in two stages, 2011-2015 and 2016-2020. During the first stage, energy intensity of the Russian economy should decline by at least 7.4%, and by the end of the second stage, by 13.5%, which is the final EE target of the FP.

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

The financing for the first stage will reach 3.31 billion roubles and 5.527 billion roubles during the final stage of the program. The financing for the implementation of the FP is expected to come from federal and regional budget as well as the private (commercial) sector, totalling 8.837 trillion roubles<sup>24</sup> (approximately 308 billion USD).

#### **e) Method for monitoring and measuring effects of action plans**

The FP calls for the establishment of various administrative mechanisms for effective management and control of monitoring and measuring the program's effects based on the compilation of data and statistics and trend analysis. Additional monitoring mechanisms include energy-efficiency and energy-saving surveys, data collection, and the comparison of the results with the indicative targets or norms established by the related legal acts. In addition, according to the new Federal Law No. 261-F3 on "Energy Conservation and Increase of Energy Efficiency" (hereafter FLEC IEE) adopted in November 2009, other methods include mandatory energy monitoring and regular auditing (once every five years) for heat and power usage of buildings, energy-intensive equipment, and other energy-consuming entities; installation of compulsory meters and requirements of the energy efficiency certificates ("energy passports"); establishment of a single, unified federal energy efficiency information network system comprised of the data collected from the energy audits; and others.

The State Standard, GOST P 51380-99 "Energy conservation and methods of assurance for energy efficiency compliance", which has been in force since November 1999, sets forth the requirements for the verification of energy-consuming products' energy efficiency indicators and their comparison to the normative values. In accordance with the standard, the following monitoring methods have to be applied: producers' declaration of energy efficiency performance; certification of production testing and verification; collection of data and its analysis concerning product energy consumption in comparison with energy efficiency normative values.

Annual energy efficiency and energy saving surveys are conducted through comparison of energy intensity per GDP unit with the indicative targets of the ES2030. Similar evaluations are made in a number of Russian Constitutional Entities regarding changes in their economy's energy intensity per gross regional product. At the level of enterprises and economic entities, energy efficiency and energy saving are monitored at their discretion and at their expense or with the involvement of energy audit organisations.

At the federal level, monitoring of the realisation of energy efficiency and energy saving policies and measures is carried out by the Section on Monitoring of the Department of the State Energy Policy and Energy Efficiency at the Ministry of Energy. In addition, the Federal Agency on Technical Regulating and Metrology (FATERM), which was founded in May 2004 and placed under jurisdiction of Ministry of Energy of the Russian Federation, carries out the functions on rendering state services, administration of public estate in the field of technical regulating and metrology, including licensing of activities with respect to manufacture and maintenance of various technical requirements. It also controls and supervises the compliance of mandatory requirements of state standards and technical regulations, including in the field of energy efficiency.

#### **f) Expected results**

The Russian Ministry of Energy estimates that the savings of energy and fuel resources from the successful implementation of the FP are expected to reach 300 million tfe by 2015 and 1,000 million tfe in total from 2011 to 2020. In addition, successful implementation of the

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<sup>24</sup> FP, p. 6.

program should help overcome negative development tendencies in the fuel and energy complex as well as the achievement of the targets listed in Section 1.2 of this report.

#### **g) Future tasks**

The FP envisions the following two key policy directions for the improvement of energy efficiency of the Russian economy: 1) the stimulation of various cross-sector processes and mechanisms encouraging the improvement of energy efficiency of the Russian economy, and 2) the realisation of the energy conservation projects by sectors to reach the energy saving potential of the Russian economy. To reach these goals, the program proposes such measures as:

- 1) Significantly increasing the share of renewable energy resources in the total energy consumption balance
- 2) Enhancing and coordinating federal, regional and municipal energy efficiency and energy saving programs
- 3) Establishing information dissemination, public awareness and promotion of education initiatives
- 4) Introducing various financial assistance measures for the promotion of the efficient use of energy and heat resources, and many others.

Additionally, a number of regional and local energy saving programs, which identify major energy saving and energy efficiency measures at a regional or municipal level and use regional or municipal budgetary resources for their implementation, have also been developed and put in effect to supplement the above-mentioned federal programs. Currently, several regions of the Russian Federation have already established or are currently establishing regional energy efficiency programs or initiatives.

In addition to above-mentioned measures and policies for the strengthening of the EE legal framework under the auspices of the FP, the Russian government has launched the following six pilot 'Presidential EE projects' that are currently being implemented in several regions of the Russian Federation. Upon their successful completion, these projects are expected to be applied across all regions.

- 1) metering (installation of metering devices and automation)
- 2) EE in budget sector (piloting of energy performance contracting in schools and public buildings)
- 3) energy efficient district (targeting the residential sector)
- 4) energy efficient lighting (replacement of street lighting and other measures)
- 5) small-scale cogeneration
- 6) new energy sources (renewable and other, non-carbon, energy resources).

#### **1.4. Institutional Structure**

In the Russian Federation, legislative power is vested with the two-chamber Federal Assembly consisting of the State Duma (more powerful lower house) and the Federation Council (upper house). In addition, policy responsibility for energy efficiency actions varies between the levels of government, with the federal government holding the higher jurisdiction.

At the federal level, until May 2008, energy saving and energy efficiency policy was placed within the competence of the Federal Assembly. However, during the administrative restructuring of the Russian government in May/June 2008, the responsibility for energy policymaking and oversight was transferred from the Ministry of Economic Development and Trade (which was reorganised into the Ministry of Economic Development and a separate Ministry of Industry and Trade), the Ministry of Industry and Energy and the Federal Energy Agency to the newly established Ministry of Energy (Minenergo), currently headed by Sergey Shmatko.

Within the new Ministry of Energy, for the first time, the Department of the State Energy Policy and Energy Efficiency (currently headed by Mr. Sergei A. Mikhailov) was created to deal specifically with the issues and policies pertaining to energy saving and efficiency. In addition, in 2009, to facilitate policymaking and improve inter-government communication concerning energy saving and energy efficiency, two special intergovernmental groups were established. The first group, the commission on the fuel and energy complex, is located at the prime minister's office and headed by Minister of Energy Sergey Shmatko. It is engaged in legal aspects and institutional structures, as well as preparing and monitoring the National Program. The second group, the Expert Group on energy efficiency within the Commission on Modernization and Technological Development of the Russian Economy, was established in May 2009. The Commission's Expert Group is located at the president's office and is headed by President Dmitry Medvedev himself. It holds regular monthly meetings and is engaged in the coordination of federal, regional, and municipal projects and initiatives, as well as choosing and funding the most innovative projects in energy efficiency and renewable energy that can be implemented within the Russian Federation.

At the government level, the responsibility for the state energy policy, including energy saving and energy efficiency, is also shared by the Ministry of Regional Development, the Ministry of Natural Resources and Ecology, the Ministry of Finance, the Ministry of Agriculture, the State Atomic Energy Corporation (Rosatom), the Federal Tariff Service, and other agencies. At the level of the Russian constituent entities, the relevant functions are performed by the regional legislative and executive bodies.

Furthermore, on December 22, 2009, the government established the (Russian [Federal] Energy Agency) (hereafter REA) within the Ministry of Energy. The REA currently has 70 regional branches. Its key tasks currently focus on operating the federal EE and energy saving information system; administering, monitoring, and coordinating efforts for the effective implementation of the EE law, the FTP, and other measures for the improvement of EE and energy conservation efforts in the budgetary, power generation, industrial, and residential sectors of the Russian economy.

In addition to governmental organisations, there are several energy efficiency centres operating under different external supporting programs in the Russian Federation. Some of the largest are: the Center for Energy Efficiency (CENEF), Center for Energy Policy, AcademEnergoServis, Institute for Energy Policy, RusDem, ESCO Negawatt, Rus Esco, 3E, Energo Servis and regional centers for energy efficiency with the major located in Kaliningrad, Murmansk, Kola, Karelia, and Ekaterinburg.

In order to improve policy coordination at different levels, a number of Coordination Councils for the realisation of energy saving and energy efficiency policies have been established in Russian regions and municipalities. Energy saving and energy efficiency issues and policies have been addressed by energy service organisations and associations, as well as by energy producer and end-user economic entities at the regional and municipal levels. The majority of the Russian constituent entities have relevant energy saving management infrastructures (in 2007 there were 75 centres and agencies and 24 energy saving foundations).<sup>25</sup> Additionally, according to the Russian Ministry of Energy, the establishment of a state energy services company (Federal Service Company) (OAO FESCO) and regional (municipal) public-private energy service companies (RESCO) is planned. It is envisaged to create a network of such companies in the regions to cover with their activities all the territory of the Russian Federation. These federal and regional ESCOs will, however, only serve state-owned enterprises and municipal buildings.

#### **a) Name of organisation**

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<sup>25</sup> Ibid, p. 19.

The Ministry of Energy of the Russian Federation; its official website is available in Russian only at <http://minenergo.gov.ru/>.

**b) Status of organisation**

The Ministry of Energy is a Federal governmental body within the legal branch of the Russian government. In accordance with the administrative reform of May 2008, it replaced the Federal Energy Agency and the Ministry of Industry and Energy. The ministry reports to the executive branch of the Russian Federation, the prime minister's office and the Russian president.

**c) Roles and responsibilities**

The ministry is responsible for design, realisation, and oversight of the state energy policy and legal framework of the Russian energy structure, particularly in the oil and gas, power generation, coal, renewable energy sectors as well as in the area of energy efficiency, saving and transportation.

**d) Covered sectors**

The Ministry's Department of the State Energy Policy and Energy Efficiency covers all sectors of the Russian economy.

**e) Established date**

In May 2008, the Ministry of Energy replaced the old Ministry of Industry and Energy and the Federal Energy Agency.

**f) Number of staff members**

No information available

**Russian Energy Agency**

Important step in implementation of the Russian energy efficient programme was establishment of the national operating unit – Russian Energy Agency. Federal State Organization Russian Energy Agency was established under the auspice of the Ministry of Energy on December 22, 2009, on the basis of Russian Association for Scientific and Technical Development Information Resources (Rosinformresurs Association since 1966).

REA is a center for information exchange, analytic research, encouragement, examination and implementation coordination of projects related to energy efficiency, energy saving, renewable energy sources and innovations in the Fuel & Energy Complex of the Russian Federation. REA's HQ is in Moscow; further 70 branches in Russia's 8 major federal regions, including St. Petersburg, total staff is 2000 employees.

REA's Goals are:

- É Support of implementation of the Federal Law "On energy saving and energy efficiency improvement" and coordinate practical actions for state policy on energy efficiency realisation and apply energy efficiency principles as a priority direction for Russian economic modernization and technological development;
- É Facilitation of improvement of effectiveness of the state energy efficiency policy;
- É Creation of the single platform for interaction of all market participants;
- É Improvement of electric energy industry investment profile.

Russian Energy Agency is a Directorate of the Russian Federation State Programme on Energy Conservation and Energy Efficiency till 2020.

Activity domains include:

1. Fuel and energy complex and energy efficiency information and analytical centre
2. Energy Efficiency Scientific & Technical Information and Innovation Implementation Support Center
3. Center of Organizational and Methodological Support for Energy Efficiency Activities
4. Support Center for Implementation of Energy Efficiency Projects, including financing
5. Coordination Center for International Cooperation in the Field of Energy Efficiency
6. Energy Efficiency Knowledge Center

REA has to collaborate with relevant ministries on development, implementation and review of energy efficiency policy, including development of industrial standards and certificates on energy efficiency, key indicators for energy audits and energy balance, etc.

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

Information dissemination, EE education and capacity-building in the field of EE and energy conservation have become the key priority areas of the Russian Ministry of Energy.

#### a) Information collection and dissemination

The Ministry of Energy has put forth a number of programs and various events for the promotion of awareness-rising among the general public.

The FLEC IEE includes a separate chapter entitled "Information provision concerning energy conservation measures and energy efficiency increase." Article 22 of Chapter 6 outlines the following activities for the dissemination of information:

- Establishment of a single integrated federal information network on energy conservation and energy efficiency
- Publication of information about energy saving and energy efficiency programs in the print and other media at the federal, regional, and municipal levels
- Organisation of various television and radio programs on the measures and best practices for energy efficiency improvement and latest equipment and technologies in the field of energy conservation
- Distribution of information on energy saving issues to the consumers
- Dissemination of information about the energy saving measures and potential in the building and residential sectors
- Organisation of exhibitions of equipment and technologies with high energy efficiency
- Realisation of other measures for energy conservation and energy efficiency improvement in accordance with the FLEC IEE.

In addition, a number of measures to improve information dissemination and awareness-raising have been developed by the Russian government under the "Complex Measures Plan for the realisation of the federal policy for energy saving and improvement of energy efficiency," which was presented by the Ministry of Energy in June 2008. Furthermore, on June 1, 2010, in line with Article 23 of the FLEC IEE, the Russian Government issued a Decree No. 391 "About Establishment of the State Information System on Energy Conservation and EE," which calls for the completion of the integrated federal EE information network within a 9-month period.

Finally, private companies distribute information about the energy efficiency and energy saving potential of their products to consumers through their websites or informational brochures.

#### **b) Awareness-raising**

In accordance with Chapter 6 of the FLEC IEE on 'Information provision concerning energy conservation measures and energy efficiency increase', the federal, regional and municipal governments are required to organise and support various media-based awareness campaigns and events for the promotion of energy saving, improvement of energy efficiency, and effective use of natural resources in industrial and social spheres of Russia. In addition, the producers of energy-consuming equipment and suppliers of energy resources are obliged to inform consumers on a regular basis about energy- and heat-consuming potential of their products by using the Internet, advertisements and other means.

#### **c) Capacity-building**

As one of the measures for improvement in the area of EE capacity-building, President Medvedev, in his Decree No. 889 'Concerning some measures for improving the energy and ecological efficiency of the Russian economy' (4 June 2008), stressed the need to include basics of ecology, including improving basic knowledge on energy saving, into the federal standards for secondary education, which was incorporated in Chapter 6 of the FLEC IEE. Furthermore, on April 7, 2010, the Ministry issued a Decree No. 148 in support of FLEC IEE provision focusing on the improvement and support of EE auditors' professional training and education.

### **1.6. Research and Development in Energy Efficiency and Conservation**

The ES2030 stressed the need to gradually replace imported technology and equipment with domestically produced innovative and advanced technologies and equipment in order to help boost energy efficiency and energy conservation in various sectors of the Russian economy.

With this task in mind, the FP's funding and budgetary scheme is expected to provide support for measures and activities aimed at promoting scientific and technology research, as well as innovating and investing in the field of energy saving and EE.

In addition, two Federal Targeted Programs, titled 'Research and Development in Priority Areas of Science and Technology Complex of Russia 2007-2012' and 'National Technological Basis for 2007-2011', which contain tasks and measures related to appropriate research and development activities (including on energy saving) in the Russian economy have been introduced.

There have been a growing number of private research institutes and organisations engaged in research on improving energy efficiency and energy saving in various sectors of the Russian economy, such as the Center for Energy Efficiency (CENEF), the Sustainable Energy Development Center (ISED), the Institute of Energy Strategy (IES), and others.

According to the PEEREA Report, research is under way on priority areas of the development of science, technology, and equipment in the Russian Federation and on the List of Critical Technologies having a direct bearing on the improvement of energy efficiency (including technologies of nuclear energy, hydrogen energy, new and renewable energy resources, development of energy saving heat and electricity transportation, distribution and consumption systems, development of energy efficient engines and propulsion plants for transportation systems, nanotechnologies and nanomaterials, etc.)<sup>26</sup>

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<sup>26</sup> PEEREA report, p. 36.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

#### 2.1.1. Energy Efficiency Act

The legal framework for energy efficiency is based on various codes and Federal laws, such as the Civil Code, the Tax Code, the Customs Code, the Urban Development Code, the Laws on Electricity Sector and Municipal Housing Sector. In November 2009, the Russian Government has taken the policy for energy efficiency improvement and energy conservation to a new level by adopting the Federal law No. 261-FZ "On Energy Conservation and Increase of Energy Efficiency" (hereafter FLEC IEE), which was approved by the President on 23 November 2009 and came into effect on 1 January 2010. In addition, the Law on Heat Supply came into force in July 2010, which calls for the development of cogeneration facilities as the most effective way to increase EE. A number of draft laws amending some existing laws and technical regulations with a view of improving opportunities for the use of non-traditional energy and improving energy efficiency and energy conservation are being currently developed to supplement the new law.

#### a) Name

Federal Law No. 261-FZ "On Energy Conservation and Increase of Energy Efficiency" has been approved and adopted by the Russian government on 18 November 2009. It came into effect on 1 January 2010, and the latest amendments were introduced on 27 July 2010.

#### b) Purpose

The FLEC IEE is designed to create economic and organisational conditions leading to the increase in energy savings and improvement of energy efficiency of the Russian economy. It also sets a legal framework for the use of energy resources in Russia in terms of promoting rational use of exhaustible energy resources and alternative fuel resources for electricity and heat generation.

#### c) Applicable sectors

The FLEC IEE applies to all large energy users across all sectors throughout the Russian Federation.

#### d) Outline

The FLEC IEE, which is effective throughout the territory of the Russian Federation, sets forth the following five key principles of the policy for energy saving and energy efficiency increase in the Russian Federation:

- Effective and efficient use of energy resources
- Support and encouragement of energy conservation and energy efficiency improvement
- Systematic and full-fledged realisation of the measures to encourage energy conservation and energy efficiency improvement
- Planning activities for energy conservation and energy efficiency improvement
- Use of energy assets based on resource, technological, ecological, and social conditions.

The law is comprised of 10 Chapters and 50 Articles, including the following regulations and provisions:

- General government regulations in the area of energy conservation and energy efficiency

- Requirements for energy efficiency labelling of goods and commercial inventory of energy resources
- Energy efficiency of buildings and installations in the residential and commercial sectors
- Requirements for mandatory energy efficiency audit, inspection, and monitoring (including requirements for data collections and analysis of the energy passports)
- Requirements for information dissemination (including the establishment of the federal integrated information system) and campaigns for awareness raising
- Requirements for energy conservation and energy efficiency in the budget/governmental sector
- Government support and stimulation of energy conservation and energy efficiency
- Enforcement of compliance with energy conservation and energy efficiency requirements.

#### e) Financial resources and budget allocation

There is currently no information available about budget allocation in support of the FLEC IEE. However, the law includes a separate chapter (Chapter 8), which stipulates the directions and forms of government support in the field of energy conservation and energy efficiency. In accordance with Article 27 of Chapter 8, the programs and activities in this field should be financed by federal, regional, and municipal budgets; domestic and foreign private investments; and other resources in accordance with the existing laws and regulations. In addition, the article stipulates that the government support of investment activities in the field of energy conservation and energy efficiency improvement will come in the forms of various stimulation measures, such as direct subsidies, special loans, tariff regulations, special privileges, tax deductions, fee reductions, payback schemes, and others.

#### f) Expected results

The new law on energy saving and energy efficiency will become the core of a legal framework for the use of energy resources in the Russian Federation in terms of promoting rational use of exhaustible energy resources and alternative fuel resources for electricity and heat generation. Notably, it will help provide state support for the companies implementing investment activities in the energy efficiency field. Furthermore, the law will help encourage additional financial incentive mechanisms for energy saving activities, separation of energy saving competences between the federal, regional, and municipal level authorities, promotion of increased production and sales of equipment that corresponds to the most advanced energy efficiency requirements, a linkage between addressing environmental and energy saving programs, and increased use of renewable energy and alternative types of fuel. The enactment of the FLEC IEE will ultimately help create the necessary environment to achieve the overall energy efficiency goal of reducing energy intensity of the Russian economy by a minimum 40% by 2020 compared to 2007.

## 2.2. Regulatory Measures

The FLEC IEE has several articles dedicated to standardisation, mandatory certification, audit, and declaration of energy efficient indicators (energy passports and energy efficiency certificates). Specifically, Article 9 and Article 10 in Chapter 3 "Federal regulations in the field of energy conservation and increase of energy efficiency", require governmental standard declarations for all energy-consuming production to be supplemented by energy efficiency data, including energy consumption data; prohibition of the production and circulation of goods with low energy efficiency performance; mandatory inventory of energy resources; energy efficiency requirements for buildings and installations; requirements of mandatory energy audit and energy passports, and so on.

In addition, there is many federal and regional codes and regulations (State Standards or "GOST") in the area of energy conservation and energy efficiency improvement, most

important of which include GOST P 51541-99 "Composition of indicators and basic concepts in the field of energy saving and efficiency", GOST P 51379-99 "Power-engineering certificates for industrial consumers of fuel-energy resources" (adopted and set in force on 30 November 1999) that regulates the mandatory issuance of energy passports to energy- and fuel-consuming industrial producers; GOST P 51380-99 "Energy conservation and methods of assurance for energy efficiency compliance", GOST P 51388-99 "Energy conservation and informing consumers about energy efficiency of equipment in the residential sector", as well as a number of building codes and thermal performance regulations.

### 2.2.1. Minimum Energy Performance Standards and Labelling

Presently, there are no MEPS in Russia, but the government is planning to introduce mandatory MEPS for white goods and electric appliances.

In accordance with GOST P 51388-99 "Energy conservation and informing consumers about energy efficiency of equipment in the residential sector", instead of MEPS, partially mandatory energy performance certificates and energy saving labelling (based on a 7-class, 95/75 ES and 92/2 ES international standards system) for specified equipment, materials, and products are currently being used. In addition, Article 10 of the FLEC IEE stipulated the requirements for obligatory posting of technical information, including energy efficiency class/rank, by marking and labelling most domestically-produced and imported goods, which came into effect on 1 January 2011 for white goods, elevators, and computer-related goods.

In addition, in accordance with Article 10, Section 8 of FLEC IEE, in order to improve energy saving of lighting devices, the government has ruled to introduce a ban on the distribution, sale, and general use of inefficient lighting, such as 100-watt or higher incandescent lamps, starting on 1 January 2011, particularly in the budgetary and government sector. This ban will be followed by the prohibition of sale and distribution of 75-watt lights from 1 January 2013, and completely prohibiting the sales and distribution of all incandescent lighting (25-watts or higher) starting on 1 January 2014.

#### a) Name

Labelling and "energy passports" (energy efficiency and thermal efficiency performance certificates for specified equipment and materials)

#### b) Purpose

To provide the energy labelling of the goods, appliances, and materials in order to improve their energy efficiency

#### c) Applicable sectors

The requirements apply to white goods, appliances, heat and lighting units, and other equipment and materials in the industry, transport, residential/commercial, and government sectors.

#### d) Outline

In accordance with GOST P 51388-99 "Energy conservation and informing consumers about energy efficiency of equipment in the residential sector" as well as FLEC IEE and FTP EEE, it is required to verify, and provide consumers with information about, energy efficiency and actual energy performance of the following types of products: household appliances and equipment, including lighting; gas stoves and heaters for residential/commercial use; heat-insulation products and materials; as well as automobiles and vehicles in private use.

In addition, the aforementioned GOST established an energy efficiency performance classification system, particularly for white goods and appliances. It is based on the 7-class standards system, with the A class being the most efficient (less than 55% actual energy consumption than expected), while the G class being the worst (exceeding expected energy performance by over 125%).

| Электрoэнергия                       |             |
|--------------------------------------|-------------|
| Производитель                        | 1 Siemens   |
| Модель                               | 2 ККЗ1Е01   |
| Низкий расход                        | 3 <b>A</b>  |
| Высокий расход                       | 4 325       |
| Энергопотребление, кВт·час/год       | 5 190<br>90 |
| Полный объем Холод. (l)              |             |
| Полный объем Мороз. (l)              |             |
| Шкала при работе<br>дв(A) отн. 1 кВт |             |

1. Maker
2. Model
3. Energy Consumption Class (A to G)
4. Actual energy consumption (kWh/year)
5. Size of the freezer and refrigerator, etc.



### 2.2.2. Building Energy Codes

#### a) Name

Federal and regional building and heat efficiency (thermal performance) codes

#### b) Purpose

The aim of the existing building codes is to improve the energy efficiency of the design and construction, as well as thermal efficiency of existing and new buildings.

#### c) Applicable sectors

Residential/commercial and government (especially budgetary offices)

#### d) Outline

Energy efficiency provisions for housing were first introduced in the mid-1990s at both federal and regional levels. Established in 1996, GOST 30494-96 «Residential and Public Buildings: Microclimate parameters for indoor enclosures» (the code for the temperature and humidity of indoor facilities) was among the first Russian building codes to promote building efficiency and account for energy consumption.

In addition, in February 2003, the new Thermal Performance of Building Code (also known as Construction Code and Regulations, or SNiP 23-02-2003) was introduced. Effective 1 October 2003, it required architects, builders and contractors to comply with energy efficiency requirements and technical regulations. More specifically, the new code established numerical values for required technical targets, corresponding to world levels; classified new, renovated, and existing buildings according to their energy efficiency and thermal performance, encouraging buildings that are more efficient than required by code (such buildings would qualify for economic incentives); created a mechanism for identifying low-performing existing buildings and mandating necessary upgrades; developed design guidelines for both prescriptive and performance-based compliance paths; and developed methods for oversight and enforcement of compliance in terms of thermal performance and energy efficiency (energy passports), during the design, construction, and prospective operation phases.

Between 1995 and 2004, 50 regions of the Russian Federation implemented their own building codes in accordance with federal building standards. Some local enforcement agencies offered incentives for exemplary performance, while others mandated auditing. Regions established their own requirements for calculating a building's energy consumption and compliance with local codes.<sup>27</sup>

<sup>27</sup> IEA Energy Efficiency: Policies and Measures database (Russia).

Furthermore, Article 11 and 13 of FLEC IEE introduced requirements for the monitoring of energy efficiency standards for existing and new buildings and installations, including such measures as keeping records on energy efficiency compliance information in the mandatory energy passports; updating at least once every five years energy efficiency requirements for buildings and installations; installing compulsory meters to encourage lower use of water, electricity, and heating as well as reducing budget expenditures on energy use and heating (the compliance deadline is set on 1 January 2011 for most of the public sector and on 1 January 2012 for most of the residential sector); regular building audit and monitoring in existing and new buildings and construction units to ensure compliance with the established regulations and laws; and so on. Similar to EE labelling, there are 7 EE categories for the buildings and structures. As of July 2010, construction of new buildings that would fall in the lower EE categories of C, D, and E has been prohibited.

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

In addition to introducing various incentives to improve energy consumption performance in the building sector, the government established a special Housing Reform Fund at the amount of RUB 25 billion (USD 726.3 million) in early 2009 in order to provide financial support for the remodelling of existing housing facilities by private citizens and entities.

#### **f) Expected results**

Overall improvement of energy efficiency and thermal performance of new, existing, and renovated buildings, indoor facilities, and related equipment

#### **2.2.3. Fuel Efficiency Standards**

Currently, Russia does not have enforceable fuel efficiency standards for its domestic transport industry. However, Article 14, Chapter 3 of FLEC IEE introduces the measures for the use of vehicles with a high level of fuel efficiency, specifically by replacing gasoline with more efficient fuels such as natural gas in motor vehicles in the transport sector.

#### **2.3. Voluntary Measures**

No information available

#### **2.4. Financial Measures Taken by the Government**

FLEC IEE and the FP encourage tax-related, budgetary, and other financial measures of governmental support designed specifically for energy efficiency and energy saving programs and initiatives in the Russian Federation.

In accordance with FLEC IEE (Article 27 of Chapter 8), the programs and activities in the field of energy conservation and improvement of energy efficiency should be financed by federal, regional, and municipal budgets; domestic and foreign private investments; and by other resources in accordance with the existing laws and regulations. In addition, the law stipulates introduction of incentives and tax benefits for Russia's heavy industry to replace highly energy-inefficient machinery and equipment.

With the aim to promote energy saving and improvement of energy efficiency in Russia, the article also recommends the following forms of government support of investment activities and stimulation measures in this field, such as direct subsidies, special loans, tariff regulations, special privileges, tax deductions, fee reductions, payback schemes, and others.

##### **2.4.1. Tax Scheme**

Currently under consideration

##### **2.4.2. Low-Interest Loans**

Currently under consideration

##### **2.4.3. Subsidies and Budgetary Measures**

President Medvedev, in his Decree No. 889 öConcerning some measures for improving the energy and ecological efficiency of the Russian economyö (4 June 2008), called to develop certain types of subsidies allocated from the Federal budget in order to support ecologically clean and energy effective technologies.

FLEC IEE (Section 3, Article 27 of Chapter 8) introduces various methods of budgetary support, including direct budget distribution through subsidies and co-financing among federal, regional, municipal organs, and other entities of the Russian Federation in support of their respective energy conservation and energy efficiency programs. However, the entities can qualify for such government support based on their proposed programsøenergy efficiency performance and energy saving potential.

#### 2.4.4. Other Incentives

In accordance with Article 27 of Chapter 8 of FLEC ICC, economic entities in the Russian Federation can qualify for government support in order to develop energy efficient technology as well as energy saving procedures and measures in their production (including the use of renewable energy resources). If they have successfully introduced such technologies and measures, they can also apply for various financial benefits and privileges and will also have a right to internalise their energy saving costs in the prices and tariffs of their products, goods, and services for the amount and period determined by the law.

#### 2.5. Energy Pricing

In Russia, prices for the products of natural monopolies, such as electricity, gas, pipeline transport, etc., are regulated by the state, which sets an upper limit on heat and power tariff increases. These state-regulated prices are established by the Federal Tariff Service (FTS) and regulated by the Federal and Regional Energy Commissions within their authority (due to Russiaø geographical size, electricity and gas prices are differentiated by 9 territorial zones). The Federal Energy Commission regulates wholesale electricity tariff and prices, while the Regional Energy Commissions regulate retail tariffs for power and energy at a regional level.

In order to stimulate efficient use of energy resources, the government established a system of seasonal energy consumption quota and gas prices, seasonal tariffs for heat and electricity, as well as differentiated (based on the time of the day) electric power rates in accordance with the federal law on price and tariff regulations and FLEC IEE recommendations.

It is important to note that despite the existence of several independent gas producers and oil companies that can sell gas in a deregulated sector, the overall gas sector is not fully liberalised yet since the market is dominated by the de-facto monopolist Gazprom. Currently, domestic gas and electricity prices in the industrial, residential, and commercial sectors are kept at an artificially low level and regulated below market prices. The government has committed to liberalise domestic gas prices, at least for industrial users, by 2014.

Since 1 September 2006, the new rules of operation of wholesale and retail electricity markets have come into force. As a consequence, the wholesale electricity (capacity) market saw a transition to regulated contracts to be concluded between buyers and generation companies, the free trade sector was liquidated, and spot market (day ahead market (DAM)) was launched. In accordance with Russian Federation Government Resolution of 7 April 2007, there are plans to replace regulated contracts with free (unregulated) ones by 2011. The rules of operation of retail markets suggest that gradual liberalisation of retail markets should go in parallel with wholesale market liberalisation. It is important to note that during the transition period electricity tariffs for the population will remain regulated.

One of the important developments as the first step towards liberalisation and privatisation of the Russian electricity market was the completion of the reorganisation of the former monopolist Unified Energy System of Russia (RAO-UES) and the subsequent creation of several electricity generation, transmission and distribution companies located over the territory of the Russian Federation in July 2008. As a result of the ongoing policy of a phased

liberalisation (except in the household and public services sectors), electricity and gas prices in industrial and power sectors are expected to reach market levels by 2012-2014.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organisations

There is no official record of the Russian government cooperating with non-government organisations in order to stimulate energy saving and energy efficiency improvements.

### 2.6.2. Cooperation through Bilateral, Regional and Multilateral Schemes

A number of important agreements concerning cooperation in the area of Energy Efficiency and Energy Conservation were recently signed between the Ministry of Energy of the Russian Federation and the partnering foreign ministries of the following countries:

- 1) China - the Memorandum of Understanding (MoU) on cooperation of Energy Efficiency and renewable energy resources between the Ministry of Energy of the Russian Federation and the National Development and Reform Commission of China signed on 27 September 2010;
- 2) France - the Memorandum on Cooperation in the field of Energy Efficiency and renewable energy resources between the Ministry of Energy of the Russian Federation and Ministry of Ecology, Energy, and Sustainable Development of France concluded on 20 September 2008);
- 3) Italy - the MoU on cooperation of Energy Efficiency and renewable energy resources between the Ministry of Energy of the Russian Federation and the Ministry of Economic Development of Italy signed on 7 April 2009;
- 4) Japan - the Memorandum on Cooperation Regarding Increasing Energy Efficiency and Renewable Energy Usage between the Ministry of Energy of the Russian Federation and the Ministry of Economics, Trade and Industry (METI) of Japan concluded on May 2009;
- 5) Netherlands - the Memorandum of Understanding Regarding Energy Efficiency and Renewable Energy Sources between the Ministry of Industry and Energy of Russia and the Ministry of Economy of the Netherlands (2006);
- 6) Portugal - Joint Statement on a Russian-Portuguese Protocol of energy innovation, Energy Efficiency and renewable energy (signed on June 2010);
- 7) the United Kingdom - the MoU to cooperate in Energy Efficiency projects between the energy ministries of Russia and the United Kingdom (5 October 2009);
- 8) the USA ó Protocol of Intent with the USAID on improve cooperation in the areas of EE, smart grid technology, and clean energy.

The Russian government cooperates actively with many economies within bilateral and multilateral formats. Some examples include the establishment of the Russia-EU Energy Dialogue, which has been in place since 2000 and has a special area dedicated to energy efficiency; the Joint Ministry of Industry and Energy of Russia and US Department of Energy Working Panel on Energy Efficiency; and Russian-German Energy Efficiency Forum under the auspices of the Russian-German Energy Agency (RUDEA). In addition, Russia is an active participant in international energy organisations, such as CERA, IEA, IEF, Gas Exporting Countries Forum, and others.

REA, which is responsible for coordinating international cooperation of the Ministry of Energy, concludes MoUs and establishes Centres on EE with its foreign partnering agencies and companies. To date, REA has signed a range of Joint Statements on establishing centres for Energy Saving, Energy Efficiency and Innovations with the public and private partnering organizations of the following countries:

- 1) France (the Joint Statement on establishing the Russian-French Centre on Energy Efficiency was signed on 19 June of 2010 in Saint-Petersburg);

- 2) Slovakia (the Joint Statement on establishing the Russian-Slovakian Centre on Energy Efficiency was signed on 6 April 2010 between REA and Russian-Slovakian Business Centre);
- 3) South Korea (the Joint Statement on establishing the Russian-Korean Centre on Energy Efficiency and Innovations was signed on 19 June of 2010 in Seoul between REA, the Korea Energy Management Corporation of the Republic of Korea, and the Korea Association for Photonics Industry Development of the Republic of Korea).

In addition, REA plans to establish such centers and expand cooperation with the following economies:

Japan:

REA conducts the policy of the staged development of cooperation with Japanese private and public organizations, passing from the series of exploratory seminars to the deeper forms of cooperation which comprise joint realization of technological and manufacturing projects in Russia.

The main partners of REA the following Japanese organizations:

- 1) Japanese Business Alliance for Smart Energy Worldwide (JASE WOLRD);
- 2) Japan Bank for International Cooperation (JBIC);
- 3) Japan External Trade Organization (JETRO);
- 4) Institute of Energy Economics Japan (IEEJ);
- 5) Energy Conservation Centre Japan (ECCJ) and others.

USA:

Russian-American relations regarding Energy Efficiency, Energy Saving, renewable energy, smart grid (SG) dynamically develop within the framework of the working group on energy of the U.S.-Russia Bilateral Presidential Commission.

The main U.S. partners of REA are the following:

- 1) United States Department of Energy (US DOE);
- 2) United States Agency for International Development (USAID);
- 3) United States Energy Association (USEA);
- 4) United States in the framework of Federal Energy Management Program (FEMP).

South Korea:

REA has signed MoUs on Energy Efficiency and renewable energy with the following partners:

- 1) Korea Energy Management Corporation ó KEMCO;
- 2) Korea Association for Photonics Industry Development óKAPID;
- 3) Korea Trade Insurance Corporation (K-Sure);
- 4) LG Corporation and other companies.

Iceland:

REA cooperates with Iceland on the basis of the MoU in the field of EE and Renewable Energy Sources (RES) which was concluded on 28 September 2010 between REA and National Energy Agency (NEA) of Iceland. The next step of the joint activity with NEA which REA plans is establishing the Russian-Icelandic Centre on Energy Efficiency, Energy Saving and RES.

United Kingdom:

REA develops Russian-British cooperation in EE and renewable energy, in particular, carries out projects and regular meetings with the representatives of the United Kingdom ministries, responsible for policy in energy sector (Ministry of Policy and Economy, Department of Energy and Climate change, Department of Enterprise, Trade and Investments).

Italy:

REA has been cooperating with Italy in the framework of the MoU in the field of EE and RES concluded between REA's predecessor Rosinformresurs Association and Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) on 3 December 2009. REA and NEA are currently planning to establish the Russian-Italian Centre on Energy Efficiency and RES. Russian ó Italian Center on Energy Efficiency and Innovations (RICEI) is a new project, tailored specifically to the goals of effective cooperation between Italy and Russia in the fields of energy efficiency, energy saving and renewable energy.

**2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements**

Russia has been pursuing international cooperation in the area of energy efficiency on the basis of such instruments as the Kyoto Protocol and the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA).

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# SINGAPORE

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In 2009, Singapore pledged to reduce its emissions by 16% below business-as-usual (BAU) by 2020, should a legally binding global agreement be in place. In the meantime, Singapore aims to achieve its unconditional reduction pledge of 7%<sup>6</sup>11% by 2020.

Singapore supports the Paris accord achieved in the COP 21, which sets a target of limiting global warming overall below 2°C (compared with the Industrial Revolution), while aiming for a more ambitious goal of 1.5°C.

### 1.2. Sectoral Energy Efficiency Improvement Goals

Singapore does not have sectoral energy efficiency improvement goals.

### 1.3. Action Plan for Promoting Energy Efficiency

#### a) Objectives

As a small economy without renewable energy resources, Singapore has identified energy efficiency as a key strategy to mitigate greenhouse gas emissions. It also helps to improve competitiveness, energy security, and environmental sustainability.

To improve its energy efficiency, Singapore has increased its capabilities, raised awareness across the major energy-consuming sectors of its economy, and addressed sector-specific barriers using incentives or regulatory measures.

#### b) Applicable sectors

The emphasis is on the five most energy-intensive sectors: power generation, industrial, transport, buildings, and households.<sup>28</sup>

#### c) Outline

##### Power generation

The liberalization of Singapore's energy market since 2000 has promoted competition in the electricity and gas markets by encouraging investments in more efficient power generation. The implementation of a competitive electricity market has enabled greater efficiency to be achieved in the power-generation sector. Singapore's overall power-generation efficiency improved from 39% to 44% over the 2001<sup>6</sup>2012 time period.

The industry is increasingly deploying cogeneration and trigeneration technologies as part of its ongoing and future developmental plans.

##### Industrial

In addition to the regulatory approach, outreach programs, capability-building measures (refer to the relevant sections below), various assistance schemes, and grants have been implemented to drive energy efficiency improvements in the industrial sector. These include the following:

- The Energy Efficiency Improvement Assistance Scheme (EASe): This encourages companies to identify potential energy efficiency opportunities by funding up to 50%, (capped at SGD 200,000) of detailed assessments of buildings and industrial facilities.

<sup>28</sup> Ministry of National Development; Energy Market Authority.

- The Economic Development Board (EDB): This provides an energy efficiency financing program to encourage industrial and manufacturing facilities to adopt energy-efficient activities. Under this program, a third-party financier pays for the cost of energy efficiency projects and the energy savings are shared among the various stakeholders.
- The Grant for Energy Efficient Technologies (GREET): This provides up to 20% co-funding for energy efficiency retrofits (capped at SGD 4 million per project) to encourage industrial facilities to invest in energy-efficient equipment or technologies.
- The Investment Allowance (IA) Scheme: This encourages companies to invest in energy-efficient equipment by allowing an additional 30% of investment allowance to be deducted from the companies' taxable income.
- The Design for Efficiency (DfE) Scheme: This provides up to 50% funding (capped at SGD 600,000) to encourage investors in new facilities in Singapore to integrate energy and resource efficiency improvements into development plans early in the design stage.
- The Accelerated Depreciation Allowance Scheme: This allows capital expenditures on qualifying energy-efficient equipment to be written off in one year instead of three.

### Transport

Since the transport sector accounts for a substantial and growing share of total energy use and carbon emissions, the government supports energy efficiency through various measures, including: investing in new mass rapid transit (MRT) lines, upgrading existing facilities, central bus planning, bus priority schemes, tightening quality of service standards, and enhancing commuter information. Other measures include the following:

- Managing car ownership and usage by reducing the growth of vehicle numbers through the Vehicle Quota System (VQS), refining the Electronic Road Pricing (ERP) system, improving the Off-Peak Car and Park & Ride schemes, and further developing Intelligent Transport System (ITS) solutions.
- Testing new technologies such as the Diesel Particulate Filter (DPF), diesel-hybrid buses, and electric cars.
- Developing a Green Framework for the Rapid Transit System (RTS). The Green Mark provides a systematic and structured approach in evaluating and rating the environmental performance of the RTS for existing and future lines.
- Carbon Emissions-Based Vehicle Scheme (CEVS). Since 2001, a green vehicle rebate (GVR) was offered to encourage the purchase of such vehicles. From January 1, 2013, the CEVS was adopted to provide a broader outcome-based approach that considers vehicles' carbon emissions and fuel efficiency.
- Fuel Economy Labeling Scheme (FELS). Since 2009, passenger and light-goods vehicles that are sold in Singapore have had to show a Fuel Economy Label. With the fuel economy information, buyers can make better-informed decisions on fuel efficiency when purchasing new cars.

### Buildings

The Building and Construction Authority (BCA), a statutory board under the Ministry of National Development, spearheads energy efficiency improvements in the building sector. Regulatory requirements, such as the building-enveloping thermal performance standard, have been implemented since 1979 to better ensure efficiency performance in buildings. In recent years, energy-related regulations, such as minimum energy efficiency for cooling equipment and natural ventilation for all residential buildings, have been introduced.

- The Green Mark Scheme is a green building rating system launched by the BCA in 2005 to evaluate a building on the basis of its environmental impact performance. Since 2008, all new and existing buildings with a gross floor area of 2000 m<sup>2</sup> that are undergoing major retrofitting must meet the Green Mark Certified standard.

- The BCA has developed the Green Mark for Office Interior and Restaurants to support these businesses in promoting green initiatives. It has also worked with other agencies, such as the Ministry of Education (MOE), to develop a Green Mark for Existing Schools. In addition, the BCA introduced a Green Mark for Existing Residential Buildings to recognize the efforts by town councils and managing agents.

Table 1. List of Green Mark schemes shaping Singapore's building environment

|  |
|--|
| <b>Green Mark Schemes – New Buildings</b>      |
| Residential Buildings                          |
| Non-residential Buildings                      |
| Landed House                                   |
| <b>Green Mark Schemes – Existing Buildings</b> |
| Residential Buildings                          |
| Non-residential Buildings                      |
| Schools  |
| <b>Green Mark Schemes – Within Buildings</b>   |
| Office interiors                               |
| Restaurants                                    |
| <b>Green Mark Schemes – Beyond Buildings</b>   |
| New parks                                      |
| Existing parks                                 |
| Districts                                      |
| Infrastructures                                |
| Rapid Transit System                           |

- The BCA Green Mark Incentive Scheme was launched in 2006 to encourage building developers to achieve higher Green Mark ratings. New and retrofitted buildings with a gross floor area above 5000 m<sup>2</sup>, which have achieved ratings of Green Mark Gold and above, will be awarded monetary incentives. Due to the overwhelming response, the SGD 20 million fund was fully committed in 2010. To accelerate energy efficiency in buildings, the BCA introduced a SGD 100 million Green Mark Incentive Scheme for Existing buildings (GMIS-EB) in 2009 to help fund upgrades. A SGD 5 million Green Mark Incentive Scheme (Design Prototype) was launched in 2011 to encourage both private and public developers to go beyond the Green Mark Platinum rating and achieve 10% better energy efficiency than this level.
- A high Green Mark standard will be set as part of the land sales conditions for all new developments in selected strategic growth areas.
- In September 2015, the BCA Green Mark 2015 Scheme was introduced to push the envelope on environmental sustainability. This new Green Mark scheme places greater emphasis on health and wellbeing, smart technologies, and climatically responsive designs.
- The Public Sector Taking the Lead in Environmental Sustainability (PSTLES) initiative requires public sector agencies to implement resource management and environmental sustainability measures, such as energy and water efficiency as well as recycling. Each ministry is required to submit reduction targets and management plans to meet the targets. In addition, new public sector buildings with an air-conditioned area exceeding 5,000m<sup>2</sup> are required to attain the Green Mark Platinum

rating. Existing large and mid-sized public sector buildings must attain the Green Mark Gold rating by 2020.

### Households

- According to the Mandatory Energy Labeling Scheme (MELS), under the Energy Conservation Act, registrable household appliances that are sold in Singapore must show the mandatory energy label. The MELS currently covers household refrigerators, air conditioners, clothes dryers, televisions, and lamps.
- The Minimum Energy Performance Standards (MEPS) for household refrigerators and air conditioners were introduced in September 2011. The MEPS were extended to clothes dryers in April 2014 and lamps in July 2015. Under the Energy Conservation Act, all registrable household refrigerators, air conditioners, clothes dryers, and lamps that are sold in Singapore must meet the minimum energy performance standards.
- A new pilot project will enable consumers with e-billing accounts to compare their electricity consumption against the average consumption of their neighbors in order to encourage improved behavior. Users can also compare their electricity consumption in the last six months against the national average and the average of neighbors in similar housing types.

#### d) Financial resources and budget allocation

- The Sustainable Energy Fund ó SGD 28 million.
- The Green Mark Incentive Scheme for New Buildings ó SGD 20 million.
- The Green Mark Incentive Scheme for Existing Buildings ó SGD 100 million.
- The Grant for Energy Efficient Technologies (GREET) ó SGD 93.25 million.
- The Energy Efficiency Improvement Assistance Scheme (EASe) ó SGD 13.4 million.
- The Green Mark Gross Floor Area Incentive Scheme.
- The Sustainable Construction (SC) Capability Development Fund - SGD 15 million.
- The Green Mark Incentive Scheme for Design Prototype (GMIS-DP) ó SGD 5 million.
- The Building Retrofit Energy Efficiency Financing (BREEF) Scheme.
- The Smart Energy Challenge ó SGD 25 million.

(Note: Other funds in relation to R&D are stated under Section 1.6)

#### e) Method for monitoring and measuring the effect of the measures

Singapore's various energy efficiency measures include different methods to monitor and measure their impact. They are used at the discretion of their implementing government agencies.

### 1.4. Institutional Structure

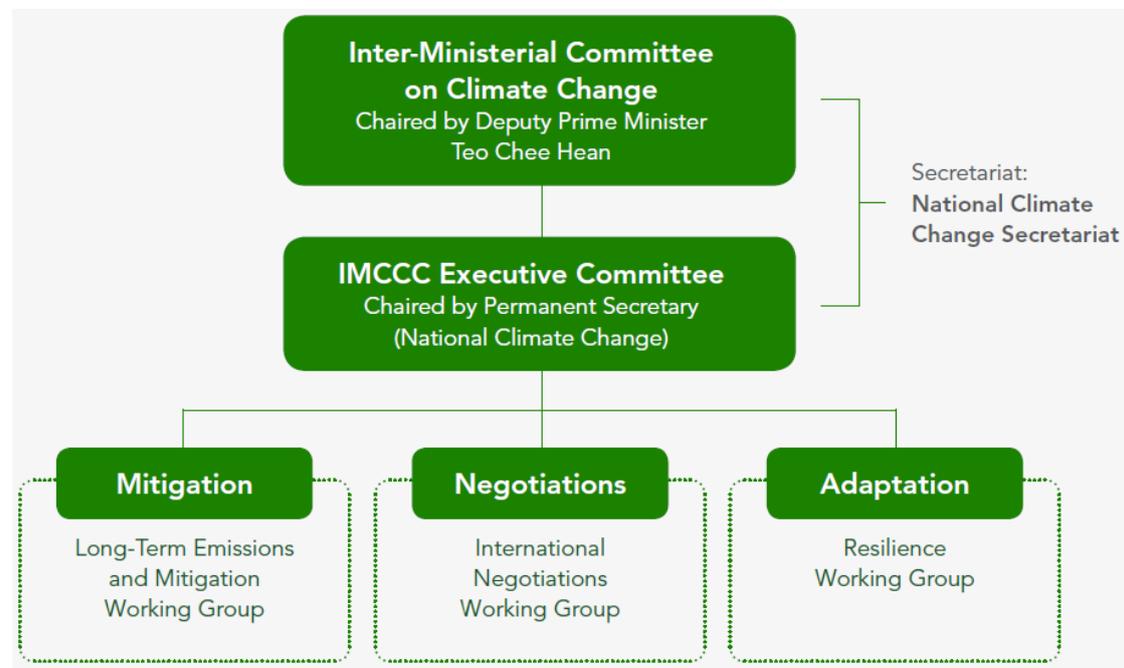
The Inter-Ministerial Committee on Climate Change (IMCCC) was set up to coordinate climate change actions across several ministries and government organizations. The IMCCC is supported by an executive committee, which oversees the work of three groups, namely:

- The International Negotiations Working Group ó in charge of the international climate change negotiations strategy under the UNFCCC.
- The Long-term Emissions and Mitigation Working Group, which studies how Singapore can stabilize its long-term emissions.

- The Resilience Working Group, which studies Singapore's vulnerability to the effects of climate change and recommends long-term plans for mitigation and adaptation.

In July 2010, the National Climate Change Secretariat (NCCS) was established under the Prime Minister's Office to coordinate Singapore's domestic and international policies, plans, and actions on climate change.

**Figure 1.** Relationship diagram of the IMCCC



Source: Energy Market Authority.

## 1.5. Outreach and Capacity Building

### a) Outreach programs

Awareness is promoted through several programs, including:

- The Home Energy Auditor (HEA) and the Life Cycle Cost Calculator (LCCC), which are mobile applications developed to improve information on high energy-consuming appliances and their lifetime costs.
- The Energy Efficiency National Partnership (EENP) is a voluntary program launched in April 2010 to promote energy efficiency in the industry. It includes:
  - a) Encouraging participants to implement an energy management system.
  - b) Develop a learning network to provide opportunities to learn and share energy efficiency ideas, technologies, practices, standards, and case studies.
  - c) The EENP Awards to recognize companies and individuals who excel in the areas of energy management. The Fifth EENP Awards Ceremony was held on October 6, 2015, in conjunction with the National Energy Efficiency Conference (NEEC).
- The BCA has implemented outreach programs, including: a public online portal; roving green building exhibitions; and new social media (Facebook). The BCA has also partnered with the Green Mark Champion, CDL, to hold the BCA-CDL Green Sparks Competition 2010 in order to stimulate innovation among the youth on retrofitting existing buildings.

- The BCA also implemented the International Green Building Conference (IGBC) 2015, which was held in September 2015.

#### **b) Capacity Building**

- The Singapore Certified Energy Manager (SCEM) program offers formal training and certification in the area of energy management. A grant covering approximately 70% of the cost is available to participants.
- As part of the EENP learning network activities (refer to Section 1.5 (a)), the National Energy Efficiency Conference (NEEC) brings together experts and professionals to provide leadership, share the best practices, and discuss case studies. The event is organized by the National Environment Agency (NEA), in partnership with the EDB and the EMA.
- The Energy Services Companies (ESCOs) Accreditation Scheme was introduced to enhance the professionalism and quality of energy services offered. Currently, there are 20 accredited ESCOs operating in Singapore and 27 qualified energy services specialists.
- Green Mark Specialist Certification Programs aimed at equipping professionals with new skills and deepening their professional abilities in environmental sustainability. These include the certification courses for Green Mark Managers (GMM), Green Mark Facilities Managers, and Green Mark Professionals (GMP).
- The BCA introduced a certification course on Measurement & Verification of Central Chilled-Water Plant Efficiency to increase capacity in this area.
- Executive Development and Degree Programs on Sustainable Design and Operations.
- The BCA Academy partnered with the University of Nottingham to implement a Master of Science in Sustainable Building Design program in 2009. The two-year, part-time program is the first of its kind in Singapore, and it focuses on developing cross-disciplinary professional skills as well as analysis and decision-making skills.
- The BCA Academy partnered with the University College London (UCL) to launch the Master of Science Degree in Facility and Environment Management in 2015. This is also a two-year, part-time degree program.
- Apart from postgraduate degrees, the BCA has signed an agreement with UniSIM and Singapore Polytechnic to jointly offer the Bachelor of Science in Facility and Events Management program.

Short but intensive executive development programs are also in place for continual education. One example is the six-day, Carnegie Mellon University-BCA Executive Development Program on Leadership in Environmental Sustainability. To date, approximately 540 executives have been trained through this program.

In addition, since 2010, the BCA Academy has collaborated with the Stuttgart University of Applied Sciences in Germany for the HFT Stuttgart-BCA Executive Development Program on Innovations in Sustainable Design and Technology. This program provides a strategic platform for fostering building professionals in the area of green building design and technology.

#### **1.6. Research and Development in Energy Efficiency and Conservation**

In 2007, the Ministry of National Development (MND) Research Fund established a SGD 50 million research fund to support R&D efforts in green building technologies and energy efficiency.

To further harness multi-disciplinary research and development capabilities, Singapore has launched a SGD 1 billion National Innovation Challenge as a major new R&D thrust over the

next five years. The first area for the challenge is Energy Resilience for Sustainable Growth, which aims to develop cost-competitive energy solutions for deployment within 20 years in order to help Singapore improve energy efficiency, reduce carbon emissions, and increase energy options.

As part of the inaugural Smart Energy Challenge (SEC),<sup>29</sup> launched in November 2009, the EMA awarded Singapore-based companies a total of SGD 10 million in order to support the development of new energy technologies and solutions in power generation, energy for transportation, and energy efficiency for the industry.

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## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts

Energy efficiency is governed through a number of regulatory measures.

### 2.2. Regulatory Measures

Energy Labeling and Standards:

- The Energy Conservation Act (ECA) sets energy efficiency requirements and energy management practices.
- Mandatory energy labeling for household air conditioners and refrigerators in January 2008; fuel economy labeling for passenger and light-goods vehicles in April 2009; clothes dryers in April 2009; televisions in July 2014; and lamps in July 2015.
- MEPS for household air conditioners and refrigerators in September 2011, and clothes dryers in July 2014.

Vehicles:

- The Vehicle Quota System (VQS) (see Section 1.3 for details).
- The Off-Peak Car scheme.
- Electronic Road Pricing (ERP).
- The Carbon Emissions-Based Vehicle Scheme (CEVS).
- Building a Green Framework for the Rapid Transit System (RTS), which specifically addresses and evaluates energy concerns and sustainable design efforts.

Buildings:

- Building Control (Environmental Sustainability) Regulations 2008.
- Code for Environmental Sustainability of Buildings 2nd Edition.
- BCA Green Mark Scheme 6 New Buildings.
- Code on Envelope Thermal Performance for Buildings 2008.
- Mandatory Higher Green Mark Standard for Government Land Sales Sites in Key Strategic Areas.

Industrial:

- Mandatory energy management practices came into effect under the Energy Conservation Act in April 2013.

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<sup>29</sup> The SGD 25 million Energy Research Development Fund (ERDF) provides financial support for the implementation of new and innovative energy solutions that are close to deployment and have the potential to provide tangible results.

### 2.3. Voluntary Measures

Voluntary measures to drive energy efficiency improvements in Singapore include: the EENP program; the BCA Green Mark Scheme; the Green Label Scheme (SEC); the Singapore Carbon Label (SEC); the Green Building Product Certification Scheme (SGBC); the Green Office Label (SEC); the public sector energy audits and others (see Section 1.3 for details).

### 2.4. Financial Measures Taken by the Government

#### 2.4.1. Tax Scheme

Investment Allowance (IA) Scheme and Accelerated Depreciation Allowance Scheme (see Section 1.3 for details)

#### 2.4.2. Low-Interest Loans

N/A

#### 2.4.3. Subsidies and Budgetary Measures

Subsidies available include the following: the Energy Efficiency Improvement Assistance Scheme (EASe); the Grant for Energy Efficient Technologies (GREET); the Design for Efficiency (DfE) Scheme; the Green Vehicle Rebate; the Innovation for Environmental Sustainability (IES) Fund; and the Green Vehicle Rebate. (Note: The respective information was provided in earlier sections.)

### 2.5. Energy Pricing

Since Singapore imports most of its energy, energy prices in Singapore are not subsidized and subject to volatility in regional and global energy prices. Fuels are also subject to excise duties and a goods and services tax (GST). Taxes and duties make up approximately 30% of retail fuel prices at the pump.

### 2.6. Other Efforts for Energy Efficiency Improvements

#### 2.6.1. Cooperation with Non-Governmental Organizations

- Sustainable Energy Association of Singapore (SEAS) and the Institution of Engineers Singapore (IES) for the Singapore Certified Energy Manager Program.
- The NEA for the Renewable Energy and Energy Efficiency Partnership (REEEP).
- Cooperation with the Singapore Green Building Council (SGBC): SGBC-BCA Green Individual Award recognizes the contributions of professionals and individuals who have been leading the green building movement in Singapore.

#### 2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes

Singapore actively participates in multilateral forums on energy such as the APEC Energy Working Group, ASEAN, and the East Asia Summit (EAS) Energy Cooperation Task Force (ECTF).

#### 2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements

Cooperation with the International Energy Agency (IEA), the Asian Development Bank (ADB), and the United Nations Environment Program (UNEP): Sustainable Building and Climate Initiative (SBCI) have been initiated to facilitate the transfer of technologies, policies, and exchange of the best practices in energy efficiency as well as other aspects of sustainable development.

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# CHINESE TAIPEI

## 1. GOALS FOR EFFICIENCY IMPROVEMENT<sup>30</sup>

### 1.1. Overall Energy Efficiency Improvement Goals

#### a) Goals

The goal is to improve energy efficiency by more than 2% per annum (compared to 2005 levels) in order to achieve a 20% energy intensity reduction by 2015. The target extends to 50% by 2025 with the support of further technological breakthroughs and administrative measures.

#### b) Base year

2005.

#### c) Goal year

Intermediate goal of 2015 with the final objective of 2025.

### 1.2. Sectoral Energy Efficiency Improvement Goals

#### a) Industry

Reform the industrial sector toward a high value-added, low-energy-intensive structure so that its carbon intensity could decrease by more than 30% by 2025.

#### b) Transport

Raise the standard fuel efficiency for private vehicles (measured in terms of passenger kilometers per liter) incrementally to 25% by 2015.

#### c) Residential and commercial

Raise appliance efficiency standards by 10% to 70% in 2011. Further increase the efficiency standards in 2015 to promote high-efficiency products.

#### d) Government

Reduce the energy use of governmental agencies and schools by 10% in 2015.

#### e) Base year

2008.

#### f) Goal year

2025 (for the industrial sector), 2015 (for the transport and government sectors), and 2015 (for the residential and commercial sectors).

### 1.3. Action Plans for Promoting Energy Efficiency

#### a) Name

Energy Conservation and Greenhouse Gas Emission Reduction Action Plan

#### b) Objectives

Reduce CO<sub>2</sub> emissions by applying cleaner energy and energy conservation measures.

#### c) Applicable sectors

Residential, commercial, industrial, transport, and government.

#### d) Outline

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<sup>30</sup> BOE (2008A).

A number of measures have been introduced to achieve the energy efficiency goals:

- Raise power generation efficiency.
- Replace coal-fired power plants with high-efficiency generating units (efficiency raised by 7.5% by 2025) and gas-fired power plants (efficiency raised by 11%).
- Improve power dispatch and transmission facilities (reducing line loss by 0.5% by 2015).
- Raise the vehicle energy efficiency standard.<sup>31</sup>
- Raise private vehicles' standard fuel efficiency incrementally to 25% by 2015.
- Use LED electricity saving lighting.
- Completely replace traffic signal lamps with LED lamps by 2012.
- Completely replace building (exits, fire alarm signals, etc.) and landscape lighting with LED lamps by 2025.
- Promote the uptake of energy-efficient appliances.
- Establish voluntary energy-saving partnership agreements.
- Conduct energy audits of major energy consumers.
- Establish new MEPS for room air conditioners and refrigerators by 2011 (efficiency raised by 15% and 60%, respectively)
- Establish MEPSs and EE rating labels for electric pots, storage water heaters, and LED bulbs by 2014 and 2015.

More details can be found at <http://www.moeaboe.gov.tw>.

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

For policy development, the annual energy research budget will be increased within the next four years from NTD 5 billion to NTD 10 billion (equivalent to USD 1506300 million in 2015).

#### f) **Method for monitoring and measuring the effects of action plans**

- Measure the sales of energy-efficient appliances on a monthly basis.
- Monitor the progress of energy efficiency standard revisions on a quarterly basis.
- Monitor the results of voluntary energy-saving agreements on a quarterly basis.

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

Reduced CO<sub>2</sub> emissions through more efficient energy use.

#### h) **Future tasks**

- Minimum energy performance standards (MEPS) and energy efficiency rating labeling for hot-water dispensers and hot/cold water dispensers by 2016.
- MEPSs and energy efficiency rating labeling for hot-water fountains and hot/cold water fountains by 2017.
- MEPSs and energy efficiency rating labeling for TVs and monitors by 2018.
- New MEPSs and energy efficiency rating labeling for refrigerators and dehumidifiers by 2019.

### 1.4. Institutional Structure

#### a) **Name of organization**

Bureau of Energy, Ministry of Economic Affairs

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<sup>31</sup> BOE (2008B).

**b) Status of organization**

No information is available.

**c) Roles and responsibilities**

- Draw up drafts of policies and laws.
- Plan and predict the energy supply and demand.
- Examine and approve energy development, distribution, and sales.
- Monitor energy prices.
- Build an energy database.
- Energy savings promotion and dissemination, energy technology R&D.

**d) Covered sectors**

All sectors of the economy.

**e) Established date**

The Energy Commission was established on November 1, 1979 and renamed Bureau of Energy on July 1, 2004.

**f) Number of staff**

Approximately 110 employees.

**1.5. Information Dissemination, Awareness-Raising, and Capacity-Building****a) Information collection and dissemination**

Media dissemination programs evaluate potential audiences. Meanwhile, an economy-wide telephone survey is conducted to assess public awareness.

**b) Awareness-Raising**

There are two awareness-raising programs: 1) Research and Promotion of the Energy Conservation Labeling and Energy Efficiency Labels, and 2) Energy Conservation Environment Establishment, Achievements Appraised, and Technology Promotion.

**c) Capacity-Building**

There is a government-funded program to train energy auditors and managers for manufacturing firms and the commercial sector.

**1.6. Research and Development in Energy Efficiency and Conservation**

The Chinese Taipei Government's Energy Conservation Technology Mid-Term Project is administered by the Bureau of Energy, Ministry of Economic Affairs. The project is applicable to the transport, residential, commercial, and government sectors (excluding agriculture).

The aim of the project is to develop and advance Chinese Taipei's R&D capabilities and intellectual property in various energy technologies, including LED lighting, photovoltaic, hydrogen power, air conditioning, refrigeration, electric motors, energy information, and communication technology. The government allocates an annual budget of approximately USD 33 million to this project of which 59% is used for energy-related research and design.

Since December 2001, the Chinese Taipei Government has allocated USD 12 million for the Energy Conservation Labeling and Energy Efficiency Labels system for the transport, residential, commercial, and government sectors. This system is expected to result in annual energy savings of up to 160,000 kiloliters of oil equivalent and in energy efficiency increases of 25% for air conditioners, 70% for refrigerators, 36% for hot/warm water drinking fountains, 16% for fluorescent lamps with embedded ballasts, 20% for clothes washers, 5%

for electric cookers, 15% for warm/hot water dispensers, 20% for dehumidifiers, 50% for electric fans, 10% for electric pots, and 15% for automobiles.

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## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts

#### a) Name

Energy Management Law (EML)

#### b) Purpose

The EML is designed to govern the energy efficiency of energy-consuming devices.

#### c) Applicable sectors

The EML applies to all large energy users across all sectors. This mainly includes the industrial, transport and commercial sectors.

#### d) Outline

- Energy-utilization facilities and equipment that are designated by the central competent authority, manufactured by local manufacturers, or imported by merchants for domestic use must conform to the permit standards of energy consumption established by the central competent authority.
- Vehicles that are designated by the central competent authority, manufactured by local manufacturers, or imported by merchants for domestic use must conform to the permit standards of energy consumption established by the competent central authority.

#### e) Financial resources and budget allocation

Governmental funds.

#### f) Expected results

Energy efficiency improvement of 2% every year for the next eight years; improve appliance energy efficiency 10% to 70% by 2015.

### 2.2. Regulatory Measures

#### a) Name

Minimum Energy Performance Standard (MEPS) and EE Rating Labeling for Appliances and Lighting; Fuel Efficiency Standards for Automobiles

#### b) Purpose

Improve the energy efficiency of appliances, lighting devices, and vehicles.

#### c) Applicable sectors

Industrial, transport, residential, commercial, energy, and government.

#### d) Outline

The Energy Efficiency Rating Labeling program covers the following 12 products:

1. Non-ducted air conditioners (by August 11, 2015)
2. Refrigerators (by December 7, 2012)
3. Dehumidifier (by December 7, 2012)
4. Self-ballasted fluorescent lamps (by December 6, 2012)

5. Gas-burning water heaters (by December 6, 2012)
6. Gas-burning cooking appliances (by December 6, 2012)
7. Electric pots (by November 22, 2013)
8. Electric storage tank water heaters (by April 28, 2014)
9. Warm-hot type water dispensers (by September 21, 2015)
10. Chilled-warm-hot type water dispensers (by September 21, 2015)
11. Passenger vehicles (including sedans and station wagons) (by August 11, 2014)
12. Motorcycles (by August 11, 2014)

The MEPS and efficiency standards for the following products will be raised:

- Private vehicles (by 2015)
- Fluorescent lamps with embedded ballasts (from 2010)
- Compact fluorescent lamps (from 2010)
- Room air conditioners and refrigerators (from 2011)
- Dehumidifiers (from 2011)
- Incandescent lamps (from 2012)

### 2.3. Voluntary Measures

#### a) Name

Energy Conservation Labeling Program

#### b) Purpose

To encourage manufacturers to develop highly efficient products and promote customer purchases of these products. These projects started in December 2001.

#### c) Applicable sectors

Industrial, transport, residential, commercial, energy, government, etc.

#### d) Outline

The Energy Conservation Labeling program covers the following 46 products:

- 1) air conditioners; 2) refrigerators; 3) dehumidifiers; 4) clothes dryers; 5) TVs; 6) clothes washers; 7) electric fans; 8) fluorescent lamps (> 32W); 8) fluorescent lamps (< 32W); 9) hair dryers; 10) hand dryers; 11) warm-hot water dispensers; 12) chilled-warm-hot water dispensers, 13) chilled-warm-hot drinking fountains; 14) automobiles and light trucks; 15) motorcycles; 16) self-ballasted fluorescent lamps; 17) thin film transistor-liquid crystal display; 18) instant gas-burning water heaters; 19) gas-burning cooking appliances; 20) electric rice cookers; 21) electric storage water heaters; 22) electric pots; 23) exit lights and emergency direction lights; 24) DVD products; 25) warm-hot drinking fountains; 26) luminaries; 27) integrated street lighting; 28) compact fluorescent lamps; 29) printers; 30) copiers; 31) air cleaners (new); 32) street lighting; 33) ventilating fans for bathrooms; 34) window type ventilating fans; 35) desktop PCs; 36) notebook PCs; 37) heat-pump water heaters; 38) range hoods; 39) microwave ovens; 40) axial-flow fans; 41) centrifugal fans; 42) ballasts for fluorescent tubes; 43) electric stoves; 44) electric water machines; 45) LED bulbs; and 46) LED panel luminaries.

**Figure 1. Example of conservation labeling****e) Financial resources and budget allocation**

Government funds.

**f) Expected results**

Raising energy efficiency of appliances from 10% to 70%.

**2.4. Financial Measures Taken by the Government****2.4.1. Tax Scheme**

The high-efficiency product rebate programs have been executed in 2008, 2011, and 2013.

**2.4.2. Low-Interest Loans**

No information available.

**2.4.3. Subsidies and Budgetary Measures**

Each purchasing unit can receive a rebate of up to NT\$2000 (approximately USD 60 in 2015).

**2.4.4. Other Incentives**

The Free Energy Audit scheme began 15 years ago to assist business owners in improving their energy efficiency and to increase energy efficiency by 30% by 2025 in the industrial and commercial sectors.

**2.5. Energy Pricing**

The equation used to adjust gasoline and diesel prices, originally determined by the China Petroleum Corporation (CPC), was abolished in September 2000, after petroleum products by the Formosa Petrochemical Corporation were released to the market. Following significant fluctuation in international petroleum prices in the second half of 2005, the Ministry of Economic Affairs authorized the CPC to adopt a floating fuel pricing mechanism at the beginning of 2007. However, the petroleum price should maintain the principle of the lowest price among the neighboring economies in Asia.

The pricing mechanism for electricity is controlled by the government rather than based on generation cost. In addition, proposals for electricity price adjustments are reviewed by a governmental committee.

Higher energy prices have proved to be an effective tool for energy conservation. Chinese Taipei raised the petroleum and electricity prices in June and July 2008 after which petroleum and electricity consumption significantly declined. Higher energy prices may also provide the incentive for equipment replacement. However, the effect is difficult to assess due to higher sales prices of high-efficiency products.

**2.6. Other Efforts for Energy Efficiency Improvement**

### **2.6.1. Cooperation with Non-Government Organizations**

The government cooperates with non-government organizations in order to disseminate energy efficiency and energy-saving policies.

### **2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes**

The Chinese Taipei Government participates in APEC Energy Working Group projects that are related to energy efficiency and conservation.

### **2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvement**

Chinese Taipei is an affiliate partner of the Collaborative Labeling and Appliance Standards Program (CLASP) based in the U.S. state of California to promote energy-efficient products by developing and updating the standards and labeling program.

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# THAILAND

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The revised Energy Efficiency Plan (EEP), ratified by the National Energy Policy Council (NEPC) in 2015, states an energy intensity reduction target of 30% by 2036 (compared with 2010) from an estimated final demand reduction of 56 Mtoe (compared to business-as-usual (BAU)).

Additionally, Thailand adopted the goal to reduce its energy intensity by at least 45% by 2035 and expressed its intention to reduce greenhouse gas emissions from energy by 7% to 20% in accordance with the Thailand Climate Change Master Plan enacted by the Office of Natural Resources and Environmental Policy and Planning (ONEP).

### 1.2. Sectoral Energy Efficiency Improvement Goals

The EEP sets the sectoral energy efficiency targets for all major sectors (see Table 1).

**Table 1:** The EEP sectoral energy efficiency targets

| Sector                                      | Reduction by 2036 (ktoe) | Share (%)    |
|---|--------------------------|--------------|
| Industrial                                  | 14,515                   | 28.1         |
| Commercial + government                     | 4,819                    | 9.3          |
| Residential                                 | 2,153                    | 4.2          |
| Transport                                   | 30,213                   | 58.4         |
| <b>Total (EEP 2015)</b>                     | <b>51,700</b>            | <b>100.0</b> |
| Energy reduction result during 2010 to 2014 | 4,442                    |              |
| <b>Total</b>                                | <b>56,142</b>            |              |

### 1.3. Action Plans for Promoting Energy Efficiency

The EEP was ratified in 2015, but it was undergoing minor revisions at the time of writing. The plan is expected to be finalized in 2016.

The EEP features 10 measures classified into three major categories (compulsory, voluntary, and complementary) targeting all major sectors (industrial, commercial and government, residential, and transport) (see Table 2).

**Table 2:** EEP-specific sectoral energy efficiency measures breakdown

| Measures/Sector  | Industry | Commercial/<br>Government | Residential | Transport | Total  | %  |
|--|----------|---------------------------|-------------|-----------|--------|----|
| <b>Compulsory Measures</b>                                     |          |                           |             |           |        |    |
| Energy conservation standard in designated factories/buildings | 4,388    | 768                       | -           | -         | 5,156  | 10 |
| Building energy code   |          | 1,166                     | -           | -         | 1,166  | 2  |
| Energy Standard and Labeling (HEPS/MEPS)                       | 749      | 1,648                     | 1,753       | -         | 4,149  | 8  |
| Energy Efficiency Resources Standard (EERS)                    | 202      | 184                       | 114         | -         | 500    | 1  |
| <b>Voluntary Measures</b>                                      |          |                           |             |           |        |    |
| Financial incentives   | 8,895    | 629                       | -           | -         | 9,524  | 18 |
| Promoting LED lights   | 281      | 424                       | 286         | -         | 991    | 2  |
| Energy-saving measures   | -        | -                         | -           | 30,213    | 30,213 | 58 |

|  |                   |                 |                 |                   |        |       |
|--|-------------------|-----------------|-----------------|-------------------|--------|-------|
| in the transport sector                              |                   |                 |                 |                   | 3      |       |
| <b>Complementary Measures</b>                        |                   |                 |                 |                   |        |       |
| Innovation and improvement of energy efficiency tech | -                 | -               | -               | -                 | -      | 0.0   |
| Capacity building for human resources                | -                 | -               | -               | -                 | -      | 0.0   |
| Energy conservation and awareness promotion          | -                 | -               | -               | -                 | -      | 0.0   |
| <b>Total</b>   | 14,515<br>(28.1%) | 4,819<br>(9.3%) | 2,153<br>(4.2%) | 30,213<br>(58.45) | 51,700 | 100.0 |

Unit: ktoe

#### 1.4. Institutional Structure

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

- **Energy Policy and Planning Office (EPPO)** ó As the policy and action plans development agency, it examines economy-wide energy conservation policies, management and development plans, and budget allocation, and it coordinates the follow-up and evaluation of policy implementation outcomes.
- **Department of Alternative Energy Development and Efficiency (DEDE)** – As the implementation and regulation agency, its duties include the promotion, support, and monitoring of energy efficiency and conservation activities. It also develops energy efficiency standards and research as well as information dissemination for awareness.
- **National Energy Policy Council (NEPC)** ó This is responsible for the oversight of energy agencies to ensure that they operate in accordance with the provisions specified in the ENCON Act (1992) and the management of the Energy Conservation Promotion Fund (ENCON Fund).
- **Electricity Generating Authority of Thailand (EGAT)** ó This is the owner-operator of power generation, transmission, and distribution systems economy-wide. It includes a Demand-Side Management Office to promote energy conservation, especially in electrical appliances through standard and labeling schemes. The EGAT is also a significant player in encouraging energy efficiency in major industries via energy service companies (ESCOs).

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

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, and Acts

#### a) Name

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

#### b) Purpose

To enforce energy conservation, particularly in designated factories and buildings.

#### c) Applicable sectors

Economy-wide (industrial, commercial, and government sectors)

#### d) Outline

The NEPC is responsible for the promotion of energy conservation pursuant to the provisions specified in the ENCON Act (1992) and the management of the ENCON Fund. To assist the NEPC, the Energy Conservation Promotion Fund Committee has been established to be responsible for the management of the ENCON Fund and ensure that the allocations are made in compliance with the regulations stipulated in the act. The act stipulates the duties of owners of designated factories/buildings with regard to energy conservation in their facilities and promotes the use of energy-efficient machinery/equipment as well as materials contributing to energy conservation. The act also establishes penalties for noncompliance with the regulations issued under this act.

#### e) Financial resources and budget allocation

The ENCON Fund was established under the ENCON Act to serve as working capital, grants, or subsidies for implementation in energy conservation programs in the public and private sectors. Such programs include renewable and alternative energy, R&D projects, human resource development, and public awareness and education. In FY2011, THB 1.3 billion (approximately USD 40 million<sup>32</sup>) was allocated for the energy efficiency program.

#### f) Expected results

Under the newly developed EEP 2015, the target is to reduce energy intensity by 30% in 2030 compared with 2010.

## 2.2. Compulsory Measures

### 2.2.1. Minimum Energy Performance Standards and Labeling (MEPS)

With collaboration between the DEDE and the Thailand Industrial Standard Institute (TISI), Minimum Energy Performance Standards (MEPS) were implemented to prevent the production and import of substandard equipment. Moreover, equipment that meets a high standard is eligible for certification marks. The certification schemes include mandatory and voluntary certification options for different product classes. Mandatory certification is required for air conditioners and refrigerators, while voluntary certification is optional for the following types of equipment:

- |                                    |                         |
|------------------------------------|-------------------------|
| 1. Air conditioners                | 10. Microwaves          |
| 2. Refrigerators                   | 11. Rice cookers        |
| 3. Double-capped fluorescent lamps | 12. Electric ovens      |
| 4. Self-ballasted lamps            | 13. Motorcycles         |
| 5. Single-capped fluorescent lamps | 14. Electric kettles    |
| 6. LPG cooking stoves              | 15. Irons               |
| 7. Three-phase motors              | 16. Magnetic ballasts   |
| 8. Fiberglass insulation           | 17. Electronic ballasts |
| 9. Diesel engines                  | 18. Water pumps         |

In addition, the government introduced the Energy Efficiency Labeling No. 5 Program (for more information, see Section 2.2.1).

### 2.2.2. Compulsory Energy Management Program for Designated Buildings and Factories

Buildings and factories with installed electricity meters  $\times$  1000 kW or that consume  $\times$  20 TJ of energy per year or those with a total transformer capacity of 1,175 kVA or more are required to implement an energy management system as prescribed in the regulations. An

<sup>32</sup> The official World Bank exchange rate for 2014 was USD 1 : TBH 32.48

energy management report must be submitted to the DEDE in March of each year, starting in 2010. Energy efficiency improvement is expected to be around 5%–10% from the implementation of this energy management system.

### 2.2.3. Building Energy Code (BEC)

A mandatory energy code has been set under the Ministerial Regulation Prescribing the Type or Size of Building and Standards, Criteria and Procedures for Designing Buildings for Energy Conservation, B.E. 2552 (2009), with the purpose of improving energy efficiency in the design/construction of new/retrofitted buildings that occupy more than 2,000 m<sup>2</sup>. The code was set for major energy systems, including the building's envelope, lighting, air conditioning and heating system, to promote the concept of energy efficiency design as well as the utilization of highly-efficient equipment and materials. In practice, the regulation will be initially applied to new/retrofitted buildings that occupy more than 10,000 m<sup>2</sup> to ensure regulation suitability and provide the time for adaptation. The regulation will be applied to smaller buildings (2,000 m<sup>2</sup>) over the next five years.

By implementing this program, it is expected to save approximately 10%-20% of energy, compared to conventional designs.

### 2.2.4. Energy Efficiency Resources Standard (EERS)

Electric utility companies, under the revised Energy Efficiency Plan (EEP 2015), must help their customers reduce their energy consumption. While the specifics of the measure are still under consideration, the measure is expected to reduce final energy consumption by 0.3%.

## 2.3. Voluntary Measures

### 2.3.1. High Energy Performance Standards and Labeling (HEPS)

Thailand established HEPS, known as the Energy Efficiency Labeling No. 5 Program, on a voluntary basis with the purpose of informing consumers that No. 5 labeled appliances/equipment are highly energy efficient and that they will help reduce their electricity bills. This will also enhance competition among manufacturers to further improve the energy efficiency of their products. This program, in operation since 1993, applies to the industrial, commercial, and residential sectors. Concerning financial resources and budget allocation, financing comes from various sources, including GEF grants and the Australian Government (1993–2000), concessional loans from the JBIC (OECD) (1994–2002), reimbursements through the Automatic Electricity Tariff Adjustment Mechanism (Ft) (1993–2000), and since 2000, reimbursement through the base tariff (in EGAT's annual budgeting).

The program's main purpose is to provide consumers with better awareness regarding the importance of energy-efficient appliances and equipment, especially when making purchasing decisions. Thus, it will help to gradually remove low energy-efficient products from the market. The labeling of appliances is the responsibility of EGAT, which has labeled a total of 19 types of typical household appliances.

In 2015, Thailand established another energy efficiency labeling program for non-appliances on a voluntary basis, which is the responsibility of the DEDE. Currently, there are eight products that have been labeled, including liquefied petroleum gas (LPG) cooking stoves (low-pressure), LPG cooking stoves (high-pressure), glazing panes, three-phase motors, variable speed drives, fiberglass insulation, small diesel engines, and small gasoline engines.

### 2.3.2. Financial Measures Taken by the Government

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

### 2.3.2.1 Tax Scheme

#### a) Name

Tax incentives (monitored by the DEDE)

#### b) Purpose

To induce operators to invest in the purchase of energy-efficient equipment/machinery as well as the promotion of energy efficiency in businesses.

#### c) Applicable sectors

Various sectors.

#### d) Outline

Two schemes of tax incentives are offered:

- 1) Investments in energy-efficient equipment/machinery can be claimed for an additional 25% of the purchasing cost, which can be deducted in tax calculations during that year.
- 2) For those who invest in EE/RE projects, the Board of Investment provides a waiver of income and import taxes for a maximum of eight years.

#### e) Financial resources and budget allocation

ENCON Fund.

#### f) Expected results

Tax incentives have been available since its inception in 2006. The resulting energy savings is as follows.

|                              | Phase 1<br>(2006)       | Phase 2<br>(2009–2010)     | Phase 3<br>(2011–2012)     | Total |
|------------------------------|-------------------------|----------------------------|----------------------------|-------|
| Equipment                    | 53 (number)<br>Measures | 19 types<br>(3,887 models) | 22 types<br>(7,949 models) | n/a   |
| Energy saving<br>(ktoe/year) | 3.31                    | 9.07                       | 16.10                      | 53.65 |

Tax incentives based on the purchase of energy-efficient equipment are under consideration for a time period extension (Phase 4) as well as a higher tax deduction.

### 2.3.2.2 Low-Interest Loans

#### a) Name

Revolving funds or soft loans (monitored by the DEDE)

#### b) Purpose

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

#### c) Applicable sectors

Buildings and factories.

#### d) Outline

Provide loans with a 0.5% interest rate and a seven-year final maturity to local commercial banks as an incentive for banks to lend money to RE/EE projects (including ESCOs) at a maximum interest rate of 4%.

The maximum loan size is THB 50 million (USD 1.5 million) per project. The bank will manage all aspects of the loan and report the project's status to the DEDE. Then, the DEDE will take the following steps: ensure that the projects are genuinely energy-saving projects, not simply equipment replacements; monitor the performance of the bank to ensure that it meets their targets in terms of projects, lending, and repayment; and evaluate the program to measure energy savings.

#### e) Financial resources and budget allocation

Launched in January 2003, with an initial budget of THB 2 billion (approximately USD 58.8 million) allocated from the ENCON Fund. To date, almost THB 6 billion has been allocated for soft loans.

#### f) Results

Since its introduction in 2003, the ENCON Fund has recruited 11 public and commercial banks and extended approximately USD 200 million in loans (via the banks) in support of approximately 300 projects with roughly THB 7 billion (USD 206 million) aggregated project costs. The ENCON Fund has been successful in familiarizing the banks with EE/RE business activities. Since 2012, the revolving fund program has terminated the injection of the government budget into the program. However, the program is encouraging more participation from commercial banks to offer loans for energy efficiency projects (through the market mechanism with some technical assistance provided by the DEDE). The result can be summarized as follows.

(Note that the amount of investment is more than the amount loaned via the bank)

| Phase        | Year                 | Amount allocated by ENCON Fund (million Baht) | Amount loaned to bank (million Baht) | Resulting Energy Saving (ktoe/year) |
|--------------|----------------------|---|--------------------------------------|-------------------------------------|
| 1            | Jan. 2003óJan. 2006  | 2,000.00                                      | 1,850.97                             | 97.61                               |
| 2            | March 2006óMar. 2009 | 2,000.00                                      | 1,678.13                             | 98.95                               |
| 3            | Aug. 2007óAug. 2010  | 2,942.5                                       | 2,632.68                             | 93.31                               |
| 4            | Sep. 2009óSep. 2012  | 400.0   | 377.21                               | 13.25                               |
| 5            | June 2010óMay 2013   | 500.0   | 488.90                               | 17.25                               |
| <b>Total</b> |                      | <b>7,842.5</b>                                | <b>7,027.89</b>                      | <b>320.37</b>                       |

The program will, in the next phase, provide loans with a 0% interest rate and five-year final maturity to local commercial banks as an incentive for the banks to lend money to RE/EE projects (including ESCOs) at a maximum interest rate of 3.5%.

#### 2.3.2.3 Co-Investment Program

##### a) Name

ESCO Fund (monitored by the DEDE)

##### b) Purpose

To encourage investments in EE/RE projects with high technical potential in energy saving, especially those facing limited access to financing.

##### c) Applicable sectors

Buildings, factories, and ESCOs.

#### d) Outline

A co-investment program between public and private entities that utilizes the project-financing scheme to share risks with private developers. The government budget has been allocated as seed funding for selected non-profit organizations (also known as *fund managers*) with the responsibility to search for and manage investments in EE/RE projects, which cover sufficient technical potential and economic return. A seven-year investment period in several project types, such as equity investment, venture capital, equipment leasing, creation of a carbon credit market, and a credit guarantee, will be co-invested by fund managers for a maximum of THB 50 million per project (with appropriate criteria), while being supervised and monitored by the investment committee.

#### e) Financial resources and budget allocation

Launched in 2008 as Phase 1, with an initial budget of THB 500 million (allocated from the ENCON Fund) for project investments within the two-year window. In addition, a total of THB 500 million from the ENCON Fund has been allocated in 2015.

#### f) Expected results

The implementation of the ESCO Fund (Phase 1, 2, and 3) resulted in EE/RE investments for up to 126 projects with the total investment of THB 5 billion (approximately 18% of total investment provided by the ESCO Fund). The total energy saving of up to 40.7 ktoe per year (equivalent to THB 1.1 billion per year) was observed.

|  | Phase 1<br>(Oct. 2008 - Sep.<br>2010) | Phase 2<br>(Oct 2010 - Mar<br>2013) | Phase 3<br>(Mar 2013 - July<br>2014) | Total   |
|--|---------------------------------------|-------------------------------------|--------------------------------------|---------|
| No. of measures                                    | 32                                    | 68                                  | 26                                   | 126     |
| Total investment<br>(million Baht)                 | 3,217.2                               | 1,548.5                             | 173.0                                | 4,938.7 |
| Investment from<br>the ESCO Fund<br>(million Baht) | 314.8                                 | 418.6                               | 161.9                                | 895.2   |
| Energy saving<br>(ktoe/year)                       | 15.1                                  | 22.9                                | 2.7                                  | 40.7    |

### 2.3.2.4 Subsidies and Budgetary Measures

#### a) Name

Demand-Side Management by the Bidding Mechanism (monitored by the EPPO) (a new initiative launched in 2008)

#### b) Purpose

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

#### c) Applicable sectors

Industrial and commercial.

#### d) Outline

In accordance with the initiative, subsidies are granted based on actual energy savings achieved in a year. The subsidy is defined as  $\text{annual energy saving} \times \text{subsidy rate}$  (as bid by each company). With this bidding mechanism, proposals with lower-weighted subsidy rates will be subsidized first. The weighted subsidy rate takes into account not only the bid rate, but also the lifetime of the investment, i.e., how long the investment will result in energy savings.

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

**Table 1: Subsidy rates**

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

#### e) Financial resources and budgetary allocation

THB 1.1 billion (approximately USD 35 million) was allocated from the ENCON Fund.

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

#### f) Results

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

#### a) Name

Direct Subsidy (20-80 programs)

#### b) Purpose

The initiative's main purpose is to provide financial support for designated factories and buildings as well as small- and medium-sized enterprises (SMEs) by providing subsidies of 20% (for designated factories and buildings) or 30% (for SMEs) of the investment, including installation costs. Only the replacement of equipment by high-efficiency equipment is eligible for such subsidies.

#### c) Applicable sectors

Industrial and commercial.

#### d) Outline

A subsidy of 20% (for designated factories and buildings) or 30% (for SMEs) of the investment shall be provided to replace old equipment with high-efficiency equipment after which the payback period must not exceed seven years. The requested subsidy must exceed THB 50,000 with a maximum of THB 3 million. While a list of eligible technologies exists, other technologies are also eligible, if approved by the responsible committee.

#### e) Financial resources and budgetary allocation

During the 2010-2013 time period, approximately THB 319.7 million was allocated from the ENCON Fund.

#### f) Results

A total of 1,462 projects were approved during the 2010-2013 time period with a total investment of THB 2.1 billion (around USD 65 million) (THB 320 million from the ECON Fund), resulting in a total final energy-consumption reduction of 27 ktce per year.

|  | <b>Phase 1<br/>(2010–2011)</b>           | <b>Phase 2<br/>(2012)</b>                | <b>Phase 3<br/>(2013)</b> | <b>Total</b> |
|--|--|--|---------------------------|--------------|
| Primary target                           | Factories,<br>Buildings,<br>Agricultures | Factories,<br>Buildings,<br>Agricultures | SMEs                      |              |
| No. of measures                          | 316                                      | 362                                      | 190                       | 1,462        |
| Amount of<br>subsidies<br>(million Baht) | 127.5                                    | 166.5                                    | 25.7                      | 319.7        |
| Energy saving<br>(ktce/year)             | 10.6                                     | 14.2                                     | 2.1                       | 26.90        |

### 2.3.3. Promotion of LEDs

Light-emitting diodes (LEDs) are renowned for their energy efficiency. However, due to their relatively high cost, they are not widely used in most facilities. Under this measure, LEDs will be installed for government buildings and other public facilities such as streetlights. In addition, monetary measures will be used to expedite the affordability of LEDs. The EEP, however, is undergoing revisions and thus, the specifics of the measure cannot be provided at this time.

### 2.3.4. Energy Savings in Transport Sector

Thailand includes a large untapped energy conservation potential in the transport sector, as reflected by the expected energy savings of more than 30,000 ktce over the course of EEP 2015. The measures that will be implemented in the transport sector consist of the following:

- a) Remove subsidies from fossil fuels, allowing the market prices to reflect the true cost.
- b) Implement CO<sub>2</sub> emission-based excise tax for cars.
- c) Increase efficiency in cars/trucks/buses via energy labeling for tires, eco-driving techniques, and logistic management.
- d) Improve infrastructure e.g., double-track railway, elevated transit systems, etc.
- e) Implement pipeline transport of fuels.

## 2.4. Complementary Measures

### 2.4.1. Research and Development in Energy Efficiency and Conservation

The Thai Government, via the ENCON Fund, supports R&D by allocating more than THB 100 million (approximately USD 3 million) each year for energy conservation technologies. This funding can be accessed by academic institutions, public sector research institutions, and non-profit private institutions. The R&D work under the Energy Conservation Program must demonstrate its practical application in line with the short-term measures designed for energy efficiency improvements.

### 2.4.2. Capacity Building

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

- 1) Policy research to provide recommendations, options or situation overviews comprising several dimensions. Examination of the economic, social, and environmental impacts of energy supply/demand, the findings of which can be used to enhance the Energy Efficiency Improvement Program or Renewable Energy Development Program so that the programs can correspond with the changing situations. The research outcomes can also serve as guides for setting and implementing work priorities and budget allocation.
- 2) Monitoring and management to ensure efficient and effective implementation of the Energy Conservation Program.
- 3) Special tasks to support and enhance implementation that is of particular importance or urgency.

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

- 1) Development of curriculum and teaching materials that integrate energy efficiency and the environment into the education system in order to increase awareness in younger generations.
- 2) Short-term projects/activities (e.g., school recycling banks, energy conservation competitions) to increase participants' knowledge and understanding of energy conservation, stimulate improvement in their energy consumption behaviors, and share their experiences and knowledge with their peers.
- 3) Short-term human resource development and technical visits abroad.
- 4) Undergraduate and post-graduate scholarships (both local and abroad).
- 5) Provision of funds to encourage students in public and private universities to seriously consider research on energy management, energy efficiency, and renewable energy technologies.
- 6) Public-awareness campaigns on energy saving.

### 2.4.3. Awareness Raising

Example of these activities include production of a series of television commercials on energy saving methods and their benefits; dissemination of energy conservation issues through various types of media (newspapers, magazines, energy talks via television programs, etc.); energy mobile units undertaken by regional energy offices; energy camps for students; plays and cultural shows based on energy conservation themes; and the establishment of energy information centers to disseminate materials, posters, and other printed materials regarding issues related to energy conservation and renewable energy.

## 2.5. Other Efforts for Energy Efficiency Improvements

### 2.5.1. Cooperation with Non-Government Organizations

Stand-alone PEA Renewable Energy and Energy Efficiency Project

The Provincial Electricity Authority (PEA) is collaborating with the Forest Industry Organization (FIO) to invest in a pilot biomass power-generation project (using biomass residuals from FIO plantations) in order to scale up to approximately 100 sites (approximate total capacity of 100 MW) in the next five years, in addition to associated transmission lines and substations. The PEA also includes a plan to improve the energy efficiency of streetlights on highways, with private participation by ESCOs.

In addition, the PEA includes a Master Plan for Energy Conservation that focuses on the following: energy conservation projects for public and street lighting; energy efficiency for PEA buildings (air conditioning and lighting); and consulting services in energy management for PEA customers. The PEA estimates a reduction in energy consumption of at least 300 GWh per year, which is equivalent to THB 750 million (approximately USD 23 million). The

financing structure of the energy efficiency activities includes the following items: a public-private partnership scheme to finance energy-efficient street lighting; the turn-key method for building retrofitting; and normal energy efficiency consultancy services for PEA customers. In order to implement this plan, the PEA has established a subsidiary (100% owned) named, PEA ENCOM International. However, according to the PEA, this subsidiary will be the entity to invest in for the above-mentioned energy-efficient projects, not the PEA mother company.

### **2.5.2. Cooperation through Bilateral, Regional, and Multilateral Schemes**

Thailand has established close relationships in energy efficiency in the areas of capacity-building and technical assistance with neighboring economies, such as Lao PDR, Cambodia, Myanmar, Malaysia, and Vietnam. Regarding multilateral and regional cooperation, Thailand, as ASEAN Chair in 2008, led ASEAN toward the leaders' goal of achieving 8% of energy efficiency improvement by 2015. Energy efficiency support and cooperation from the government of Japan has also been actively implemented.

### **2.5.3. Other Cooperation/Efforts for Energy Efficiency Improvements**

There is financial support from designated banks to support energy audits and investments in energy efficiency for university compounds, hospitals, and public buildings through the ENCON Fund. Other energy efficiency programs also involve joint studies, R&D, and promotional activities to enhance the efficient use of energy in the transport, industrial, and household sectors as well as capacity-building and development of personnel dealing with energy efficiency improvement projects/activities through academic conferences, seminars, training, and technical visits. The latter activities include scholarships to pursue further study at the bachelor's, master's and Ph.D. levels, through the ENCON Fund.

### **2.5.4. Energy Conservation Market Stimulation and Promotion via Energy Service Companies (ESCOs)**

ESCOs are firms with the capabilities to provide consultation and expertise regarding energy conservation and renewable energy under energy management contract (EPC). The Ministry of Energy realizes their importance and assigns the DEDE, in cooperation with the Federation of Thai Industries (FTI), to help promote the utilization of ESCOs. The stimulation and promotion conducted by the DEDE are in the form of awareness promotions through networking and business matching as well as the regulation and improvement of various aspects concerning ESCO standards e.g., Measure and Verification (M&V) methods, Energy Performance Contracts (EPCs), and ESCO Accreditation.

# UNITED STATES

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1 Overall Energy Efficiency Improvement Goals

The United States has adopted the aspirational goal expressed by APEC leaders in 2007 of reducing the energy intensity of GDP 25% by 2030 (relative to 2005).

### 1.2 Sectoral Energy Efficiency Improvement Goals

The United States Department of Energy (DOE) has goals for the research, development and deployment (RD&D) of energy efficient technologies and practices.

#### 1.2.1 Buildings

The energy used in residential and commercial buildings represents 40% of total US energy consumption. The Building Technologies Program (BTP) developed by the United States Department of Energy (DOE) aims to construct partnerships among industry, end users and other stakeholders to prioritize research, development and the deployment of energy efficient technologies. Innovations in energy efficiency for residential and commercial buildings, energy efficient appliances and lighting, alongside advances in renewable energy technologies could stabilize the total primary energy consumption by the buildings sector at levels well below current levels by 2025. BTP programs that are helping to reduce US energy demand include Building America, Better Buildings, Commercial Building Initiative, Commercial Building Energy Alliance, Energy Smart Schools and Hospitals, Energy Star and Home Energy Score, Energy Codes, and Appliance and Equipment Standards.

##### a) Residential

Building America, which is an industry-driven program, supports research to reduce energy consumption of new and existing homes. BTP will invest in whole-building strategies to reduce the energy consumption of new homes by 50% before 2020.

##### b) Commercial Buildings

DOE is developing integrated whole-building strategies to enable new commercial buildings to be designed, constructed, and operated to use up to 50% less energy before 2020, relative to the commercial building energy standard, ASHRAE Standard 90.1-2004. In November of 2010, U.S. Energy Secretary Steven Chu announced that \$21 million will be awarded to help reduce energy consumption in commercial buildings. The goal is to achieve 30% energy savings in existing buildings and 50% savings in new projects.

#### 1.2.3 Other Sectoral Goals

The industry sector currently accounts for more than 30% of the energy used nationwide. To substantially reduce energy use in this sector, the DOE now focuses on the development of new manufacturing processes and materials that use half the energy currently required. DOE also establishes voluntary agreements with industrial partners to reduce energy intensity (annual energy consumption per unit of physical output) 2.5% per year over 10 years.

According to the Energy Independence and Security Act of 2007, federal government buildings are required to reduce energy intensity (energy consumption per unit area of floor space) 30% by 2015 (relative to 2005).

### 1.3 Action Plans for Promoting Energy Efficiency

#### 1.3.1 The United States Strategic Approach for Promoting Energy Efficiency

##### a) Objectives

Invest in the RD&D of energy efficient technologies. Support programs and development of best practices relating to energy efficiency implementation.

**b) Applicable sectors**

Industry, buildings, vehicles, and government

**c) Outline**

The US government has, over decades, supported the promotion of energy efficiency through legislation, regulation and dedicated funding. Earlier emphasis, in keeping with economy-wide economic practices, has been on leveraging the market system and the self-interest of decision makers, with occasional explicit efficiency requirements in selected sectors. More recently, with greater recognition of the economic, environmental and security benefits offered by energy efficiency, there has been a series of increasingly stringent energy efficiency targets and mandates, most often expressed by sector or technology. Financial incentives and funding levels have also grown.

**d) Financial resources and budget allocation**

For FY2012, the EERE budget for energy efficiency R&D programs totalled \$821 million:

- Advanced Manufacturing: \$115 million
- Building Technologies: 219 million
- Federal Energy Management Program: 30 million
- Vehicle Technologies: 329 million
- Weatherization and Intergovernmental Activities: 128 million

The numbers below represent the additional funding made available for EERE's energy efficiency programs from FY2009 to FY2013 through the American Recovery and Reinvestment Act:

- USD 46.2 million for high-efficiency solid-state lighting development and manufacturing
- USD 74.64 million for advanced energy-efficiency building technologies and commercial building training programs
- USD 21.73 million for the federal energy management program
- USD 160.1 million for industrial energy efficiency projects
- USD 47.01 million for information and communication technologies
- USD 2.8 billion for energy efficiency and conservation block grants
- USD 3.1 billion for state energy program
- USD 452.04 million for better buildings
- USD 4.98 billion for weatherization assistant program
- USD 106.06 million for heavy-duty truck and passenger vehicle efficiency
- USD 298.5 million for alternative fuelled vehicles pilot grant programs
- USD 1.99 billion for advanced battery and electric drive component manufacturing grants
- USD 386.23 million for transportation electrification projects
- USD 20.3 million for small business clean energy innovation projects

**1.3.2 The National Action Plan for Energy Efficiency****a) Objectives**

Boost energy efficiency through actions by participating organisations to overcome barriers to energy efficiency investment

**b) Applicable sectors**

Utilities, industry, NGOs, private and public sectors

**c) Outline**

The National Action Plan for Energy Efficiency was issued by the electric and gas utility industry and State regulators who see the need to increase energy efficiency and have the ability to do so. This Action Plan, facilitated by technical assistance from the US Department of Energy and US Environmental Protection Agency, aims to create a sustainable, aggressive commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organisations. Over 120 organisations, including leading electric and gas utilities, all three of their trade associations, many state regulators and governors, and the National Association of Regulatory Utility Commissioners have endorsed the Action Plan's five main recommendations and have pledged to take individual actions to carry them out.

The five main recommendations are:

- 1) Recognise energy efficiency (EE) as a high priority resource
- 2) Make a long-term commitment to implement cost-effective EE
- 3) Communicate benefits of EE
- 4) Fund programs to deliver EE
- 5) Align utility incentives with delivery of cost-effective EE.

**d) Financial resources and budget allocation**

Commitments by participating organisations are expressed as advocacy for priority and funding, communication/education, support for legislation, commitments to efficiency and procurement goals, and funding, among other commitments. Many of the participating organisations fund/operate energy efficiency programs within their spheres of influence.

**e) Method for monitoring and measuring effects of action plans**

Self-reporting by stakeholders

**f) Expected results**

Not quantified

**g) Outputs of monitoring**

Annual update describing accomplishments

**h) Outcomes**

The wide range of outcomes includes legislation, deployed efficiency, education, and increased funding

**1.3.3 State and Local Energy Efficiency Action Network (SEE Action)****a) Objective**

To help the states to achieve cost-effective energy efficiency improvements by 2020

**b) Applicable Sectors**

Buildings and industry

**c) Outline**

The goals of the program are as follows:

- Establish real-time metering systems that enable the user to access current usage and costs of their electricity
- Assist state and local governments in the development of energy efficiency policies and programs
- Removing barriers to energy savings
- Increase the investments in energy efficiency technologies

- Expansion of residential and commercial retrofits for existing buildings
- Reduction of industrial energy intensity and increased use of combined heat and power
- Innovative financing solutions
- Strengthened building codes and compliance plans
- Innovative methods of evaluation, measurement and verification

During 2011, SEE Action established eight working groups that focus on specific energy efficiency program and policy issues. Each group represents stakeholders from across the country, including state and local governments, associations, business leaders, and non-government organizations. Each group has collaborated to produce a blueprint to guide near- and long-term goals to capture cost effective energy efficiency. These blueprints will guide implementation efforts that focus on leveraging existing measures and targeting new activities to help state and local governments achieve energy efficiency on a broad scale.

- Customer Information and Behavior Working Group will assist regulators and policymakers with considering data issues associated with energy efficiency and using customer feedback programs to help customers save energy.
- Evaluation, Measurement and Verification Working Group will provide tools and training to improve energy efficiency management by increasing the accuracy, credibility, and timeliness of evaluation, measurement, and verification results.
- Existing Commercial Buildings Working Group will engage state and local governments on model programs and policies, such as on benchmarking/disclosure.
- Industrial Energy Efficiency and Combined Heat and Power Working Group will provide guidance on model state programs and policies for industry and combined heat and power.
- Building Energy Codes Working Group will work to increase adoption of and compliance with building codes for new buildings and renovations to existing buildings.
- Financing Solutions Working Group will work to remove financing barriers to energy efficiency in the United States through improved financing tools and mechanisms such as loans, leases, and service agreements.
- Residential Building Retrofits Working Group will establish a robust, sustainable, private sector industry that provides home energy upgrade services.
- Utility Motivation and Energy Efficiency Working Group will work to implement policies that motivate utilities to support energy efficiency initiatives that target all cost-effective energy efficiency.

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

The U.S. DOE provides funding to states and local governments that promote energy efficiency savings through the development of policies and programs.

#### **1.3.4 Advanced Manufacturing Office**

##### **a) Objectives**

Reduce energy consumption per unit of output of an industrial partner by 25% over 10 years and reduce carbon emissions by 70% by 2030. This goal derives from the Energy Policy Act (EPAAct) of 2005.

##### **b) Applicable sectors**

## Industry

### **c) Outline**

The DOE supports the US energy goals for industry through two critical pathways: technology delivery and energy efficiency R&D. These pathways support immediate and long-term efforts to reduce industrial energy consumption.

Through technology delivery, DOE helps plants save energy immediately by assessing opportunities and facilitating adoption of best energy management practices and efficient new technologies. Technology delivery activities include: energy assessments, best practices, training and qualification, energy management certification, software tools, technical publications, and deployment/demonstration. In August 2011, DOE released an update to the State Incentives and Resource Database which provides access to more than 3,900 programs offered by federal and state governments, regional and nonprofit organizations, and utilities to help manufacturers identify and implement energy-saving projects. Users can quickly search for information about energy assessments, grants, rebates, loans, training and other tools by location (state, city, zip code), program sponsor, resource, industrial system, or energy type.

Energy efficiency R&D develops technologies addressing top energy saving opportunities in the industrial sector. R&D activities are divided between industry specific R&D and crosscutting R&D. Industries supported in the industry-specific R&D include aluminium, cement, chemicals, food processing, forest products, glass, metal casting, mining, refining, and steel. Crosscutting areas cover energy-intensive processes, nanomanufacturing, fuel and feedstock flexibility, sensors and automation, clean distributed energy and materials R&D. The EISA of 2007 provides grants for R&D for universities, research centers and other institutions to support eight Regional Clean Energy Application Centers.

More broadly, the United States is supporting improved industrial energy efficiency through international efforts to implement ISO energy management standard 50001 which was issued in final form in June 2011. The Global Superior Energy Performance (GSEP) initiative that was launched under the Clean Energy Ministerial supports efforts in economies to encourage widespread adoption of ISO 50001 by major energy-using industries and commercial firms. Domestically, the Superior Energy Performance initiative is supporting implementation of the ISO 50001 standard by U.S. industry and commercial building owners.

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

The Recovery Act of 2009 provided USD 256 million for industrial energy efficiency R&D projects: USD 156 million for combined heat and power, district energy systems, waste energy recovery systems and efficient industrial equipment; USD 50 million for improved energy efficiency for information and communication technology; and USD 50 million for advanced materials in support of advanced clean energy technologies and energy-intensive processes. In January of 2010, DOE announced USD 47 million to improve efficiency in the information technology and communication technology sectors. The budget for the Advanced Manufacturing Office is USD 116 million in 2012; USD 290 million is requested for 2013..

### **e) Method for monitoring and measuring effects of action plans**

The DOE maintains databases of activities and results for a majority of industrial activities. Impacts are reported annually in a publication of results. Effects of the plan are analysed annually as required by the Government Performance and Results Act of 1993 (GPRA). This analysis includes a GPRA data call and DOE programmatic evaluations.

### **f) Expected results**

Working with industry, DOE's Industrial Technologies Program seeks to reduce industrial energy intensity by 25% over 10 years.

### **g) Responsibility for monitoring**

The Industrial Technologies Program

**h) Outputs of monitoring**

The Industrial Technologies Program releases an annual Impacts Report

**i) Outcomes**

Energy savings, reduction in industrial energy intensity, and newly commercialised technologies<sup>33</sup>

**1.3.5 Federal Fleet Petroleum Reduction and Alternative Fuel Use Increase****a) Objectives**

Reduce petroleum consumed by Federal transport fleets in favour of alternative fuels and hybrid-electric vehicles

**b) Applicable sectors**

Federal transport

**c) Outline**

United States Federal agencies have requirements to decrease vehicle fleet petroleum consumption 2% annually and increase vehicle fleet alternative fuel use 10% annually through the year 2015, relative to a year 2005 baseline. Assisting in achieving these goals are mandates requiring Federal agencies to acquire alternative fuel vehicles and hybrid electric vehicles, and requirements to use alternative fuel in Federal alternative fuel vehicles when alternative fuel is available and reasonably priced.

**d) Financial resources and budget allocation**

No information available

**e) Method for monitoring and measuring effects of action plans**

Federal agency self-reporting

**f) Expected results**

20% reduction in fleet petroleum consumption, more than double the amount of alternative fuel use, and increased inventory of hybrid electric vehicles

**g) Responsibility for monitoring**

Agencies report on their own progress and the DOE monitors results

**h) Outputs of monitoring**

Annual report on Federal Fleet Compliance with EPACT and E.O. 13423

**i) Outcomes**

Targets were met, or nearly met, in 2007. Twenty-one covered Federal agencies reported progress toward petroleum reduction and alternative fuel goals.

**1.4 Institutional Structure****1.4.1 Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy****a) Status of organisation**

Implementer

**b) Roles and responsibilities**

The Office of Energy Efficiency and Renewable Energy (EERE) develops cost-effective energy efficiency and renewable energy technologies that provide a diverse supply of reliable,

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<sup>33</sup> OMB (2009).

affordable, and environmentally sound energy for the economy. EERE achieves this goal through a strong and balanced program of research, development and market deployment. EERE is organised around the three main energy users in the renewable and energy efficiency resource and demand markets: industry, transportation, and buildings.

The *Advanced Manufacturing Office* leads the drive to increase energy productivity and foster innovations that will bolster U.S. technology leadership and global competitiveness. The office sponsors cost-shared R&D and provides support for the widespread use of energy management systems and best practices across the supply chain.

The *Vehicle Technologies Program* supports R&D in vehicle systems, hybrid electric systems, hybrid and electric propulsion, advanced combustion engines, advanced materials technologies, and fuels technology. Focus areas for technology deployment include: alternative fuel vehicles, alternative fuel infrastructure development, idling reduction for commercial trucks and buses, expanded use of non-petroleum and renewable fuel blends, hybrid vehicles, driving practices for improved efficiency, and engine/vehicle technologies that maximise fuel economy.

The *Building Technologies Program* develops technologies, techniques and tools for making residential and commercial buildings more energy efficient, productive, and affordable. The portfolio of activities includes efforts to improve the energy efficiency of building components and equipment and their effective integration using whole building system design techniques, the development of building codes and equipment standards, the integration of renewable energy systems into building design and operation, and the accelerated adoption of these technologies and practices.

The *Federal Energy Management Program* works with Federal agencies and private sector partners to help agencies realise energy, environmental and cost savings potentials, including Federal energy intensity goals, as set by Presidential Executive Orders or Congressional legislation.

**c) Covered sectors**

Residential, commercial, industry, manufacturing, transport, power, and public sectors

**d) Established date**

Department of Energy Organization Act (1974)

**e) Number of staff members**

Approximately 800 (in Washington D.C. and Golden, Colorado)

### 1.4.2 Environmental Protection Agency

**a) Status of organisation**

Regulator, implementer

**b) Roles and responsibilities**

The EPA mission is to protect human health and the environment by developing and enforcing regulation, giving grants, studying environmental issues, sponsoring partnerships, and informing people about the environment. Efforts in support of energy efficiency include Clean Energy programs, Energy Star (with DOE), the Responsible Appliance Disposal program, the Electronic Product Environmental Assessment tool, and activities to improve energy efficiency at water utilities.

**c) Covered sectors**

Residential, commercial, industry, transport, and public sectors

**d) Established date**

1970

## e) Number of staff members

Estimated dozens of people spread across clean energy and other EPA programs

### 1.4.3 Regional Organisations

State and local governments and utility regulators have introduced energy efficiency policy measures that address all sectors. These measures include minimum performance standards (that is, building codes) and a variety of financial incentives.

## 1.5 Information Dissemination, Awareness-Raising and Capacity-Building

### a) Information collection and dissemination

*Energy Information Administration:* The Energy Information Administration collects and interprets data on energy production, trade, transformation, and consumption. This includes collection of energy use data for many industrial sectors and for residential and commercial buildings.<sup>34</sup>

*Database of State Incentives for Renewables & Efficiency (DSIRE):* DSIRE is a comprehensive source of information on state, local, utility, and Federal incentives that promote renewable energy and energy efficiency. The DSIRE website ([www.dsireusa.org](http://www.dsireusa.org)) provides Federal, state, local governments, and the public with a fast and convenient method for accessing information about renewable energy and energy efficiency incentives and regulatory policies administered by Federal and state agencies, utilities, and local organisations across the economy.

*www.EnergySavingTips.gov:* In December 2004, DOE launched a new website ([www.EnergySavingTips.gov](http://www.EnergySavingTips.gov)) as a consumer-friendly portal to detailed energy saving information from various Federal agencies.

### b) Awareness-raising

*Powerful Savings Campaign:* In May 2004, DOE and the Alliance to Save Energy teamed up on a Powerful Savings campaign to help consumers reduce their energy bills and the economy reduce its energy use through smart energy practices and energy-efficiency. Powerful Savings focuses on increasing public awareness of the importance of energy efficiency and on smart energy practices both at home and on the road through an extensive media outreach campaign.

*“Easy Ways to Save Energy”:* This campaign promotes energy savings through an *Energy Savers Guide*. The Guide is being distributed to consumers across the economy. Aggressive radio and print advertisements to promote more efficient energy use are also under way.

*Public Energy Education Program:* The EPACT 2005 states that DOE is required to convene a conference with representatives from industry, education, professional societies, trade associations, and government agencies to design and establish an ongoing economy-wide public education program focused on energy efficiency and other topics. The Office of Science held this conference in January 2007.

*Energy Efficiency Public Information Initiative:* DOE is required to conduct an advertising and public outreach program about the need to reduce energy use, the consumer benefits of reduced use, the relationship to jobs and economic growth, and cost-effective consumer measures to reduce energy use. Funding at US D90 million per year is authorised for FY2006 to FY2010. DOE is implementing this provision within the limits of annual Congressional appropriations.

Many more information programs are operated by state and local governments and utilities.

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OMB (2009).

### c) Capacity-building

*Advanced Technology Transfer Centers:* The Energy Policy Act of 2005 directs DOE to provide grants to non-profit institutions, state and local governments, or universities to establish a geographically dispersed network of Advanced Energy Technology Transfer Centers. DOE has so far funded pilot projects at the Florida Solar Energy Center and Washington State University. The centres are to encourage the demonstration and commercial application of advanced energy methods and technology through education and outreach to building and industry professionals. The Recovery Act of 2009 has allocated USD 500 million for energy efficiency and renewable energy workforce investment programs.

*Industrial Energy Management:* Industrial energy management is encouraged through information and training offered by many Federal, state and utility voluntary programs. The Department of Energy's Industrial Technologies Program and the Environmental Protection Agencies Energy Star Program are two key Federal resources for information and training on industrial energy management.<sup>35</sup>

*Small Businesses:* The US Environmental Protection Agency's Energy Star program provides education and technical resources to help small businesses improve energy efficiency. In addition, many state and local programs provide technical assistance as well as access to funding for implementing energy efficiency measures.<sup>36</sup>

## 1.6 Research and Development in Energy Efficiency and Conservation

### 1.6.1 Research and Development on Building Technologies

The Building Technologies Program supports innovation, emerging technologies, systems integration, and reducing market barriers of advanced technologies to improve energy efficiency in America's buildings. The 2012 budget allocation for the Building Program was USD 219 million and the 2013 request is USD 310 million. The primary barriers to improved building efficiency are technological (greater energy efficiency) and market-based (acceptable cost to purchase) in nature. The principal strategy of BTP is to support research, development, demonstration and deployment (RDD&D) of technologies that have the potential to achieve significant improvements in building efficiency. The Program also supports market-priming measures to ensure that these technologies overcome the barriers to widespread adoption, such as first cost, the various building trades' acceptance of new technology, and insufficient availability of consumer information.

Widespread adoption of building efficiency technologies is critical to the success in meeting the Program's goals and includes both voluntary efforts such as Energy Star and the Better Buildings Program (Residential and Commercial) as well as regulatory activities, such as, the Appliance Standards Program.

The Program strategy is divided into three interwoven pathways, each of which can result in lowering building energy use:

- Improve building components (solid state lighting, windows, heating ventilation and cooling, building envelope, sensors and controls), both performance and cost to manufacture/install, through ground breaking research and development; and develop whole building energy simulation programs such as Energy Plus that engineers, architects, and researchers can use to model energy and water use in buildings;
- Increase market pull from private industry through cooperation with stakeholders, improvement of building design and audit tools, and the creation of reliable efficiency benchmarks and databases to facilitate energy efficiency financing and to define

<sup>35</sup>DOE (2009) and EPA and DOE (n.d. - a).

<sup>36</sup>DOE and EPA (n.d. - b).

efficiency's value-add to consumers (Better Buildings Residential and Commercial, HUB, Energy Star); and

- Raise the standards for new energy consuming equipment and new buildings with continually updated equipment and model building codes based on cost effective, higher performing technology that has been successfully commercialized.

The program applies all three interwoven pathways to pursue market opportunities to achieve five main mid-term goals:

- **Appliance and Equipment:** Provide cost-effective energy savings through national appliance and equipment standards; issue 23 final rules by the end of FY2015; deliver 1,350 trillion BTUs annual savings by 2030;
- **New Construction:** Reduce the energy required to operate new residential and commercial buildings by 50 percent, at less than the cost of the energy saved. Prove existing technologies and practices and accelerate deployment through model building codes to deliver:
  - 350 trillion BTUs in annual savings by 2020;
  - 1,600 trillion BTUs in annual savings by 2030;
- **Existing Commercial Buildings:** Reduce the energy required to operate existing commercial buildings by 40 percent, at less than the cost of the energy saved. Bring needed technologies and practices to market delivering:
  - 1,600 trillion BTUs in annual savings by 2020;
  - 6,000 trillion BTUs in annual savings by 2030;
- **Existing Residential Buildings:** Reduce the energy required to operate existing residential buildings by 50 percent at less than the cost of the energy saved. Bring needed technologies and practices to market delivering:
  - 1,250 trillion BTUs in annual savings by 2020;
  - 4,500 trillion BTUs in annual savings by 2030;
 and
- **Technology Development:** Bring to market technologies that save 70 percent of lighting, 60 percent of water heating, 40 percent of HVAC, and 20 percent of other appliances energy use at less than the cost of the energy saved.

### 1.6.2 Advanced Manufacturing Research and Development

Formerly the Industrial Technologies Program, EERE's Advanced Manufacturing Office is the lead government program to develop and deploy new, energy-efficient technologies for manufacturing. The FY2012 budget of USD 116 million is being invested in:

*R&D for Next Generation Manufacturing Processes:* New manufacturing processes, simulation tools, and technologies are pursued in four key areas to lower the energy intensity of manufacturing:

- Reactions and Separations
- High-Temperature Processing
- Waste Heat Minimization and Recovery
- Sustainable Manufacturing

*R&D Next Generation Materials:* Novel materials can open new design spaces for high-performance and renewable energy technology manufacturing. Projects focus on three areas with clear energy, carbon, and economic benefits:

- Thermal and Degradation Resistant Materials
- Highly Functional, High-Performance Materials
- Lower-Cost Materials for Energy Systems

*Technology Deployment Activities:* The Energy Resource Center helps manufacturers across the supply chain reduce energy costs and learn how to improve energy efficiency by selecting state-of-the-art technology and adopting energy management best practices.

The FY13 budget request is USD 290 million, representing a 150% increase in funding.

### 1.6.3 Research and Development in Transport Sector Energy Efficiency

The mission of the Vehicle Technologies Program (VTP) is to accelerate the development and deployment of cost-effective, energy-efficient, and environmentally-friendly technologies for on-highway passenger and commercial vehicles that meet or exceed performance expectations and other requirements, enabling the United States to use significantly less petroleum and reduce greenhouse gas emissions. The program's 2012 budget allocation was USD \$329 million. The FY2013 budget request is approximately \$420 million, with the largest increase supporting additional work in batteries and electric drive technology.

The program focuses primarily on research and development, with approximately 10% of its total budget supporting technology deployment. Research covers a broad portfolio of technologies including batteries; power electronics and electric machines; advanced combustion technologies; materials technologies, including lightweighting; and advanced fuels and lubricants. The program also supports a comprehensive testing and evaluation effort, a robust analysis and modelling capability, and related codes and standards and education activities. Precompetitive research is coordinated with industry through two partnerships – U.S. DRIVE (Driving Research and Innovation for Vehicle efficiency and Energy sustainability) for light-duty vehicle technologies, and the 21<sup>st</sup> Century Truck Partnership for heavy-duty vehicle technologies. These partnership efforts provide a valuable means for leveraging technical expertise, ensuring government-funded activities remain focused on critical barriers to technology commercialization, and preventing duplication of effort between government and industry.

The program has established the following specific targets that drive its activities:

- Reduce battery pack cost to \$300/kWh by 2015 and \$125/kWh by 2020;
- By 2020, reduce traction drive system cost to \$8/kW, power electronics to \$3.3/kW, and electric motor cost to \$4.7/kW;
- By 2015, demonstrate an engine-/powertrain-only approach that achieves fuel economy improvements of 25% for light-duty gasoline vehicles and 40% for light-duty diesel vehicles (compared to a 2009 gasoline vehicle);
- By 2015, demonstrate an optimized heavy-duty diesel engine that achieves a 20% fuel economy improvement;
- By 2020, achieve estimated weight reductions in the following vehicle systems: 35% for the body structure, 25% for the chassis and suspension, 10% for the powertrain, and 5% for the interior;
- By 2015, identify fuel formulations using non-petroleum-based blending components that are optimized for use in high-efficiency heavy truck engines, while meeting

prevailing emissions standards, with the potential to achieve at least a 15% replacement of petroleum fuels by 2030;

- By 2015, demonstrate cost-effective lubricant with a 2% fuel economy improvement;
- By 2020, to achieve a petroleum reduction of over 2.5 billion gallons per year through voluntary adoption of alternative fuel vehicles and infrastructure.

### 1.6.3 Electric Power Sector Energy Efficiency Technology Research and Development

The Office of Electric Delivery & Energy Reliability supports the development of technologies to modernise the electric grid. Some of these technologies will have important benefits for energy efficiency. The total 2010 budget allocation for this office was approximately USD 172 million. The budget request for 2011 is approximately USD 186 million. The Recovery Act provided USD 4.5 billion to the Office of Electric Delivery & Energy Reliability.

Research on *high-temperature superconductivity* (HTS) is focused on improving the current carrying capability of long-distance cables; its manufacturability; and cost-effective ways to use the cable in equipment such as motors, transformers, and compensators. Research goals include HTS wires with 100 times the capacity of conventional copper/aluminium wires. The program aims to develop and demonstrate a diverse portfolio of electric equipment based on HTS, with half the energy losses and half the size of conventional equipment with the same rating.

Research on *transmission and distribution technologies* is focused on real-time information and control technologies; and systems that increase transmission capability, allow economic and efficient electricity markets, and improve grid reliability. Examples include high-strength composite overhead conductors, grid-status measurement systems that improve reliability by giving early warning of unstable conditions over major geographic regions, and technologies and regulations that enable the customer to participate more in electric markets through a demand response. Research program goals in this area include, by 2010, demonstrated reliability of energy-storage systems; reduced cost of advanced conductors systems by 30%; and operation of a prototype smart, switchable grid in a region within the United States transmission grid.

Research on *energy storage* is focused in two general areas. One goal is storage technologies that reduce power-quality disturbances and peak electricity demand, and improve system flexibility to reduce adverse effects to industrial and other users. A second goal is to improve electrical energy storage for stationary (utility, customer-side, and renewable) applications. Research focuses on storage technologies with high reliability and affordable cost.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

#### a) Name

There have been many laws, decrees and acts including provisions intended to achieve energy efficiency improvements enacted at Federal, state and local levels. Some of the most important examples at the Federal level include US Code Title 42, Chapter 77; Code of Federal Regulations (CFR) Title 10, Chapter II; Energy Policy Act of 2005 (EPA 2005); Executive Order 13423; and the Energy Independence and Security Act of 2007 (EISA). The American Recovery and Reinvestment Act of 2009 has also directed substantial energy efficiency investments.

#### b) Purpose

Promote energy efficiency in all sectors of the economy

#### c) Applicable sectors

Residential, commercial, industry, agriculture, power, and public sectors

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards (MEPS) and Labelling

#### a) Name

- Appliances and Commercial Equipment Standards (many standards were added or revised by the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007)
- Energy Star Labels.

#### b) Purpose

Improve the energy efficiency of appliances and equipment

#### c) Applicable sectors

Residential, commercial, industry, and public sectors

#### d) Outline

The DOE *Appliance Standards* program develops, promulgates, and enforces test procedures and energy conservation standards for about 50 categories of appliances and equipment. DOE has energy efficiency standards in place for most major types of energy-using appliances and equipment, including air conditioners, clothes washers and dryers, space and water heaters, kitchen ranges and ovens, refrigerators and freezers, lighting, electric motors and distribution transformers.

Section 135 of EAct 2005 establishes new or revised energy conservation standards for a number of products as follows:

- *Residential*: ceiling fans, compact fluorescent lighting fixtures (medium base), dehumidifiers, torchiere lighting fixtures
- *Commercial*: commercial refrigerators and freezers, commercial package air conditioning and heating equipment, fan-type unit heaters, coin-operated clothes washers, low-voltage dry-type distribution transformers, illuminated exit signs, traffic signal indicator light modules, pedestrian signals, automatic ice makers, commercial ice cream freezers, mercury vapour light ballasts, tubular fluorescent lamp ballasts (34, 60, 95 watts), pre-rinse spray valves, air flow through duct work, refrigerated beverage vending machines, determination of standards for battery chargers and external power supplies.

The Energy Independence and Security Act of 2007 (EISA) set standards for certain consumer and industrial products and requires new or revised standards for others. EISA sets incandescent lighting standards that will cut energy consumption 30% by 2014 and substantially more by 2020. These standards will encourage but not require the use of compact fluorescent bulbs and advanced solid state lighting technologies. Other related provisions of EISA include:

- Statutory efficiency standards for external power supplies (0.5 watts for units up to 250 watts), residential boilers, dehumidifiers, electric motors, and walk-in coolers
- Requirement for electric motors to meet efficiency levels specified by the National Electrical Manufacturers Association (these were previously voluntary)
- Water use standards for clothes washers and dishwashers
- Authority to set regional standards for home heating and cooling equipment
- Mandates to develop standards for furnace fans, refrigerators, and standby power
- Requirements for periodic updating of all standards and test procedures labelling of electronic products.

In 2011, the Department of Energy updated minimum energy efficiency standards for furnaces, central air conditioners, clothes dryers, room air conditioners, residential refrigerators, fluorescent lamp ballasts, refrigerators and freezers, and direct heating equipment. DOE has also proposed a significant update to standards for utility distribution transformers and anticipates updating standards on clothes washers and dishwashers in 2012. Further, DOE is exploring the potential costs and benefits of establishing minimum standards for commercial and industrial pumps and for industrial fans, blowers and fume hoods.

DOE issued a policy statement in 2011 that commits to adopting full fuel cycle analysis as part of its standards development process and to improving the information available to product buyers and users on product emissions and energy impacts over the full fuel cycle. In addition, DOE has issued a number of public notices or rules affecting its appliance and equipment test procedures, as well as its efficiency certification and enforcement efforts. In December 2011, DOE launched a web-based data base of all product certification data.

EISA outlines a rigorous lighting efficiency program, which mandates increases in the energy efficiency of light bulbs by 25%-30% starting in 2012. This will effectively phase out most common types of incandescent light bulbs by 2014. EISA mandates revised lighting efficiency standards effective in 2020 which could be met by compact fluorescents, LED or other energy efficient bulbs. EISA sets efficiency standards for metal halide lamps and requires amended standards in 2012 and 2019. DOE is progressing on rule-making to update and expand the scope of energy efficiency standards for fluorescent lamps and ballasts, and incandescent reflector lamps.

EISA requires that test procedures for covered consumer products be amended to include standby mode and off mode energy consumption, taking into consideration the most current versions of Standards 62301 and 62087 of the International Electrotechnical Commission. EISA mandates that any final rule establishing or revising a standard for a covered consumer product, adopted after 1 July 2010, incorporate standby mode and off mode energy use. DOE is revising test procedures for battery chargers and external power supplies and developing an efficiency standard to address standby energy use. With accurate measurement of standby power needs included in testing to meet appliance standards, as well as with standards for external power supplies, typical appliances will use less standby power. The Federal government is required to buy devices that use less than 1 watt of standby power. Some states have implemented standby limits on certain consumer electronics products.

DOE is implementing a round-robin test program to assess the repeatability and reproducibility of test procedures for various appliances. The National Institute of Standards and Technology (NIST), the Appliance Technology Evaluation Center (ATEC) at the National Energy Technology Laboratory (NETL), and many third parties and manufacturers perform these tests. The round robin testing will document the variability of test results, both within a test lab (repeatability) and among test labs (reproducibility), and seek to identify the potential contributing causes of variability. The results will form the basis of recommended corrective actions for facilities and highlight needed modifications to test procedures.

The *Energy Star® labelling* program is designed to clearly signal high efficiency in buildings and products to consumers and businesses. Over 50 types of products can now earn the label. The US Environmental Protection Agency (EPA) manages the labelling of buildings, new homes, office equipment, home electronics, and residential heating, ventilation and air conditioning (HVAC). DOE manages the labelling for a variety of residential products, including appliances, compact fluorescent lamps (CFL), solid state lighting, windows, and residential water heaters. In July 2011, EPA and DOE announced the first products recognized as the most energy-efficient in their categories among those that have earned the Energy Star label. "EnergyStar Most Efficient 2012" product identification is available for clothes washers, refrigerators, televisions, central air conditioners, furnaces, and heat pumps.

The EISA of 2007 states that as of December 19, 2010, federal agencies are generally required to lease space in buildings that have earned an Energy Star label in the previous year.

There are exemptions to this rule; agencies are allowed to remain the previously occupied buildings, even if not Energy Star labelled.

### 2.2.2. Building Energy Codes

#### a) Name

Energy Efficiency Standards for Buildings

#### b) Purpose

Reduce energy used in the heating, cooling and ventilation of buildings

#### c) Applicable sectors

Residential and commercial

#### d) Outline

The United States has developed energy efficiency standards for new buildings since 1975, with the first codification of those standards taking place in 1977. Adoption and enforcement of these codes and standards is the responsibility of the states, with the US DOE playing a major support role in the development of new economy-wide model codes. According to the Database of State Incentives for Renewables & Efficiency, all 50 states and the District of Columbia have building energy codes. The goal expressed by the 2009 Recovery Act is for 90% compliance with energy code requirements for each state.

In 2007, DOE undertook to support a 30% improvement in ASHRAE/IESNA Standard 90.1 for the year 2010 (relative to Standard 90.1-2004). Standard 90.1 is the primary reference for economy-wide model commercial codes. In 2008, DOE provided support to a 30% improvement in the economy-wide model residential code.

The Building Energy Codes Program estimates an energy cost savings of more than USD 2.5 billion per year. The program supports the development, adoption and compliance of energy efficiency standards in buildings.

#### e) Financial resources and budget allocation

At the Federal level, about USD 4 million was allocated in 2008. Additional budget is allocated at the state level.

#### f) Expected results

Many new residential and commercial buildings will use 30% less energy in 2010 than in 2007 due to widespread state compliance with model buildings codes developed.

### 2.2.3. Vehicle Fuel Efficiency Standards

#### a) Name

Corporate Average Fuel Economy (CAFE) Standards for Light Vehicles and Greenhouse Gas and Fuel Efficiency Standards for Trucks and Buses

#### b) Purpose

Improve the fuel economy of light vehicles, trucks and buses

#### c) Applicable sectors

Transport

#### d) Outline

The Energy Independence and Security Act of 2007 (EISA) mandates a corporate average fuel economy standard of 35 miles per gallon for new light vehicles (cars and light trucks (vans, SUVs, and pickups)) throughout the United States by 2020. On 19 May 2009, President Obama greatly accelerated the vehicle efficiency improvement by introducing a

policy aimed at both increasing fuel economy and reducing greenhouse gas pollution. The new standards, covering model years 2012-16, require an average fuel economy standard of 35.5 miles per gallon in 2016 (6.6 liters/100 km; 250 g CO<sub>2</sub>/mile). On April 1, 2010, the U.S. Environmental Protection Agency and the National Highway Traffic Safety Administration issued regulations to implement this standard. It is estimated that the new requirements will save 1.8 billion barrels of oil and cut carbon emissions by about 960 million metric tons.

On July 29, 2011, President Obama announced more new standards to increase fuel efficiency and reduce greenhouse gas pollution for new cars and light trucks sold in the United States. These new standards will cover cars and light trucks for Model Years 2017-2025, requiring performance equivalent to 54.5 mpg in 2025 while reducing greenhouse gas emissions to 163 grams per mile. The standards will save an estimated 12 billion barrels of oil in total 6 2.2 million barrels per day by 2025 and over 4 million barrels per day by 2045 when new vehicles meeting the 2025 fuel economy requirement replace nearly the entire vehicle fleet. They will also reduce carbon dioxide emissions by a total of over 6 billion metric tons.

On August 9, 2011, The Environmental Protection Agency and National Highway Traffic Safety Administration established the first-ever U.S. fuel economy standard for heavy trucks which should reduce vehicle fuel consumption by 10-20% between 2014 and 2018 with net cost savings of \$42 billion to commercial truck owners. Based on projected fuel savings, vehicle owners are expected to recover the additional upfront costs of the more efficient vehicles in one to five years.<sup>37</sup> The standards are projected to reduce oil consumption by 530 million barrels and carbon dioxide emissions by 270 million tons over the life of these trucks.

The United States has also greatly expanded support for development and manufacture of more fuel-efficient vehicles. Loan guarantee authority funded in 2008 and the economic stimulus program enacted in 2009 have expanded support for the retooling of auto manufacturing plants to increase fuel efficiency, the manufacture of advanced batteries, and purchase of plug-in hybrid vehicles. This support is in the form of expanded R&D, loan guarantees, direct financial assistance, and tax incentives.

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

Information not available

#### **f) Expected results**

Average fuel economy for new cars and light trucks will gradually increase to 35.5 miles per gallon by 2016 and then further to 54.5 miles per gallon by 2025. The new CAFE standards are expected to result in savings of 12 billion barrels of oil over the lifetime of the vehicles. Average fuel economy for heavy trucks will also increase, saving another half billion barrels.

### **2.3. Voluntary Measures**

#### **2.3.1. Climate VISION-Voluntary Innovative Sector Initiatives**

##### **a) Purpose**

Reduce energy intensity and greenhouse gas intensity of industrial output

##### **b) Applicable sectors**

Industry

##### **c) Outline**

Climate VISION works with its partners to standardise measuring and monitoring, find cost-effective solutions to reduce energy use and GHG emissions, accelerate R&D, and explore cross-sector efficiency gains to reduce emissions. Partners represent a broad range of

<sup>37</sup> NHTSA (2010)

industrial sectors: oil and gas production, transportation, and refining; electricity generation; coal and mineral production and mining; manufacturing; railroads; and forestry products.

### 2.3.2. Commercial Lighting Initiative

#### a) Purpose

Reduce energy use for commercial lighting

#### b) Applicable sectors

Commercial

#### c) Outline

This initiative works to reduce energy use for lighting in stores, offices, hospitals, and other commercial buildings to 30% below the prevailing US commercial buildings energy standard, the ASHRAE/IESNA Standard 90.1-2004, using voluntary market pull strategies.

### 2.3.3. Better Buildings Program

#### a) Purpose

Reduce energy use in commercial buildings

#### b) Applicable sectors

Commercial

#### c) Outline

The program, launched by DOE in February 2011, catalyzes private sector investment in upgrades to make commercial buildings 20 percent more energy efficient over the next decade. On June 30, 2011, 14 partners announced commitments to the Better Buildings Challenge, including private companies, financial institutions and local governments. Companies will provide data on energy savings and efficiency strategies which can serve as models to others. Financial institutions have agreed to help finance efficiency projects.

## 2.4. Financial Measures Taken by the Government

### 2.4.1. Tax Schemes

#### *Federal Tax Credits for Energy Efficiency: Home Improvements*

#### a) Level

Federal

#### b) Purpose

Promote energy efficiency in existing residential buildings

#### c) Applicable sectors

Residential

#### d) Outline

Individuals can get an income tax credit for 30% of the cost of energy efficiency measures.

#### e) Financial resources and budget allocation

Given there are about 100 000 000 households in the United States, this credit represents a potential investment in the order of USD 150 billion dollars for as much as USD 450 billion in efficiency improvements. Clearly the actual uptake will be some fraction of this potential.

#### f) Expected results

Improved residential uptake of energy efficiency measures

**g) Description**

Home improvement tax credits were available for home improvements placed in service from 1 January 2009 through 31 December 2010. The maximum that a taxpayer could claim was USD 1500. It had to be an existing home and principal residence to receive this tax credit. New construction and rentals did not qualify. Geothermal heat pumps, solar energy systems, wind energy systems and fuel cells qualify for a 30% tax credit through 2016.

In January of 2011, the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 was passed in Congress and extended the tax incentives for home improvements through 2011. The new tax incentives are for home improvements made in 2011. The ones made in 2010 were still subject to the previous tax credit requirements. The new tax credit amounts for 10% of the cost of building envelope improvements, excluding labor costs; and limited to USD 200 for windows, and specific dollar limits for heating and cooling equipment. The total credit cannot exceed USD 500 and applies to cumulative claims dating back to 2006. To be eligible a home must be the taxpayer's principal residence.

*Tax Credit for Manufacturers of Energy-Efficient Appliances***a) Level**

Federal

**b) Purpose**

Promote the production of energy-efficient appliances

**c) Applicable sectors**

Commercial

**d) Outline**

Tax credits for manufacturers of high-efficiency residential clothes washers, refrigerators, and dishwashers

**e) Financial resources and budget allocation**

Information not available

**f) Expected results**

Increased domestic manufacturing of energy efficiency appliances

**g) Description**

The credits are in the form of a tax credit for increases in unit production of efficient appliances over a two-year baseline. The amount of the credit is tied to specified efficiency ratings, and varies according to appliance and the level of achieved efficiency. The appliances must be produced in the United States.

The appliance tax credit was extended until the end of 2011 and follows the criteria:

- Dishwashers
  - USD 25 - models using no more than 307 kilowatt hours/year and 5.0 gallons of water/cycle (this is the ENERGY STAR level effective July 1, 2011)
  - USD 50 - models using no more than 295 kilowatt hours/year and 4.25 gallons of water/cycle
  - USD 75 - models using no more than 280 kWh kilowatt hours/year and 4 gallons of water/cycle
- Clothes Washers
  - USD 175 - top-loading models that meet/exceed 2.2 MEF, and does not exceed 4.5 WCF

- USD 225 ó top-loading models that meet/exceed 2.4 MEF, and does not exceed 4.2 WCF, or front-loading models that meet/exceed 2.8 MEF and do not exceed a 3.5 WCF
- Refrigerators ó
  - USD 150 ó models that use 30% less energy relative to federal standard
  - USD 200 ó models that use 35% less energy relative to federal standard

*Federal Tax Credits for Energy Efficiency: Vehicle Fuel Efficiency*

**a) Level**

Federal

**b) Purpose**

Encourage market penetration of fuel-efficient hybrid electric vehicles

**c) Applicable sectors**

Residential and commercial transport

**d) Outline**

A federal income tax credit of up to USD 3,400 was available for hybrid vehicles placed in service after 31 December 2005 and purchased by December 31, 2010. Plug-in hybrid-electric vehicles and all electric vehicles purchased in or after 2010 were eligible for a federal tax credit of up to USD 7,500, depending on the capacity of the battery used. Some diesel vehicles purchased or placed into service after December 31, 2005 were eligible for a federal income tax credit of up to USD 3,400. The credit amount began to phase out for a given manufacturer once it sold over 60,000 eligible hybrid and diesel vehicles.

**e) Financial resources and budget allocation**

The net US investment depends on consumer uptake of the certified vehicles.

**f) Expected results**

Increased consumer uptake of the certified vehicles, reducing fuel consumption and associated emissions

**g) Description**

Private or commercial purchasers of certified vehicles received a USD 250-USD 3400 tax credit for certified vehicles. For the case of hybrid-electric vehicles, the tax credit for a given manufacturer was phased out after the first 60 000 certified vehicles were sold. For plug-in hybrid-electric vehicles, the tax credits were: PHEV10 (vehicles with a range of 10 miles): USD 2500, PHEV20 (20 miles): USD 4000, PHEV30: USD 5000, PHEV40: USD 5000. For plug-in vehicles, the tax credit for a given manufacturer was phased out after 200 000 vehicles were sold.

*Federal Tax Credits for Energy Efficiency: Fuel Cells*

**a) Level**

Federal

**b) Purpose**

Promote the use of energy-efficient fuel cells for stationary applications

**c) Applicable sectors**

Residential

**d) Outline**

Credits are available for residential fuel cells and micro turbine systems.

**e) Financial resources and budget allocation**

Information not available

**f) Expected results**

Increased installation of fuel cell/microturbine systems

**g) Description**

There is a residential consumer tax credit of up to 30% of the cost (up to USD 1500 per 0.5 kW of capacity maximum) for installing a qualified fuel cell and microturbine system. The system must have an efficiency of at least 30% and a capacity of at least 0.5 kW. The credits are available for systems placed in service from 1 January 2006 through 31 December 2016. This credit is not limited to the USD 1500 home improvement cap.

**2.4.2. Low-Interest Loans**

*Qualified Energy Conservation Bonds*

**a) Level**

Federal

**b) Purpose**

Accelerate the deployment of energy efficiency improvements

**c) Applicable sectors**

State, local, and tribal governments

**d) Outline**

For qualified projects, which include certain energy efficiency improvements, the borrower pays back the principal of the bond, and the bondholder receives Federal tax credits instead of bond interest.

**e) Financial resources and budget allocation**

The tax credit bond limit in the original October 2008 legislation was USD 800 million but was increased in the ARRA 2009 to USD 3.2 billion. Recent legislation provides that tax credit bonds may also be issued as Build America Bonds in which the bonds bear taxable interest and the obligor receives a subsidy directly from the federal government equal to 70% of the taxable interest cost.

**f) Expected results**

Larger-scale adoption of energy efficiency measures

*Energy Efficient Mortgages*

**a) Level**

Federal

**b) Purpose**

Help homebuyers or homeowners save money on energy bills by enabling them to finance the cost of adding energy-efficiency features to new or existing housing as part of their home purchase or refinancing mortgage.

**c) Applicable sectors**

Residential

**d) Outline**

Cost-effective energy saving measures may be financed as part of the mortgage. A buyer's debt-to-income ratio on the loan for an energy efficient home could be stretched, so that a larger percentage of the borrower's monthly income can be applied to the monthly mortgage payment. All homes built to the Council of American Building Officials Model Energy Code (MEC) can qualify for an Energy Efficient Mortgage.

**e) Financial resources and budget allocation**

Maximum loan amounts vary by originator, but may be expressed in terms of a maximum dollar amount or as a percentage of the home's appraised value.

**f) Expected results**

Larger-scale adoption of energy efficient technologies

*State and Utility Based Loan Programs*

**a) Level**

State and local government, utilities

**b) Purpose**

Promote adoption of energy efficient technologies

**c) Applicable sectors**

Residential, commercial, non-profit, state/local government

**d) Outline**

More than 200 state and utility programs are identified at the DSIRE website [www.dsireusa.org/summarytables/FinEE.cfm?&CurrentPageID=7&EE=1&RE=1](http://www.dsireusa.org/summarytables/FinEE.cfm?&CurrentPageID=7&EE=1&RE=1).

**e) Financial resources and budget allocation**

Varies

**f) Expected results**

Wider adoption of qualifying energy efficiency measures

### 2.4.3. Subsidies and Budgetary Measures

*Weatherization Assistance Program (WAP)*

**a) Level**

Federal

**b) Purpose**

Improve the energy efficiency of homes inhabited by low-income families

**c) Applicable sectors**

Residential

**d) Outline**

The program provides cost-effective energy efficiency improvements to low-income households through the weatherisation of homes. It thereby helps low-income families to permanently reduce their energy bills. DOE's weatherisation program performs energy audits to identify the most cost-effective measures for each home, which typically includes adding insulation, reducing air infiltration, servicing heating and cooling systems, and providing health and safety diagnostic services. Priority is given to the elderly, persons with disabilities, families with children, and households that spend a disproportionate amount of their income on energy bills (utility bills make up 15% to 20 % of household expenses for low income families, compared to 5% or less for all other Americans).

**e) Financial resources and budget allocation**

The Recovery Act made available approximately USD 5 billion for weatherization efforts from 2009 - 2013. The annual WAP program budget for FY2012 is USD 128 million and the request for 2013 is USD 195 million.

**f) Expected results**

Over 36 years, as of February 2012, WAP has provided weatherization services to more than 7.3 million low-income households, with 707,000 funded through the Recovery Act.

*Numerous economy-wide, state and local energy efficiency subsidies*

**a) Level**

Federal, state and local governments, local utilities

**b) Purpose**

Improve the energy efficiency of residences and commercial buildings

**c) Applicable sectors**

Residential, commercial, industry, and agriculture

**d) Outline**

Numerous subsidies are available to assist private citizens and business owners in obtaining energy efficiency audits and perform efficiency improvements. See the summary information at [www.dsireusa.org](http://www.dsireusa.org).

**e) Financial resources and budget allocation**

Varies

**f) Expected results**

Improved energy efficiency in applicable sectors

*Energy Savings Performance Contracts*

**a) Level**

Federal

**b) Purpose**

Facilitate financing of energy efficiency improvements by Federal government agencies

**c) Applicable sectors**

Public sector

**d) Outline**

Energy Savings Performance Contracts (ESPCs) are a contracting vehicle that allows agencies to accomplish energy efficiency projects for their facilities without up-front capital costs and without Congressional appropriations. An ESPC project is a partnership between the customer and an energy services company (ESCO). The ESCO conducts a comprehensive energy audit and identifies improvements that will save energy at the facility. In consultation with the agency customer, the ESCO designs and constructs a project that meets the agency's needs and arranges financing to pay for it. The ESCO guarantees that the improvements will generate savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the agency. Contract terms up to 25 years are allowed. Federal agencies structure ESPCs so that financial savings cover costs of their investments.

**e) Financial resources and budget allocation**

More than 570 projects worth USD 3.9 billion have been awarded by 25 different Federal agencies and organizations as of May 2011. These projects saved an estimated USD 13 billion in energy costs, from which USD 10 billion goes to fund energy efficiency projects and the remaining USD 3 billion in savings reduces government spending.

**f) Expected results**

The current ESPC contract permits 16 energy service companies to receive contractor payment of up to USD 5 billion for projects. This has the potential to result in up to USD80 billion of energy efficiency, water conservation, greenhouse gas emissions reduction and renewable energy projects at federally owned buildings and facilities

*Utility Energy Service Contracts*

**a) Level**

Federal

**b) Purpose**

Facilitate financing of energy efficiency improvements by Federal government agencies

**c) Applicable sectors**

Public sector

**d) Outline**

Utility arranges financing to cover the capital costs of an efficiency project; the costs are paid back by efficiency savings achieved by the installed measures.

**e) Financial resources and budget allocation**

Since 1991 more than 1,600 projects attracted USD 2.3 billion in capital investment for energy and water efficiency upgrades at Federal facilities.

**f) Expected results**

It is estimated these projects are providing more than 19 million MMBTU in annual energy savings and USD 350 million in annual cost savings.

## 2.5. Energy Pricing

The pricing mechanism is generally market based. However, particularly in the electric power sector, there is a significant regulated element in the price for many customers. Most of the wholesale electricity business is based on competitive supply to various utilities. But only about half the states offer retail choice of suppliers to small customers. The transmission and distribution component of price is generally regulated by states on a cost-of-service model. There are also a variety of taxes and fees which are levied, for example highway tolls and gasoline taxes on automobiles, which affect market prices and vary considerably from state to state within the United States.

Demand for energy fluctuates with price but is rather inelastic, particularly in transport and residential buildings. As a result, policies to improve automotive fuel efficiency have focused on regulating the fuel economy of new vehicles, and policies to reduce energy use in buildings have focused on efficiency standards and labels.

## 2.6. Other efforts for energy efficiency improvements

### 2.6.1. Cooperation with non-government organisations

Many NGOs are prominent in promoting energy efficiency in the United States. Examples include Alliance to Save Energy; American Council for an Energy Efficient Economy; American Society for Heating, Refrigeration and Air Conditioning Engineering; Northwest Energy Efficiency Alliance; Precourt Institute for Energy Efficiency; Resources for the Future; Rocky Mountain Institute; and various trade associations.

## 2.6.2. Cooperation through bilateral, regional and multilateral schemes

The United States cooperates extensively with other economies to develop energy efficiency standards, and on developing and deploying energy efficient technologies and processes. US agencies including DOE, EPA, and AID maintain relevant cooperative efforts with numerous economies and organisations involving work on all continents. For example, the United States participates in IEA Implementing Agreements on Buildings and Community Systems, Demand Side Management, District Heating and Cooling, Energy Storage, Heat Pumps, Combustion, Superconductivity, Fuel Cells, Hybrid and Electric Vehicles, and Advanced Motor Fuels. The United States participates in APEC, United Nations programs, and the Asia Pacific Partnership on Clean Development and Climate (APP). The United States is also actively engaged in efforts to launch the International Partnership for Energy Efficiency Cooperation (IPEEC) which will help economies to share best practices in implementing energy efficiency technologies and monitoring progress toward their energy efficiency goals.

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# VIET NAM

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In 2005, the Ministry of Industry and Trade (MOIT) released the National Strategic Program on Energy Savings and Effective Use (Vietnam National Energy Efficiency Program, (VNEEP)) for 2006-2015. The program was approved and adopted in April 2006 by the Prime Minister (Decision No.79/2006/QD-TTG). The overall objectives include the following:

- 1) Activities to encourage, promote, and disseminate energy efficiency and conservation (EEC) in the public sphere, science and technology research activities, and management measures required to perform synchronous activities on energy efficiency and conservation throughout society.
- 2) An energy savings goal of 3%-5% of the total energy demand (compared to business-as-usual (BAU)) during 2006-2010 and 5%-8% during 2011-2015.

The VNEEP is the first-ever long-term comprehensive plan to institute measures for improving energy efficiency and conservation in all sectors of the economy in Vietnam. Phase 1 (2006-2010) aims to actively start up all components of the program, while Phase 2 (2011-2015) aims to expand each component on the basis of the lessons learned from Phase 1.

### 1.2. Sectoral Energy Efficiency Improvement Goals

Vietnam currently has no sectoral quantitative targets.

### 1.3. Action Plans for Promoting Energy Efficiency

The VNEEP is a comprehensive program that promotes energy efficiency in Vietnam. According to the VNEEP framework, there are six components that focus on the entire field of energy efficiency with specific actions, including 11 large projects for promoting energy efficiency.

#### a) Objectives

To achieve its stated energy savings, which will help lower investment requirements for energy supply and generate socioeconomic benefits while contributing to environmental protection and rational extraction of energy resources.

#### b) Applicable sectors

Phase 1 of the VNEEP, implemented during 2006-2010, contained measures covering six sectors: 1) government (institutions, education, and information), 2) industrial (equipment and appliances for the residential and commercial sectors), 3) buildings and transport focusing on legal documents, 4) education, 5) information, and 6) capacity building.

Phase 2 began in 2012 with further action in each sector aimed at removing barriers for energy efficiency and creating breakthrough changes in end-use efficiency. The key focus was on the manufacturing sector and large energy-consuming buildings, but it also included provisions for the transport, services, and residential sectors.

#### c) Outline

The VNEEP consists of six components with 11 projects (actions). The actions and achievements to date are as follows:<sup>38</sup>

<sup>38</sup> Decision 79 /2006/QD-TTg (2006); APEC EWG (2009).

**Component 1: State Management on Energy Efficiency and Conservation**

Project 1: Complete the legislative framework on EEC in industrial production, construction site management, domestic activities, and energy-consuming equipment.

**Achievements (2007–2011)**

- Law on Energy Conservation and Efficient Use (issued in 2010).
- Issued Decree 21/2011/ND-CP (dated March 29, 2011) on the guidelines for the implementation and enforcement of the law.
- Issued Decree 73/2011/ND-CP (dated August 24, 2011) on the sanctions and penalties for the violation of energy-efficient use.
- Issued Joint Circular No. 142/2007/TTLT/BTC-BCT (dated November 30, 2007) to guide the management and use non-business funds for the implementation of the target program on the economical and efficient use of energy.
- Directed and guided all localities to conduct energy efficiency activities.
- Established EEC centers in Hanoi, Hai Phong, and Tien Giang to coordinate program activities in the entire economy.
- Organized workshops, seminars, and trainings on energy efficiency laws, policies, institutional issues, technologies, and solutions.
- Developed the VNEEP website: [www.tietkiemnangluong.com.vn](http://www.tietkiemnangluong.com.vn).
- Published leaflets, handbooks, and technical guidelines on energy efficiency.

**Component 2: Education and Information Dissemination**

Project 2: Improve public awareness on EEC.

Project 3: Integrate EEC into the education system.

Project 4: Develop pilot models for the EEC in the Household movement

**Achievements (2007–2011)**

- Broadcast EEC news on television and radio.
- Developed documentary films on energy-efficient technologies.
- Printed EEC information in various newspapers and electronic media.
- Organized an annual contest on energy-efficient buildings.
- Provided guidelines to disseminate EEC information at all levels of the education system.

**Component 3: High Energy Efficiency Equipment**

Project 5: Develop standards and provide energy efficiency labels for selected products.

Project 6: Provide technical assistance to domestic producers on energy efficiency compliance.

**Achievements (2007–2011)**

- Completed a demonstration model for solar water heaters and industrial biogas.
- Conducted the labeling program for three appliances, i.e., FTL T8-36W, T5-32W, and electronic ballasts.
- Collaborated with the Vietnam Standard Centre to develop and issue three sets of standards on energy efficiency and testing methods for refrigerators, air conditioners, and electric fans.
- Conducted a pilot EEC information program for households through the Vietnam Women's Union in six provinces and cities.

- Implemented two programs to support lighting manufacturers in the technological transition from incandescent lamps to compact fluorescent lamps.

#### **Component 4: EEC in Industrial Enterprises**

Project 7: Develop EEC management models in enterprises.

Project 8: Support industrial enterprises in improving, upgrading, and optimizing technology aimed at energy saving and efficiency.

#### **Achievements (2007–2011)**

- Completed a survey in 2008 on the energy consumption of more than 500 large enterprises in order to identify potential energy savings and determine the energy consumption rates in the industrial sectors that consume a significant amount of energy.

#### **Component 5: EEC in Buildings**

Project 9: Improve capacity in EEC and conduct EEC in building design and management.

Project 10: Develop pilot models and disseminate EEC management activities in building operations.

#### **Achievements (2007–2011)**

- Implemented various dissemination activities led by the Ministry of Construction (MOC).

#### **Component 6: EEC in Transport**

Project 11: Make optimal use of transport facilities and equipment, minimize the amount of fuel consumed, and reduce the discharge of exhausted gases to the environment.

The major actions undertaken by 2008 are as follows:

#### **Achievements (2007–2011)**

- Conducted research activities on the enhancement of public transport in cities, and the creation of fuel-consumption measurement equipment to serve the management and exploitation of diesel-powered ships for fuel-saving purposes.

The first two years of VNEEP implementation primarily focused on education, capacity building, and research. Due to the introduction of several enabling efforts and capacity-building activities, the VNEEP is now in a good position to review its objectives and develop an overall strategy and a detailed implementation plan to achieve them. This will aid the government in determining appropriate levels of funding for various initiatives, allowing for increased competition and accountability among implementing partners, and designating appropriate roles of private sector participation and leverage.

The VNEEP Phase 2 was designed with four components and 13 projects.

#### **Component 1: Strengthening education, information dissemination, community mobilization, awareness raising, promoting the use of energy efficiency and conservation, and environmental protection.**

Project 1: Disseminate information to society and raise awareness on energy efficiency and conservation.

Project 2: Embed educational programs on energy efficiency and conservation in the education system.

Project 3: Create a pilot model of large-scale alternative energy forms and an energy-saving model family.

#### **Component 2: Development and dissemination of high-performance, energy-saving equipment with a gradual phasing out of low-performance equipment.**

Project 4: Develop energy performance standards and implement a mandatory energy labeling program.

Project 5: Provide technical assistance to manufacturers, assembly factories, importers, retailers of high-performance products, and testing laboratories throughout the economy.

Project 6: Support businesses in the application of standards and technical norms and improve their performance of energy efficiency and conservation.

Project 7: Develop energy management standards and models in energy-using facilities.

**Component 3: Energy saving and efficiency in buildings.**

Project 8: Strengthen the application of energy-saving standards in the construction/renovation of large buildings.

Project 9: Apply energy-saving solutions, technologies, equipment, and materials as well as organize competitions on green energy-saving buildings.

Project 10: Energy efficiency in public lighting.

**Component 4: To promote energy efficiency in the transport sector.**

Project 11: Energy savings in the planning and construction of transport infrastructure.

Project 12: Improve energy efficiency in organizations and exploit the transport system.

Project 13: Application of new technologies and renewable energy in transport

**d) Financial resources and budget allocation**

In 2007, VND 30 billion (approximately USD 2 million) of the state budget was allocated for 28 projects registered under the VNEEP. Roughly one-third of these funds were allocated to support two energy-efficient lighting manufacturers. In 2008, VND 36 billion (approximately USD 2.25 million) were allocated for 48 projects, many of which were initiated in 2007. From this figure, about one-third was used to set up an energy efficiency laboratory for air conditioners and refrigerators.

**e) Method for monitoring and measuring the effects of action plans**

Surveys, statistic compilations, end-use information, reporting, and trend analyses are all being undertaken, and databases are being developed to assist in program evaluation and policy formation. However, these activities are limited since there has been no official agency (until now) that is responsible for energy data collection and analysis. Most of the previous and ongoing energy data monitoring and evaluations were undertaken as part of individual projects or energy audits of customers. In addition, the capability of human resources and government budget shortages are another impediment in this area.

To date, the Energy Efficiency and Conservation Office (EECO) at the MOIT is the only agency with the responsibility of energy efficiency monitoring and reporting.

**f) Expected results**

Reducing total final consumption by 5%–8% by 2015 (compared to BAU).

**g) Future tasks**

Completing related legal documents, establishing an official energy database (to be included in energy efficiency data), developing human resources, etc.

**1.4. Institutional Structure**

**a) Name of organization**

The MOIT, the focal coordinator on EEC, is authorized to administer the VNEEP. The Energy Efficiency and Conservation Office within the MOIT was established in 2006 to support this

role. The main task of this office is to develop systems in central and local governments to carry out the work of the VNEEP.

The National Steering Committee, chaired by the MOIT, was established for inter-ministerial coordination and to monitor the implementation of the VNEEP. This committee includes the Ministry of Construction, the Ministry of Transport, the Ministry of Education and Training, the Ministry of Culture, Sports and Tourism, the Ministry of Science and Technology (MOST), the Ministry of Planning and Investment, the Ministry of Justice, the Ministry of Finance, and the Union of Vietnam Associations of Science and Technology.

Since its establishment, the EECO has completed preparatory tasks, including the formulation of the action plans and detailed programs required to launch and implement the VNEEP in cooperation with other governmental organizations.

At the level of implementing agencies, the following main agencies have been carrying out energy efficiency programs or related energy efficiency programs:

- People's Committee of Provinces and Cities (under central management).
  - Develop local policies on energy conservation and effective uses.
  - Coordinate the implementation of projects in local areas.
- Energy Efficiency Centres in large cities such as Hanoi, Tien Giang, HCM City, Phu tho, Dongthap, Haiphong, and Danang.
- Institute of Energy (IE).
- Vietnam Standards and Quality Institute (VSQI) STAMEQ (MOST).
- Electricity of Vietnam (EVN).
- Other agencies under different ministries.

#### **b) Status of the organization**

All agencies report on the implementation of EE programs to the EECO and the MOIT.

#### **c) Roles and responsibilities**

The roles vary across agencies.

#### **d) Covered sectors**

All sectors of the economy.

#### **e) Established date**

Since 2002 (only for EEC centers).

#### **f) Number of staff**

The EECO has approximately 15 staff members, plus 25 staff members for other EEC centers.

### **1.5. Information Dissemination, Awareness Raising and Capacity Building**

#### **a) Information collection and dissemination**

General information on the VNEEP is readily available to Vietnamese energy consumers. For example, the EEC website, developed under the VNEEP framework, is a public source of information on energy efficiency. There are also a number of other websites containing information energy efficiency improvement from the EEC HCM Center, the EE Hanoi Center, etc.

#### **b) Awareness Raising**

The purpose of the dissemination program in Component 2 is to increase the public awareness of the definition of EEC and support the penetration of energy-efficient appliances into the

domestic retail market. In recent years, the EEC promotion and dissemination program has frequently appeared in the media.

Four projects were carried out in 2007 and six projects were implemented in 2008-2009. The projects mainly focus on communication via public media, radio, television, newspapers, and other public relations activities.

Almost all of the projects in Component 2 have completed the proposed tasks, including Vietnam television and radio, the contest for energy-efficient buildings, and the provision of EEC information to the school education system at all levels.

### **c) Capacity Building**

A wide range of training courses, workshops, the publishing of technical documents for energy efficiency knowledge, and assessments addressing all six components are being developed and implemented under the VNEEP. These include training courses on energy auditing, publishing a guidebook on energy efficiency, and capacity building for EEC centers. Most of these activities are scheduled to be completed in the first phase of the program.

Training courses in the construction and design of energy-efficient buildings, enhancing capacity for facility management on the energy efficiency of local industry department leaders, and energy managers are also being developed under the VNEEP.

## **1.6. Research and Development in Energy Efficiency and Conservation**

Vietnam has no specific policy for the support of energy efficiency R&D. However, some measures of the VNEEP encourage R&D in this area. For example, according to Item D of Article 4: "The policy on encouraging energy conservation and energy efficiency needs to define concrete requirements on energy saving in intensive energy use sectors; encouraging application of energy efficient equipment and technologies."<sup>39</sup>

The importance of R&D in energy efficiency improvement is also spelled out in the Decree on Energy Conservation and Energy Efficiency (102/2003/ND-CP). The decree stipulates that R&D should be a main tool for improving energy efficiency. The decree also mandates central and local government organizations to place reasonable efforts into energy efficiency R&D.

In regard to energy efficiency R&D, the decree prioritizes the development of suitable technologies in the industrial sector and the improvement of energy efficiency in the production activities of the Vietnamese people, especially in rural and remote areas.

The decree also calls for the government to allocate a suitable budget for energy efficiency R&D from the Science-Technology Research and Development Fund. The Ministry of Science and Technology (MOST) is responsible for the fund and setting up long- and medium-term R&D programs and budget allocations.

However, to date, there are no specific actions developed in accordance with the measures stipulated in the above documents.

## **2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS**

### **2.1. Government Laws, Decrees, and Acts**

In 2003, the first Decree on Energy Efficiency and Conservation (Decree No.102/2003/ND-CP) was issued (see below). This decree was replaced by the Law on Energy Efficiency and Conservation, passed in June 2010, and enforced on January 1, 2011.

In 2006, the VNEEP for the 2006-2015 time period was approved and enforced by the Prime Minister's Decision (Decision No.79/2006/QĐ-TTĐ). In 2012, the government approved the VNEEP Phase II for the 2012-2015 time period. The VNEEP calls for coordinated efforts for

<sup>39</sup> Decision 1855/QĐ-TTĐ (2007).

improving energy efficiency, reducing energy losses, and implementing extensive measures for the conservation of energy. Other decrees have been issued to support the implementation of the law such as Decree 21/2011/N -CP regarding regulations and measures to implement the law on energy conservation and efficient use on March 29, 2011, and Decree 134/2013/N -CP on regulations regarding penalties in energy efficiency and conservation.

Moreover, in November 2006, the MOIT issued its Guidelines for Energy Efficiency Standard and Labeling in order to assist the implementation of energy efficiency standards and labeling in appliances (Circular No.08/2006/TT/BCN). This circular has been replaced by Circular No.07/2012/TT-BCT (dated April 4, 2012), which defines energy labeling for energy-using equipment. Some other documents related to the implementation of labeling programs include the following: Decision 51/2011/Q -TTg and Decision 03/2013/Q -TTg regarding the list of equipment subject to labeling and the application of MEPS and roadmaps; Decision 78/2013/Q -TTg concerning the list of equipment and roadmaps for rejection; and Decision 68/2011/QD-TTg regarding state procurement regulations on energy labeling products.

Other related regulations include the Electricity Law (approved and enforced in July 2005), which consists of sections that specify electricity efficiency in the generation, transmission, distribution, and use processes. This was followed by the Electricity Saving Program for the 2006-2010 Time Period, which was approved by the Prime Minister in April 2006. Finally, the building code was updated in 2013 (Building Code No.09/2013-BXD).

**a) Name**

Law on Energy Conservation and Energy Efficiency (50/2010/QH12)

**b) Purpose**

The decree aims to promote energy conservation and energy efficiency that meets the increasing energy demand as well as environmental protection, reasonable energy resource exploitation, and sustainable socio-economic development.

**c) Applicable sectors**

The decree applies to all large energy users across all sectors. This mainly covers the industrial, construction (buildings), and transport sectors as well as energy-consuming equipment.

**d) Outline**

The law regulates that all designated energy consumers be defined by the government. It also confirms that the government carries out the state management of energy efficiency and conservation, while the Ministry of Industry and Trade (MOIT), as its duty to the government, is responsible for implementing the state management of energy efficiency and conservation. Apart from this, other related ministries, such as the Ministry of Science and Technology, the Ministry of Construction, the Ministry of Transport, the General Statistics Office, the People's Committee (at the provincial level), etc., are responsible for coordinating with the MOIT in implementing the state management of energy efficiency and conservation in the provinces and sectors.

**e) Financial resources and budget allocation**

The law also indicates that the energy efficiency projects can be considered for financial support from National Target Programs on Energy Efficiency and Conservation.

**f) Expected results**

No information is available.

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards and Labeling

Mandatory measures are expected to be gradually applied after The Law of Energy Conservation and Effective Use is fully enforced. Vietnam is currently creating the road map for the implementation of a standard and labeling program regarding equipment and appliances in line with Phase 2 of the VNEEP. Labeling is currently mandatory for the following products:

- Refrigerators
- Fans
- Washing machines
- Rice cookers
- TVs
- Lighting equipment: CFLs, TFLs, electronic ballasts.
- Air conditioners
- Three-phase electric motors and transformers.

### 2.2.2. Building Energy Codes

#### a) Name

Vietnam Energy Efficiency Building Codes (No. 09/2013/QĐ-BXD)

#### b) Purpose

This National Technical Building Energy Efficiency Building Code provides mandatory technical standards to achieve energy efficiency in the design and construction/retrofit of civil buildings (e.g., office buildings, hotels, hospitals, schools, commercial buildings, service buildings, and apartments buildings) with a gross floor area of 2,500 m<sup>2</sup> or larger.

#### c) Applicable sectors

Residential, commercial, and public buildings.

#### d) Outline

This code provides technical requirements applicable to the design and construction of buildings including operational equipment.

The requirements of this code apply to the following:

- 1) The building envelope, except envelopes of non-air-conditioned storage spaces or warehouses.
- 2) Equipment and systems in buildings, including the following:
  - a) Interior lighting
  - b) Ventilation and air conditioning
  - c) Water heating
  - d) Energy management equipment
  - e) Elevators and escalators

#### e) Financial resources and budget allocation

No information is available.

#### f) Expected results

No information is available.

### 2.3. Voluntary Measures

Labeling is currently voluntary for the following electrical products in Vietnam:

- Printers
- Monitors

- Photocopiers

## 2.4. Financial Measures Taken by the Government

In order to implement energy efficiency programs within the framework of the VNEEP, the MOIT, together with the Ministry of Finance, issued Circular No. 142/2007/TTLT/BTC-BTC, which guides the management and use of non-business funds for the implementation of a target program on the economic and efficient use of energy (unfortunately, no detailed information identified in this circular is currently available). The total VNEEP budget in 2007 and 2008 was nearly VND 70 billion (approximately USD 5 million) of which VND 10 billion was used to support two energy-efficient lighting manufacturers, and VND 4 billion was invested to set up an energy efficiency laboratory for air conditioners and refrigerators.

### 2.4.1. Tax Scheme

No information is available.

### 2.4.2. Low-Interest Loans

No information is available.

### 2.4.3. Subsidies and Budgetary Measures

Apart from the VNEEP, Vietnam includes other subsidies and budgetary measures to stimulate energy efficiency at the central government level. One example is provided below.

#### a) Name

The Pilot Commercial Energy Efficiency Program (CEEP)

#### b) Purpose

To enhance capacity building in EEC activities for agencies and provide financial support to enterprises.

#### c) Applicable sectors

Residential, commercial, and industrial sectors.

#### d) Outline

Vietnam received a grant for this project from the Global Environment Facility (GEF), through the International Bank for Reconstruction and Development (World Bank). The implementation period of the program was 2004-2009.

The pilot program included three components:

- Training project agents in energy-efficient commercial services and technical assistance in order to support the completion of energy efficiency investment projects (Annex 5 summarizes the training plan).
- Energy audit and efficiency investment grants (at decreasing levels over four years) to enable individual business to conduct efficiency investment transactions and overcome initial barriers when adopting energy-efficient business services (to be administered by a commercial bank to work as an administrative unit).
- Program marketing to promote energy efficiency (as both a good business service and a good investment for end-users) along with program administration to ensure success of the overall project strategy.

#### e) Financial resources and budget allocation

Funded by the state budget, the World Bank, and the Global Environmental Facility.

#### f) Expected results

Upon implementation, the total electricity consumption will be reduced by 1,540 GWh.

#### 2.4.4. Other Incentives

No information is available.

#### 2.5. Energy Pricing

Pricing mechanisms of coal for power generation, several types of petroleum products, and electricity in Vietnam are controlled by the government.

#### 2.6. Other Efforts for Energy Efficiency Improvements

##### 2.6.1. Cooperation with Non-Government Organizations

The Vietnamese Government cooperates with non-government organizations to stimulate energy efficiency improvements.

##### 2.6.2. Cooperation through Bilateral, Regional, and Multilateral Schemes

The Vietnamese Government cooperates with other economies through the Promotion of Energy Efficiency in ASEAN Economies (PROMEC Programs, funded by Japan), the Promotion of Energy Efficiency in Small and Medium Enterprises (PECSME Program, in cooperation with UNDP), and other programs and initiatives, including: the Vietnam Clean Production and Energy Efficiency Project (CPEE); The Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling (BRESL); the Low Carbon Energy Efficiency (LCEE) Program; and the Climate Change Adaptation and Mitigation (CCAM) Program.

##### 2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements

Since there are a wide variety of donor activities, coordination of donor support in the near future will be crucial. In October 2008, the MOIT and the World Bank co-chaired an Energy Efficiency Donor Coordination Meeting, which included a roundtable discussion on ideas for coordinating efforts and the further sharing of information. The following summarizes the activities and the major donors in the field of energy efficiency in Vietnam:

- Supporting implementation of the Energy Efficiency program (ADB).
- Load management and demand-side management (Agence Francaise de Development (AFD)).
- Technical training and certification program for energy efficiency (Danish International Development Agency (DANIDA)).
- Study on National Energy Efficiency Master Plan (Japan International Cooperation Agency (JICA)).
- Demand-Side Management and Energy Efficiency Project (The World Bank Group).

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