# COMPENDIUM OF ENERGY EFFICIENCY POLICIES OF APEC ECONOMIES

ASIA PACIFIC ENERGY RESEARCH CENTRE

This report is posted on the website at
www.ieej.or.jp/aperc

2011

Published by

Asia Pacific Energy Research Centre
Institute of Energy Economics, Japan
Inui Building Kachidoki 11F, 1-13-1 Kachidoki
Chuo-ku, Tokyo 104-0054 Japan
Tel: (813) 5144-8551
Fax: (813) 5144-8555
Email: master@aperc.ieej.or.jp (administration)


April 2011

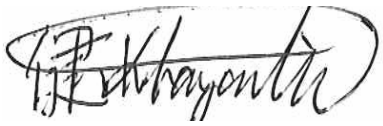
# FOREWORD

According to the *Nine Energy Policies Imperatives* (G8 Summit, 2009), "There is no scenario for putting global energy consumption on a sustainable path that does not show a major contribution from energy efficiency—predominantly in end use." Energy efficiency improvements will help APEC economies to chart new pathways for secure and sustainable development. Furthermore, the improvement of energy efficiency offers many cost-effective opportunities to achieve energy security, improve business productivity and mitigate greenhouse gas emissions.

At the 8th Meeting of APEC Energy Ministers in Darwin, Australia in May 2007, APEC Energy Ministers encouraged APEC economies to individually set goals and formulate action plans for improving energy efficiency on an overall and/or sector basis. As a result, in the Sydney Declaration of September 2007, APEC Leaders agreed to work towards achieving an APEC-wide regional aspirational goal of a reduction in energy intensity of at least 25% by 2030 (with 2005 as the base year). To this end, APEC economies were encouraged to set individual goals and action plans for improving energy efficiency, reflecting the individual circumstances of each economy.

The *Compendium of Energy Efficiency Policies of APEC Economies* is a publication intended to promote information sharing in the field of energy efficiency and energy conservation across the APEC economies under a common format. It contains energy efficiency policy information for all APEC economies (with the exception of Papua New Guinea) based on responses to a questionnaire.

We hope that this report helps to deepen mutual understanding among APEC economies on energy efficiency issues in the region.



Kenji Kobayashi
President
Asia Pacific Energy Research Centre
(APERC)

March 2011

# ACKNOWLEDGEMENTS

We would like to thank APEC member economies for their efforts in completing the questionnaire to ensure the accuracy and timeliness of the information reported. We also would like to thank members of the APEC Energy Working Group (EWG) for their helpful information and comments.

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.

PROJECT MANAGER

Goichi Komori

MAIN CONTRIBUTORS

Economy Chapters: Chandran Sundaraj (Brunei Darussalam, Malaysia), Huang Yi-Hsieh (Hong Kong, China; Chinese Taipei), James C Russell (Canada, United States), Joel Hernández-Santoyo (Chile, Mexico, Peru), Kate Penney, Gayathiri Bragatheswaran (Australia), Ralph Samuelson (New Zealand), Mardrianto Kadri (Indonesia, Singapore), Goichi Komori (Japan), Satoshi Nakanishi (Korea), Svetlana Vassiliouk (Russia), Tran Thanh Lien (Philippines, Viet Nam), Weerawat Chantanakome, Nontaphorn Udomwadhanaphorn (Thailand), and Zhang Jianguo, Chen Lei (China).

PUBLICATION

Svetlana Vassiliouk and Goichi Komori

ADMINISTRATIVE SUPPORT

Nobuo Mouri, Mizuho Fueta, and Kaori Najima

## ACKNOWLEDGEMENT OF EXPERTS OUTSIDE APERC

AUSTRALIA

Australian Government Department of Resources, Energy and Tourism, Australia. Andrew Scally.

Australian Bureau of Agricultural and Resource Economics and Sciences, Australia. Trish Gleeson and Andrew Schultz.

BRUNEI DARUSSALAM

Prime Minister's Office, Brunei Darussalam. Siti Hafsah Haji Abd Hamid and Haji Mohammad Anas Haji Abdul Latif.

CANADA

Natural Resources Canada. Veronique Aubry, Kristi Varangu, Peter Sharp and Victoria Ingram.

CHILE

National Energy Commission, Chile. Corissa Petro.

CHINA

Energy Conservation Information Dissemination Centre of National Development and Reform Commission, China. Zhang Jianguo.

HONG KONG, CHINA

Electrical & Mechanical Services Department, Hong Kong, China. Chris WY Ho

INDONESIA

Ministry of Energy and Mineral Resources, Indonesia. Maritje Hutapea.

JAPAN

Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry, Japan. Shinji Kakuno and Reiko Eda.

KOREA

Korea Energy Economics Institute, Korea. Gue Jae Jeong.

MALAYSIA

Ministry of Energy, Green Technology and Water, Malaysia. Loo Took Gee and Badriyah binti Abd. Malek.

MEXICO

Ministry of Energy, Mexico. Aldo Flores.

NEW ZEALAND

Energy Efficiency and Conservation Authority, New Zealand. Christine Patterson

PERU

Ministerio de Energia y Minas, Peru. Ismael Aragon.

PHILIPPINES

Department of Energy, Philippines. Art. P. Habitan.

RUSSIA

Ministry of Energy, Russia. Art. P. Habitan

SINGAPORE

Energy Market Authority, Singapore. Latha R Ganesh, David Tan, Wong Siew Kwong and Violet Chen.

CHINESE TAIPEI

Ministry of Economic Affairs, Chinese Taipei. Juen-Shen Wei.

THAILAND

Ministry of Energy, Thailand. Twarath Sutabutr, Prasert Sinsukprasert and Sarat Prakobchart.

UNITED STATES

Department of Energy, USA. Jeffry Skeer,.

VIET NAM

Ministry of Industry, Viet Nam. Phuong Hoang Kim.

# CONTENTS

Foreword ..... i
Acknowledgements ..... ii
Australia ..... 1
Brunei Darussalam ..... 17
Canada ..... 22
Chile ..... 35
China ..... 44
Hong Kong, China ..... 58
Indonesia ..... 64
Japan ..... 74
Korea ..... 88
Malaysia ..... 100
Mexico ..... 107
New Zealand ..... 119
Peru ..... 139
Philippines ..... 155
Russian Federation ..... 165
Singapore ..... 183
Chinese Taipei ..... 195
Thailand ..... 201
United States ..... 215
Viet Nam ..... 238

# AUSTRALIA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The Government has established a Multi-Party Climate Change Committee to explore options for the implementation of a carbon price and help to build consensus on how Australia will tackle the challenge of climate change. The introduction of a carbon price would be supported by complementary measures aimed at improving the energy efficiency of the economy by addressing barriers to the uptake of energy efficiency measures.

The Report of the Prime Minister's Task Group on Energy Efficiency was publicly released in October 2010. The Task Group was established to provide advice on options for introducing mechanisms to deliver a step-change improvement in Australia's energy efficiency by 2020 and place Australia at the forefront of OECD energy efficiency improvement. A recommendation of the Report of the Prime Minister's Task Group on Energy Efficiency was an economy wide energy efficiency target. The Government is currently considering the recommendations contained in the report. The Report is available at: http://www.climatechange.gov.au/publications/energy-efficiency/report-prime-ministers-taskforce-energy-efficiency.aspx.

### 1.2. Sectoral Energy Efficiency Improvement Goals

The Australian Government is working towards pricing carbon in the Australian economy, which would contribute to energy efficiency incentives across a range of economic sectors.

### 1.3. Action Plans for Promoting Energy Efficiency

The National Strategy on Energy Efficiency (NSEE) is the overarching program of work for promoting energy efficiency in Australia. Details can be found at http://www.coag.gov.au/coag_meeting_outcomes/2009-07-02/docs/Energy_efficiency_measures_table.pdf

#### a) Objectives

The NSEE is a coordinated, comprehensive approach to energy efficiency in Australia to accelerate energy efficiency efforts across all governments, and to help households and businesses reduce their energy costs. The NSEE aims to address barriers that prevent the optimal uptake of energy efficient opportunities, such as split incentives and information failures.

The NSEE incorporates and builds on measures already agreed by the Council of Australian Governments (COAG) and the Ministerial Council on Energy through the National Framework on Energy Efficiency (NFEE). It aims to accelerate energy efficiency efforts, streamline roles and responsibilities across levels of governments, and facilitate the adoption of more efficient and innovative practices by ensuring that businesses and households are able to make informed decisions about investments in energy efficiency.

#### b) Applicable sectors

The NSEE outlines detailed energy efficiency measures and plans to implement them under:

- Industry and business
- Skills and training
- Advice and education
- Data
- Electricity markets
- Appliances and equipment

- Transport
- Buildings standards
- Commercial building sector
- Residential building sector
- Government working in partnership and leading the way.

**c) Outline**

The NSEE was agreed to by the COAG in July 2009. It is a 10-year strategy to deliver a consistent and cooperative approach to energy efficiency. Measures include:

- Assistance to households to reduce energy use through the provision of information and advice, financial assistance and demonstration programs
- Assistance to business and industry to obtain the knowledge, skills and capacity to pursue cost effective energy efficiency opportunities
- Higher energy efficiency standards to increase the number of highly energy efficient homes and buildings, and the provision of a clear roadmap to assist Australia's residential and commercial building sector in adapting to these standards
- Consistent economy-wide energy efficiency standards for appliances and equipment and a process to enable industry to adjust to increasingly stringent standards over time
- Addressing potential regulatory impediments to the uptake of innovative demand-side initiatives and smart grid technologies
- Governments working in partnership to improve the energy efficiency of their own buildings and operations

**d) Financial resources and budget allocation**

Funding of AUD 88.3 million over four years (2009-10 to 2013-14)

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

See answer for NFEE (below).

**f) Expected results**

The expected energy and greenhouse gas emissions savings for appliances and equipment to 2020 (under the E3 MEPS and labelling program) is outlined in the report *Prevention is Cheaper than Cure - Avoiding Carbon Emissions through Energy Efficiency - Projected Impacts of the Equipment Energy Efficiency Program to 2020*. The report is available at www.energyrating.gov.au/library/details200901-projected-impacts.html.

**g) Future tasks**

Continuation of existing work programs.

**Previous action plans for promoting energy efficiency**

The National Framework for Energy Efficiency (NFEE) was the previous arrangement for cooperation on energy efficiency actions in Australia. All NFEE projects and activities now form part of the NSEE.

**a) Objectives**

The NFEE aimed to take advantage of the economic potential associated with increased uptake of energy efficient technologies and processes to help improve Australia's energy efficiency performance to reduce energy demand and lower greenhouse gas emissions.

**b) Applicable sectors**

Stage One of the NFEE was adopted in 2004 and is still ongoing. It contains a comprehensive set of measures that cover the residential, commercial and industrial sectors. Stage Two of the NFEE commenced in July 2008.

**c) Outline**

Stage One of the NFEE consisted of nine policy packages including:

- *Residential buildings*: consistent economy-wide minimum energy efficiency design standards for new buildings and renovations and mandatory disclosure of the energy performance of homes for sale or lease
- *Commercial buildings*: consistent economy-wide minimum energy efficiency design standards for new and refurbished buildings and mandatory disclosure of the energy performance at the time of sale or lease
- *Commercial/industrial energy efficiency*: mandatory energy assessments and public reporting for large energy users (the Energy Efficiency Opportunities program) and coordinated training and accreditation for energy auditors and energy performance contractors
- *Government energy efficiency*: development of consistent standards for measuring and reporting on government energy efficiency programs, introduction of public annual reporting on energy use and progress towards targets by government agencies in all jurisdictions, and the development of best practice models for government agencies to implement energy efficiency programs
- *Appliance and equipment energy efficiency*: broadening the scope of the National Appliance and Equipment Energy Efficiency Program (NAEEEP) through the introduction of mandatory Minimum Energy Performance Standards (MEPS) and introducing new or more stringent MEPS for residential, commercial and industrial products
- *Trade and professional training and accreditation*: undertaking a coordinated effort to integrate energy efficiency concepts into training courses in key professions that influence energy efficiency outcomes, and development of training and accreditation courses for practising tradespersons
- *Commercial/industrial sector capacity building*: development of a coordinated program to generate examples of energy efficient equipment or processes in key industrial sectors and new or refurbished commercial buildings, link industry and government to key centres for energy efficiency research and development, and establish coordinated energy efficiency best practice networks
- *General consumer awareness*: provision of benchmark data on energy bills, development of a coordinated network to facilitate easy and timely access to information, targeted promotional campaigns and the integration of energy efficiency concepts into the school curriculum
- *Finance sector awareness*: raising awareness of the opportunities for and benefits of investment in energy efficiency and the provision of tools to assist in the valuation and risk assessment of proposals.

Stage Two of the NFEE added another five packages, including:

- Improving the evidence base for the development and evaluation of energy efficiency policies. This will be achieved by implementing the plan developed in Phase 1 of the Energy Efficiency Data Gathering and Analysis Project (EEDP) for the collection of data required to fill identified data gaps, and collecting data to inform the development of new policies and refine existing policies.

- Expanding and enhancing the Minimum Energy Performance Standards program
- The Heating, Ventilation and Air Conditioning (HVAC) high efficiency systems strategy
- The phase-out of inefficient incandescent lighting
- Government leadership though green leases
- Development of measures for an Australian hot water strategy, for later consideration.

Examples of action that have been undertaken under the NFEE include:

- *Appliances*: MEPS and energy labelling continued to be developed and implemented through the Equipment Energy Efficiency (E3) Program. There is also agreement to implement Greenhouse and Energy Minimum Standards (GEMS). Around 40 new products have been identified to be targeted for inclusion under MEPS by end of 2011, including some types of home entertainment and office equipment.
- *Lighting*: The Government is phasing out inefficient incandescent light bulbs over a number of years through the Minimum Energy Performance Standards (MEPS). The phase-out commenced with the implementation of an import prohibition on inefficient, traditional pear shaped incandescent bulbs on 1 February 2009, followed by a sales ban in November 2009. Further lamp types have been restricted for sale from October 2010. MEPS for Compact Fluorescent Lamps (CFLs) were also introduced in November 2009 to ensure that only high quality CFLs can be sold in Australia.
- *Buildings*: Under the *Building Energy Efficiency Disclosure Act 2010*, from 1 November 2010 most sellers or lessors of office space of 2000 square metres or more must obtain and disclose an up-to-date energy efficiency rating. Work is continuing with a regulatory impact statement on mandatory disclosure of residential building energy performance due to be released in 2011. All Australian governments have also agreed to enhanced minimum energy standards for new commercial and residential buildings which were incorporated into the 2010 version of the Building Code of Australia. A National Green Lease Policy has been developed to support improved energy efficiency in all government buildings.

**d) Financial resources and budget allocation**

The budget for the packages of work under the second stage of the NFEE was AUD 6.21 million for 2008–09 and AUD 9.96 million for 2009–10. Resourcing to implement the Stage Two measures are met separately by the relevant jurisdictions.

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

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

There are a number of agencies that are responsible for energy efficiency monitoring and reporting.

- The Department of Climate Change and Energy Efficiency (DCCEE), on behalf of the E3 Program, monitors and reports information through its ‘Energy Use in the Australian Residential Sector 1986–2020’ report. The report is the second economy-wide baseline study on residential energy use. It includes private residential dwellings, both those that are separate, such as single detached family homes, and attached, such as townhouses or apartments. The modelling incorporates Australian energy policy programs in place or finalised by mid-2007.
- DCCEE is responsible for the analysis of the projected effects of the Equipment Energy Efficiency Program over the period 2000–2020. Results have been published in the report: ‘Prevention is Cheaper than Cure—Avoiding Carbon Emissions through

Energy Efficiency, Projected Impacts of the Equipment Energy Efficiency Program to 2020'.

- DCCEE 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 of energy a year or if a facility in their group consumes more than 100 terajoules of energy a year.
- The Department of Resources, Energy and Tourism (RET) administers the Energy Efficiency Opportunities (EEO) program under which companies report a range of energy use and energy efficiency information to the government.
- RET commissions work on industrial energy intensity (undertaken by the Australian Bureau of Agricultural and Resource Economics and Sciences—ABARES). The most recent report is 'End use energy intensity in the Australian economy' published in 2010. ABARE also prepares the 'Australian Energy Statistics' on behalf of RET.
- The Australian Bureau of Statistics collects and publishes a wide range of energy use and related statistics.

**f) Expected results**

See answer for Energy Efficiency Opportunities (below).

**g) Future tasks**

The National Strategy for Energy Efficiency (NSEE) provides specific actions for promoting energy efficiency (see above) over the coming years.

### 1.4. Institutional Structure

**a) Name of organisation**

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

At the federal level, direct responsibility for energy efficiency is split between two departments. DCCEE has overarching responsibility for energy efficiency policy and measures. RET is responsible for policy and programs pertaining to industrial energy efficiency. A number of other government agencies have sectoral interests in energy efficiency including the Department of Infrastructure and Transport (DIT) and the Department of Innovation, Industry, Science and Research (DIISR). The NSEE is the main mechanism for coordinating energy efficiency policy, with reports on the progress of activities being provided to COAG by the Senior Officials Group on Energy Efficiency (SOG-EE).

At the state/territory level, there is a range of institutional structures. The following agencies are responsible for energy efficiency:

- New South Wales: Department of Environment, Climate Change and Water
- Northern Territory: Department of Resources — Fisheries
- Queensland: Department of Employment, Economic Development and Innovation—Mines and Energy—Office of Clean Energy
- South Australia: Department for Transport, Energy and Infrastructure 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: Office of Energy.

The Ministerial Council on Energy is comprised of all federal and state and territory energy ministers. A subcommittee of officials, the energy efficiency working group, facilitates inter-jurisdictional cooperation on energy efficiency.

**b) Status of organisation**

All agencies report to the relevant federal or state government minister

**c) Roles and responsibilities**

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**

A wide range of information is readily available to Australian energy consumers. For example, the Energy Efficiency Exchange (EEX) website developed under the NFEE is a public source of information on industrial energy efficiency and is being redeveloped to better meet industrial energy user needs. There are also a number of websites containing information on ways to improve residential and building energy efficiency. For the transport sector, the Green Vehicle Guide provides model specific information on the emissions performance and fuel consumption of all vehicles produced since 2004.

**b) Awareness-raising**

There is no economy-wide general energy efficiency awareness-raising program, although awareness campaigns may be undertaken with specific initiatives such as the phasing out of inefficient incandescent lighting. Some states have awareness-raising campaigns.

**c) Capacity-building**

The NSEE includes a number of measures related to capacity building for industry, including supporting businesses to address barriers to improving their energy efficiency and assisting businesses to ensure they have adequate knowledge, skills and 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.

A transitional plumber training program is also being developed and delivered in support of the phase-out of greenhouse intensive water heaters under the NFEE.

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

The Energy Efficiency Opportunities program engages in significant capacity building activities that reach companies using 45% of Australia's energy end use and a range of energy services providers, providing advice, producing guidance materials, case studies, and holding annual workshops. The program, and its capacity building activities, is to be extended to electricity generators.

The Enterprise Connect Clean Technology Innovation Network works with firms on 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 supports new products, processes and skills, and builds relationships with research, education and training providers.

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

In general, Australia has a technology-neutral approach to research and development funding, with researchers undertaking work on energy efficiency related projects competing with other projects for funding. However, there are a number of specific programs that support research and development in energy efficiency.

In 2008-09 the Australian government established *Clean Business Australia,* as a partnership with business and industry to support activities aimed at improving energy and water efficiency and increasing sustainability, with a focus on productivity and innovation. This initiative is administered by the Australian Government Department of Innovation, Industry, Science and Research and is comprised of three elements—Climate Ready, Retooling for Climate Change and the Green Building Fund.

The Clean Business Australia—Climate Ready program is a competitive grants program which aims to support the development and commercialisation of innovative products, process and services that address the effects of climate change. The program offered grants from AUD 50 000 to AUD 5 million on a matching funds basis, to small and medium-sized Australian businesses to undertake research and development, proof of concept and early-stage commercialisation activities. A total of 102 projects worth AUD 75.95 million in grant funding proceeded through the four funding rounds. As the effects of climate change will be far-reaching a broad range of project applications for Climate Ready are supported. Funding has been provided for projects that include: wind turbine production; native tree plantations to reduce carbon pollution; water saving solutions; and technology for saving power in standby mode.

The *Clean Business Australia—Green Building Fund* aims to support owners of commercial office buildings in retrofitting existing buildings to improve energy efficiency and reduce greenhouse gas emissions. Grants are allocated through two activity streams. Stream A allocates grants ranging between AUD 50 000 to AUD 500 000 to cover a maximum of half the project cost to assist owners of existing commercial buildings in retrofitting their buildings. Stream B allocates grants of up to AUD 200 000 for up to 50% of project costs to industry associations to develop the knowledge, skills and capacity of those who operate commercial buildings, improve energy efficiency, and reduce greenhouse gas emissions. A total of AUD 90 million has been allocated to the program.

The Australian Government's *Green Car Innovation Fund* is also administered by the Australian Government Department of Innovation, Industry, Science and Research. The Fund is an AUD 900 million, 10-year competitive grants program. The object of the Fund is to enhance the research and development and commercialisation of Australian technologies that significantly reduce fuel consumption and/or greenhouse gas emissions of passenger motor vehicles.

Research on energy efficiency is a major component for energy efficiency improvement in Australia and is carried out through federal and state government networks. Funding mechanisms and involvement with the private sector are conducted on a need-only basis. States and territories also have a number of demonstration programs for business energy efficiency.

# 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1. Government Laws, Decrees, Acts

### 2.1.1. Energy Efficiency Opportunities Act

#### a) Name

Energy Efficiency Opportunities Act 2006 (EEO)

#### b) Purpose

The EEO legislation is designed to result in improved identification and uptake of cost effective energy efficiency opportunities, improved productivity and reduced greenhouse gas emissions, and greater scrutiny of energy use by large energy consumers.

#### c) Applicable sectors

The EEO program applies to all large energy users across all sectors except electricity generation (it is to be extended to generators) and electricity and natural gas networks. This mainly covers the mining, resource processing, manufacturing, transport and commercial sectors.

#### d) Outline

Participation in EEO is mandatory for businesses that use more than 0.5 petajoules of energy a year (equivalent to the energy used by approximately 10 000 households). The businesses (more than 280 participants on 25 October 2010) registered for the program account for more than 60% of the total energy use of business, around 45% of all energy end-use, and around 30% of primary energy use in Australia. Extension to electricity generators will increase coverage to around 60% of primary energy use.

The businesses registered for EEO are required to carry out a comprehensive and rigorous energy assessment to identify efficiency opportunities with up to a four year payback. There is a rolling five year assessment cycle. Companies are supported with advice, capacity building workshops and guidance materials.

They are then required to publish an annual report on their identification and implementation of cost effective energy saving opportunities. A number of these reports have gained media attention, highlighting the scrutiny from the Australian public on business actions relating to climate change. Companies also make a more detailed report to the Government approximately every three years.

Implementation of opportunities is not mandatory but is at the discretion of the business.

**Financial resources and budget allocation**

AUD 16.9 million was allocated to the program from 2004–05 to 2008–09. A similar level of funding has been allocated for 2010-2013.

#### e) Expected results

Abatement and energy efficiency improvements from the program are significant. 199 companies with trigger years 2005-06 and 2006-07 reported at the end of 2009 on progress over the first three years of the program. They reported that they had assessed 82% of their energy use. From these assessments they had identified energy efficiency opportunities with annual savings of 113.7 petajoules (PJ) or 8.3% of energy use assessed. These potential savings are worth a net annual benefit of over AUD 1 billion, and the Government estimates this will save 8.9 million tonnes of $CO_2$ equivalent or 1.5% of Australia's 2007-08 total emissions if implemented. 93 PJ of these opportunities have a better than 4 year payback.

From these identified opportunities, companies reported they were committed to implementing annual energy savings of 61.5 PJ, or 54% of the identified savings. This is worth more than AUD 650 million a year in net financial benefits, saving an estimated 5.4

million tonnes of $CO_2$ equivalent a year or 1% of Australia's 2007-08 total emissions. 60.3% of savings with a payback of better than 4 years are being adopted by companies.

Companies implementation commitments for savings with a better than four year payback rose 64% from 34.1 PJ to 56 PJ of annual savings from 2008 to 2009.

Savings to be implemented represent an average net abatement saving of approximately AUD 110 per tonne of $CO_2$ reduced. This means that companies are getting a large financial return, not a cost, for saving greenhouse emissions from their energy efficiency opportunities.

Another 32% of opportunities (36.1 PJ) were under further investigation and 14% (15.8 PJ) were not to be implemented at the reporting date. The report '*Continuing Opportunities – A Look at Results for the Energy Efficiency Opportunities Program 2006-2009'* is available on the Department's website at: http://www.ret.gov.au/energy/efficiency/eeo/pages/default.aspx.

### 2.1.2. Hot Water Phase Out Program

**a) Name**

Phase out of greenhouse intensive (electric) hot water heaters

**b) Purpose**

Households must replace their existing greenhouse-intensive hot water systems as they fail with high efficiency solar, gas or electric heat pump systems. The phase out is a jointly run scheme between federal and state governments.

**c) Applicable sectors**

The phase out applies to the residential sector only. It is being implemented through standards prescribed in the Building Code of Australia (BCA) covering new buildings and regulations within State Government plumbing codes for existing buildings.

**d) Outline**

The phase-out forms a central element within the National Hot Water Strategic Framework. The Framework sets out a ten year pathway for the hot water industry to move to a low emission future and comprises a mix of regulatory and industry development elements.

The phase out of the installation of greenhouse intensive electric hot water heaters in new and existing homes with access to reticulated natural gas will be completed in the following stages:

(i) Phase-out for new dwellings is planned to be implemented through the Building Code of Australia. State and Territory governments have undertaken to implement the new residential standards no later than May 2011.

(ii) Stage 1 (2010) for existing homes is being implemented on a State by State basis. Queensland and South Australia have already commenced. Stage 2 (2012), will require that electric hot water systems are no longer installed in any existing detached, terraced and town houses except where an exemption applies.

**e) Expected results**

Approximately 78.7 million tonnes of greenhouse gas emissions over 20 years are expected to be saved by the phase-out. (51.1 million tonnes over 10 years).

### 2.1.3. 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, from 1 November 2010 most sellers or lessors of office space of 2000 square metres or more will be required to obtain and disclose an up-to-date energy efficiency rating. Certain exceptions and exemptions apply (see Exemptions). There is a transition period for the first year of the program where a valid National Australian Built Environment Rating System (NABERS) energy base or whole building rating can be disclosed. From 1 November 2011 a full Building Energy Efficiency Certificate (BEEC) will need to be disclosed. BEECs are valid for 12 months, must be publicly accessible on the online Building Energy Efficiency Register, and include:

- 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**

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 do 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 and help transition the commercial office market to a low-carbon future.

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards and Labelling

**a) Name**

Mandatory Minimum Energy Performance Standards (MEPS) and Labelling

**b) Purpose**

To specify mandatory requirements for the minimum energy performance standards and energy labelling of appliances, including offences and penalties for non-compliance. Further information is available at www.energyrating.gov.au.

**c) Applicable sectors**

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

**d) Outline**

Mandatory MEPS and energy efficiency labelling are covered by the Equipment Energy Efficiency Program (E3), which is 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.

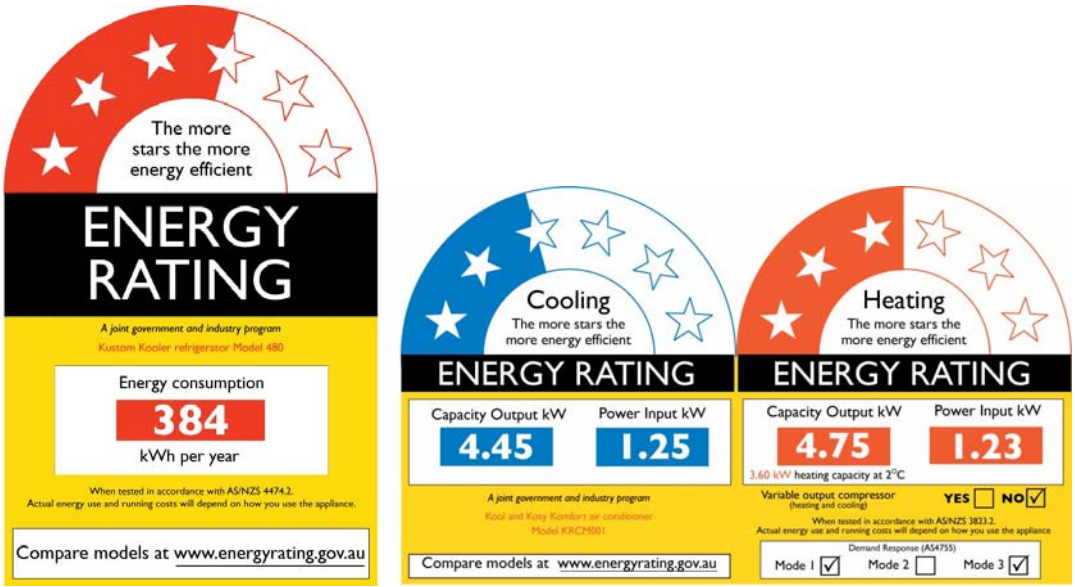
The establishment of MEPS and labelling requirements in Australia is a cooperative process between government and industry. Technical and economic analyses are undertaken in the

development and negotiation of targets and timetables. MEPS, labelling and test method standards that are called up by regulation are Australian (in conjunction with New Zealand where appropriate) and are set to be the equivalent of world's best practice 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 has two main features. 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), the more stars the more efficient it is compared with models of similar size and capacity. The label also displays an estimated energy consumption figure based on typical use of the appliance (usually kWh/year).

The star system is regularly re-graded 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).

All manufacturers that produce or import appliances for the Australian market must submit their products to an approved testing agency.




Labelling is mandatory for the following electrical products offered for sale in Australia:

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

As of October 2010, the following products are also regulated on the basis of MEPS—this means that they have regulated minimum energy efficiency labels.

- Refrigerators and freezers (from 1 October 1999, revised 1 January 2005, revision proposed for 2010)
- Mains pressure electric storage water heaters (from 1 October 1999)
- Small mains pressure electric storage water heaters (<80L) and low pressure and heat exchanger types (from 1 October 2005)
- Three-phase electric motors (0.73kW to <185kW) (from 1 October 2001, revised April 2006)

- Single-phase air conditioners (from 1 October 2004, revised 1 April 2006 and 2007, revision proposed for 2011)
- Three-phase air conditioners up to 65kW cooling capacity (from 1 October 2001, revised 1 October 2007, revision proposed for 2011)
- Distribution transformers (from 1 October 2004)
- Ballasts for linear fluorescent lamps (from 1 March 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 1 October 2004)
- Commercial refrigeration (self-contained and remote systems) (from 1 October 2004)
- Incandescent lamps (from November 2009)
- Compact fluorescent lamps (from November 2009)
- External power supplies (from 1 December 2008)
- Set top boxes (from 1 December 2008)
- Televisions (from 1 October 2009)
- Commercial building chillers (from July 2009)
- Close control air conditioners (from July 2009)
- Transformers and electronic step-down converters for ELV lamps (from June 2010).

### 2.2.2. Building Energy Codes

**a) Name**

Building Code of Australia (BCA)—Energy Efficiency Provisions

**b) Purpose**

The aim of the BCA—Energy Efficiency Provisions is to improve the energy efficiency of the design and construction of new buildings. The BCA Energy Efficiency Provisions project was endorsed under the NFEE. Details can be found at 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 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 (www.nathers.gov.au/). Following the implementation of the provisions, some states indicated that they wanted to increase the stringency of the provisions. As such, 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 must be subject to a

regulatory impact assessment (cost-benefit analysis) and be cost effective. The 2010 BCA energy efficiency provisions for residential and commercial buildings were agreed by the states and territories for adoption from 1 May 2010.

Under the National Strategy on Energy Efficiency, the Australian, state and territory governments agreed to develop a National Building Energy Standard-Setting, Assessment and Rating Framework. Its aim is to establish a consistent economy-wide approach to increasing the energy efficiency of residential and commercial buildings over time, underpinned by new economy-wide measurement and reporting metrics for rating the environmental performance of buildings.

**e) Financial resources and budget allocation**

AUD 1.535 million from the Australian government to the ABCB for 2009/2010

**f) Expected results**

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

### 2.2.3. Fuel Efficiency Standards

**a) Name**

Fuel consumption labelling standard (ADR81/02) and fuel consumption label

**b) Purpose**

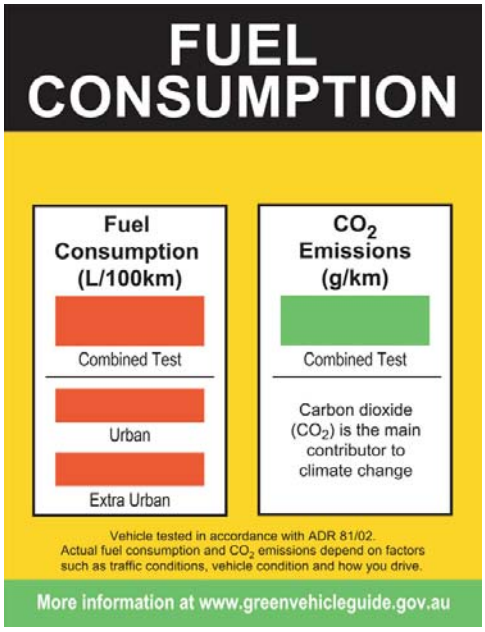
Mandated fuel consumption labelling to enable new car purchasers to compare vehicles on a common basis and incorporate vehicle fuel use in their decision making. More information can be found at http://www.greenvehicleguide.gov.au/GVGPublicUI/Information.aspx?type=FuelConsumptionLabel.

**c) Applicable sectors**

Transport

**d) Outline**

The fuel consumption labelling standard was introduced in 2004 (ADR81/01) and was subsequently updated in 2008 (ADR81/02). The standard requires all new vehicles up to 3.5 tonnes (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 litres) to travel 100 kilometres and the amount of $CO_2$ emissions (in grams) the vehicle emits for each kilometre travelled. The updated version of the label that took effect from October 2008 also displays figures for urban and extra-urban usage. The lower the numbers, the better the fuel efficiency and emissions of the vehicle.

In 2010, a revised version of the label (right) 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 recasts it as an Energy Consumption label, so as to enable the listing of the test results for energy consumption and range on the vehicle. The label includes fuel consumption and $CO_2$ emissions boxes as well, with pure electric vehicles displaying “0” and plug-in hybrids displaying the results from testing. A cross reference to the Green Vehicle Guide website

(www.greenvehicleguide.gov.au) is provided to address the potential for $CO_2$ emissions from 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 provides an international standard for energy efficient office equipment, including computers, printers and photocopiers, and home electronics, including televisions, audio products and DVD players. Products that display the Energy Star label have energy saving features enabled. See www.energystar.gov.au/ for more details.

In addition, the Australian Government and the Federal Chamber of Automotive Industries (FCAI) agreed to a voluntary average fuel consumption target in 2003. The aim of the target is to progressively improve fuel consumption of new passenger vehicles to average 6.8 litres per 100 kilometres by 2010 (around 162 grams $CO_2$ a kilometre). In 2005, the FCAI developed a new industry target of 222 grams $CO_2$ a kilometre by 2010. The revised target incorporates a broader range of vehicles—passenger, sports utility vehicles (SUVs), light trucks etc.—and fuels.

A number of other projects have been developed with the support of the Australian government such as:

- 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 Labelling and Standards.

### 2.4. Financial Measures Taken by the Government

#### 2.4.1. Tax Measures

Expenditure on capital equipment, which may improve energy efficiency, is generally deductible under capital allowance provisions. The Government has also committed to develop and implement additional tax incentives under the Tax Breaks for Green Buildings program. Businesses that invest in eligible assets or capital works to improve the energy efficiency of their buildings will be able to apply for a one-off bonus tax deduction. Approved projects will be able to claim a bonus tax deduction of 50% of the eligible assets or capital works on proof of performance levels being met. The program is expected to provide a boost of up to AUD 1 billion over its life to incentivise business to undertake major energy efficiency retrofits. The program is scheduled to commence from 1 July 2011.

#### 2.4.2. Low-Interest Loans

No information available

### 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 provided below.

**a) Name**

Low Carbon Communities

**b) Purpose**

Low Carbon Communities will provide AUD 80 million to support local councils and operators of community facilities to implement energy efficient upgrades to street and traffic lights, council buildings and community facilities.

**c) Applicable sectors**

Local government, community, sport and recreation.

**d) Outline**

The program will provide funds for energy efficiency including:

- Small scale matched funding grants for councils up to AUD 500 000 to retrofit council operated buildings and upgrade outdoor lighting.
- Large matched funding grants up to AUD 5 million for operators of community facilities with the support of their local council. Community facilities may include stadiums, education facilities, town halls or nursing homes. Funded projects could include the installation of cogeneration facilities or upgrades to heating and air conditioning systems and will be selected on the basis of: value for money; environmental outcomes; and demonstration of best practice in the deployment of cost-effective and integrated energy retrofits.

**e) Expected results**

The Government's objective is to support local councils and communities to reduce emissions and energy costs by stimulating investment in energy efficient upgrades to street lighting, community facilities and council buildings. Funded projects will also act as information hubs to motivate communities to take other actions to improve their energy efficiency.

### 2.4.4. Other Incentives

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

For a detailed description of Australian rebates for individuals see:
http://www.livinggreener.gov.au/rebates-assistance and for businesses see
http://www.business.gov.au/BusinessTopics/Grantsandassistance/Pages/default.aspx

## 2.5. Energy Pricing

The pricing mechanism for fuels and electricity in Australia is market-based—although some states apply retail price caps on social welfare grounds. The government's primary mechanism to drive improvements in energy efficiency will be placing a price on carbon.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1 Energy Efficiency in Government Operations Policy 2006

This policy aims to improve the energy efficiency of Australian government operations with particular emphasis on building energy efficiency. It commits to a progressive improvement of overall agency energy performance through minimum efficiency requirements and regular energy reporting.

A key objective of the policy is for Government office buildings to achieve specific energy efficiency targets by June 2011. Progress towards targets is tracked on an annual basis.

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 to maintain and maximise the energy efficiency of the building. The GLS management framework enables agencies to incorporate required energy efficiency standards into their leases and other procurement activities.

### 2.6.2 Cooperation with Non-Government Organisations

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

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

The government cooperates with other economies through the Asia Pacific Partnership on Clean Development and Climate (APP). The APP brings together Australia, Canada, China, India, Japan, the Republic of Korea and the United States to address the challenges of climate change, energy security and air pollution in a way that encourages economic development and reduces poverty.

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. IPEEC also aims to promote information exchange on best practices and facilitate initiatives to improve energy efficiency.

Founded in May 2009, IPEEC is a voluntary forum of developed and developing countries that represent the major economies of the world. As of October 2010, IPEEC members include Australia, Brazil, Canada, China, the European Union, France, Germany, India, Italy, Japan, Mexico, Russia, South Korea, United Kingdom and USA.

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

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

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

Domestically, the Australian Government is engaging with the business sector through a series of public-private partnerships under the auspices of the Australian Carbon Trust Limited. The Australian Carbon Trust Limited (the Trust) was established in 2010 as a Commonwealth-owned company, with an independent Board of Directors. The Trust is operating as a revolving fund with over AUD 100 million in initial funding from the Australian government. In partnership with businesses and the wider community, the Australian Carbon Trust will provide financial support and advice to promote investment in energy efficiency technologies and building retrofits.

The Trust also administers the Carbon Neutral Program under the Australian Government's National Carbon Offset Standard (NCOS). The NCOS Carbon Neutral Program is a voluntary scheme which certifies products or organisations as carbon neutral and provides a trade mark for participants to use to promote their carbon neutral status. This helps consumers and businesses trust such claims and so give them 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

To improve our energy efficiency, Brunei Darussalam has set her national quantitative target on the reduction of national energy intensity at 25% by 2030 with 2005 as the base year. This target is also in-line with the pledges by APEC Leaders in the 2007 Sydney Declaration.

### 1.2. Sectoral Energy Efficiency Improvement Goals

Three main areas have been identified that would substantially contribute to Brunei Darussalam energy saving potential through energy efficiency improvement over the period of 2010 to 2030 are power supply side, power demand side and transportation fuel.

### 1.3. Action Plans for Promoting Energy Efficiency

**a) Name**

Energy Efficiency and Conservation Strategic Plan

**b) Objectives**

To improve the energy efficiency and conservation of Brunei Darussalam by promoting and implementing energy efficiency and conservation best practices and programmes. Energy efficiency measures will help Brunei Darussalam to reduce energy wastages and contribute to improvement of energy security, economic competitiveness as well as mitigating GHG emission that cause global warming.

**c) Applicable sectors**

Industry, transport, residential, commercial, electricity, and government buildings.

**d) Outline**

The plan outlines are:

*Industrial sector*: promote the EEC best practices, energy audit, energy management, energy manager and the use of more efficient equipment.

*Residential, commercial and government sectors:* promote the EEC best practices, energy auditing and energy management, introduce energy efficiency labelling for electrical equipment & appliances, regulate operating hours for air conditioners in government buildings, improving building cooling system using efficient chillier or inverter type air-conditioning units, introduce energy efficient building guidelines or EE building code, retrofitting, adoption of green technology, energy managers, promote the use of energy efficient lighting and other energy efficient equipment and appliances, enhance energy efficiency education, inculcate behavioural changes and hold continuous awareness campaigns.

*Transportation sector:* promote techniques for energy-saving (echo) driving, electric & hybrid vehicle, fuel-efficient vehicle labeling schemes, mass transport system and improved public transport infrastructure and system (buses).

*Electricity sector*: improve overall power generation thermal efficiency. Phasing out all inefficient simple cycle power plants and set minimum energy performance standard with future planting of combined-cycle power plant of thermal efficiency between 40-50% or much higher thermal efficiency. Installation of Photovoltaic's solar power plant is also complementing to the existing power generation sector. Additionally, enhancing the transmission and distribution networks including improvement in street-lighting management.
*Others (education)*: encourage energy saving and conservation (EE&C) through energy education, incorporate energy education in curriculum syllabi, establishment of Energy Clubs

in Secondary Schools, promote EE&C activities and dissemination of energy saving tips booklets to public and private agencies including schools.

**e) Financial resources and budget allocation**

No information available

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

The plan is monitored by the Energy Division, Prime Minister's Office with the assistance of the Department of Electrical Services through the compilation of energy statistics and audits. There are also plans to introduce compulsory annual reporting on energy consumption for government buildings, commercial and industrial sectors.

**g) Expected results**

No information available

**h) Future tasks**

Extend implementation of energy efficiency measures and programmes.

### 1.4. Institutional Structure

**a) Name of organisation**

Energy Efficiency and Conservation Unit, Energy Division, Prime Minister's Office

**b) Status of organisation**

Policymaker (government)

**c) Roles and responsibilities**

Plans, formulates and implements policies on energy efficiency and conservation issues

**d) Covered sectors**

Government, industry, transport, residential and commercial, power generation and education

**e) Establishment date**

24th May 2005

**f) Number of staff members**

Three core staff members with ancillary support from the Energy Division as a whole.

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

Information on energy efficiency and conservation is continuously disseminated through briefings and talks, seminars & workshops, energy efficiency best practices reference books, energy saving tips booklets & posters, the official website and the media. This information and knowledge sharing has permeated to all sectors and every level of society.

Capacity building energy efficiency and conservation has been on going for the past few years. To enhance competency, seminar-workshops were conducted in collaboration with our local and international institutions.

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

Research and development for energy efficiency and conservation projects in Brunei Darussalam are currently being planned by local tertiary institutions (University Brunei Darussalam and Institute Technology Brunei). These projects aim to conduct energy audit on government buildings, building guidelines and fuel labelling scheme specific for the local conditions.

# 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1. Government Laws, Decrees, Acts

**a) Name**

Energy Efficiency and Conservation (EE&C) Guideline to be drafted.

**b) Purpose**

To enforce the application of Energy Efficiency and Conservation to buildings and industries to ensure reduced energy consumption

**c) Applicable sectors**

Industry, commercial and transport

**d) Outline**

1) All power producers are required to submit an annual report on energy production and energy consumption information, and report on medium- and long-term plans for energy conservation improvements.
2) Owners of buildings and industries with power demand of more than 1 MVA are required to submit a report on energy consumption information, and report on medium- and long-term plans for energy conservation improvements.

Energy producers in 1) and consumers in 2) are encouraged to engage energy auditors for preparation of the annual report.

**e) Financial resources and budget allocation**

No information available

## 2.2. Regulatory Measures

No information available

## 2.3. Voluntary Measures

There are three major voluntary measures as follows:

**a) Name**

Brunei Darussalam Energy Efficient Building Guidelines will be looked into in collaboration with relevant government agencies.

**b) Purpose**

To provide guidelines for new buildings incorporating energy efficient building design features including RE technologies.

**c) Applicable sectors**

New buildings

**d) Outline**

No information available

**e) Financial resources and budget allocation**

Funding for the necessary research to carry out the project to be derived from various sources.

**f) Expected results**

Such guidelines are expected to be mandatory and to supplement the current Piawaian Brunei Darussalam PBD 12:2008.

**a) Name**

Energy Efficiency Labelling scheme for electrical appliances and equipment

**b) Purpose**

The scheme aims to provide consumers with information on the energy efficiency of electrical appliances and equipment and thus encourage consumers to invest upfront in energy efficient appliances and equipment for the long-term financial gains and other benefits.

**c) Applicable sectors**

The scheme applies to the commercial, residential and government sector

**d) Outline**

Energy efficient labelling will be used for air conditioners (inverter, non-inverter types, single-phase and three-phase). The standards for energy efficient labelling are based on similar standards in the region. The energy efficient labelling scheme will be expanded to other electrical appliances and equipment in the future.

**e) Financial resources and budget allocation**

Financial resources for the scheme are to be derived from various sources.

**f) Expected results**

The energy efficient label informs consumers of the energy efficiency of an electrical product. It is hoped that the labels will make consumers better-informed and encourage them to invest in energy efficient appliances and equipments.

**a) Name**

National Energy Efficiency and Conservation Initiative Awards (NEECIA)

**b) Purpose**

In 2010 the NEECIA competition introduced and it was open to all sectors participation. This initiative is to recognize those who have been practicing excellent energy efficiency and conservation measures and have achieved 10 percent energy saving or more with the following key objectives:

- To promote and disseminate best practices in energy management in buildings and industries in Brunei Darussalam.
- To encourage all sectors participation in adopting and implementing innovative and creative energy management approaches towards energy efficiency and conservation to enhance business competitiveness.
- To use energy management as a tool to utilize energy optimally and to contribute towards environmental protection.

**c) Applicable sectors**

The scheme is applicable to the government, commercial, industrial and education sectors.

**d) Outline**

Organisations are selected based on initiatives introduced within the organisation or on a wider scope. Achievements are highlighted and the selected organisations become examples for others to follow.

**e) Financial resources and budget allocation**

The awards given are financed by the government and supporting private organisations.

**f) Expected results**

The continued efforts of the selected organisations and the emulation of their efforts by similar aspiring organisations in their respective sectors.

### 2.4. Financial Measures Taken by the Government

The source of funding is the government and the private sector, for the Energy Week annual event, EEC-related workshops and EEC initiative awards, for example.

### 2.5. Energy Pricing

Energy pricing is regulated by the government**.**

### 2.6. Other Efforts for Energy Efficiency Improvements

#### 2.6.1. Cooperation with Non-Government Organisations

The private sector has made efforts to increase awareness of energy efficiency and conservation and implement its activities.

The government has supported these initiatives and has brought the private sector (the industry and commercial sector) together to participate in workshops, seminars and training sessions on energy efficiency and conservation practices, such as energy auditing and energy management. Energy audits have also been conducted on selected companies. Energy efficiency and conservation initiative awards are given to companies that have shown good examples and initiatives in the implementation of energy efficiency and conservation.

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

Brunei Darussalam is involved in regional programs for energy efficiency and conservation under ASEAN through the Promotion of Energy Efficiency and Conservation. Jointly organised by the ASEAN Centre for Energy and the Energy Conservation Centre, Japan, Brunei Darussalam has participated in the programs for Major Industry, Buildings and Energy Management since 2000.

Information sharing and knowledge gathering is also carried out by the APEC Energy Working Group and the East Asia Summit Energy Cooperation Task Force.

Bilaterally, Brunei Darussalam and Japan have conducted a human capacity building program on energy efficiency and conservation for Brunei officials in 2008 which resulted in intensive training and knowledge transfer related to EEC in Japan.

#### 2.6.3. Brunei Energy Efficiency and Conservation Study – Roadmap Formulation and Policy Advice

The study will evaluate Brunei Darussalam existing energy usage and policy in terms of EEC across the power, transportation, industrial, residential and commercial sectors. To propose Roadmap for achieving EEC for Brunei Darussalam up to 2035.

A consultant from Singapore was engaged by Economic Research Institute of ASEAN and East Asia (ERIA) to assist and develop Brunei Darussalam energy efficiency roadmaps to reduce her energy intensity in the short, medium and long terms. The consultant was fully funded by ERIA and the project was completed in March 2010.

# CANADA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The separation of powers between the federal and provincial/territorial levels of government is an important consideration in Canada. Canada has no federal energy efficiency improvement target. Federal programs have quantitative objectives. There are many examples of collaboration with provincial/territorial energy efficiency programs.

Sub-federal governments have committed to achieving a 20% increase in energy efficiency by 2020 in their respective jurisdictions. These jurisdictions cover the entire economy. For more details, please see the following link: http://www.councilofthefederation.ca/pdfs/COMMUNIQUE_EN_climate_changeJuly13[1]clean.pdf .

### 1.2. Sectoral Energy Efficiency Improvement Goals

Not available

### 1.3. Action Plans for Promoting Energy Efficiency

**a) Name**

ecoENERGY Efficiency Initiative

**b) Objectives**

The ecoENERGY Efficiency Initiative, operated through Natural Resources Canada's Office of Energy Efficiency (OEE), provides a broad framework of programs through which energy conservation and energy efficiency are promoted in every sector of the Canadian economy. The ecoENERGY Efficiency suite of programs offers grants and incentives, tools, benchmarking and analysis, and training and awareness-building (e.g. workshops, publications) to support energy efficiency improvements in industry, transportation and the built environment. In addition to coordination of the ecoENERGY Efficiency Initiative, the OEE is mandated to strengthen and expand Canada's commitment to energy efficiency to further support the Government of Canada's policy objectives and programs.

Complementary energy efficiency actions are undertaken at federal and provincial/territorial levels. A framework for energy efficiency action by all levels of government was endorsed in 2007 by Canada's Council of Energy Ministers, representing all federal, provincial and territorial jurisdictions. The document, *Moving Forward on Energy Efficiency in Canada: A Foundation for Action,* provides a menu of key policy instruments and tools available to all jurisdictions to allow them to meet their own policy objectives.

**c) Objectives**

Advance energy efficiency in the industrial, transportation, residential, and commercial sectors.

**d) Outline**

The four-year ecoENERGY Efficiency Initiative was introduced in 2007 to help Canadians use energy more efficiently, boost renewable energy supplies and develop cleaner energy technologies. The ecoENERGY Efficiency Initiative includes:

- ecoENERGY Retrofit (CDN 805 million) provides qualifying homeowners, along with smaller businesses and organizations, financial support to retrofit their homes, smaller buildings and industrial facilities.
- ecoENERGY for Buildings and Houses (CDN 60 million) encourages construction and operation of more energy-efficient buildings and houses using complementary activities such as rating, labelling, training and other tools to raise awareness.

- ecoENERGY for Industry (CDN 18 million) aims to accelerate energy-saving investments and the exchange of best-practices information within Canada's industrial sector.
- ecoENERGY for Fleets (CDN 22 million) focuses on reducing fuel use and greenhouse gas missions in commercial and institutional fleets through several methods: training and education; sharing of best practices; anti-idling campaigns; and technical demonstrations to identify opportunities for improvements.
- ecoENERGY for Personal Vehicles (CDN 21 million) provides Canadians with helpful tips and decision- making tools on buying, driving and maintaining their vehicles to reduce fuel consumption and greenhouse gas emissions.
- ecoENERGY for Equipment (CDN 32 million) builds on existing initiatives to help Canadians make energy-efficient choices when buying, selling or manufacturing energy-using equipment. The program supports promotional labelling programs, such as ENERGY STAR®, to ensure continuing efficiency improvements in energy-using products for sale in the Canadian market. As well, a regulatory agenda under the authority of the Energy Efficiency Act is introducing or raising energy efficiency standards for a wide range of energy-using products. As a result, regulations will soon cover products accounting for 80% of the energy used in homes and businesses.

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

**e) Financial regulations and budget allocation**

Between 2007 and 2011, total allocations to the ecoENERGY Efficiency suite of programs will be CDN 960 million.

**f) Monitoring**

Program departments are responsible for monitoring and reporting on their individual programs. Natural Resources Canada's efforts are compiled into the Report to Parliament under the Energy Efficiency Act, which is tabled annually in Parliament by the Government of Canada (http://oee.nrcan.gc.ca/publications/statistics/parliament08-09/index.cfm?attr=0).

The Office of Energy Efficiency also produces a publically available report on Energy Efficiency Trends in Canada (and its companion document, Energy Use Data Handbook) (http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/publications.cfm?attr=0).

**g) Expected results**

The benefits of this action plan are estimated in terms of emissions reductions as described in 'A Climate Change Plan for the Purposes of the *Kyoto Protocol Implementation Act* - May 2010', which is available at http://www.climatechange.gc.ca/default.asp?lang=En&n=7F9841C4-1.

## 1.4. Institutional Structure

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

**a) Status of organisation**

Governmental organisation (policymaker and regulator)

**b) Roles and responsibilities**

The Office of Energy Efficiency (OEE), Canada's centre 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, with its programs to reduce energy use in buildings and houses, industry, personal vehicles and fleets. Homeowners and owners of

small and medium-sized organisations can also apply for grants and financial incentives for retrofits.

The OEE provides practical energy conservation advice to consumers, businesses and institutions. Informing key decision-makers in government, industry and the non-profit sector about Canada's energy conservation and energy efficiency efforts is a major focus of the OEE.

With the assistance of the National Advisory Council on Energy Efficiency, the OEE is also charged with identifying opportunities for new and heightened energy efficiency measures. As well, it keeps Canadians abreast of developments in technology that can conserve fossil fuels or support the transition to less carbon-intensive energy sources. The OEE also engages in dialogue and collaborative action on energy efficiency with Canada's provinces and territories.

**c) Covered sectors**

Industry, transport, residential, commercial, equipment and consumer products

**d) Established date**

April 1998

**e) Number of staff members**

Approximately 275

### 1.4.2. Regional and local institutions

Canada is a federation comprised of a federal government and 13 sub-federal entities. These sub-federal entities are active in the field of energy efficiency and have organisational structures of their own. Many energy utilities are also active in provincial/territorial policy and programming. Information on 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.

### 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 federal energy efficiency policy. Coordination among the federal level and sub-federal entities is ensured through annual meetings of the Council of Energy Ministers and regular meetings of the Steering Committee on Energy Efficiency which has representatives from all Canada's provinces and territories. These efforts seek to generate a complementary agenda for energy efficiency in which Ministers continue to develop real and sustainable energy solutions in their own jurisdictions and collaborate on cross-cutting initiatives that require a more integrated approach (e.g. the Model National Building Code).

## 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 government, industry, and civil society. Comprehensive information on OEE programs and related energy efficiency issues is available on the OEE website at http://oee.nrcan.gc.ca/english/index.cfm?attr=0.

**b) Awareness-raising**

Specific awareness-raising programs are included in the ecoENERGY Efficiency Initiative, including:

- ecoENERGY for Equipment supports the energy labelling of a wide range of consumer goods:

  - EnerGuide labels rate and summarise the energy efficiency of major household electrical 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—most are 10% to 50% more efficient than the minimum regulated standard.
- ecoENERGY for Personal Vehicles provides Canadian motorists with helpful tips on buying, driving and maintaining their vehicles to reduce fuel consumption and greenhouse gas emissions.
- ecoENERGY for Fleets provides information to fleet operators on energy-efficient practices that can reduce fuel consumption and emissions. FleetSmart is a component of this program, offering free practical advice on how energy-efficient vehicles and business practices can reduce fleet operating costs, improve productivity and increase competitiveness.

**c) Capacity-building**

The ecoENERGY for Buildings and Houses program includes a focus on providing home builders with the specific energy efficiency training required to certify an R-2000 home or affix an EnerGuide rating label. The R-2000 Standard includes requirements related to energy efficiency, indoor air quality and the use of environmentally responsible products and materials. It does not specify exactly how a house must be built, but rather, sets criteria for building performance that allow designers and builders to choose the most effective and economical way to build in their given context.

Through its Industry and Buildings programs, the OEE offers a range of energy efficiency workshops to representatives from industrial, commercial and institutional organisations from across Canada. The *Dollars to $ense* workshops are designed to educate participants on how to lower operating and production costs, improve competitiveness, reduce greenhouse gas emissions, increase operational efficiency and create a better work environment.

The ecoENERGY for Fleets SmartDriver program is designed to promote energy efficiency as a cost-effective and responsible way to reduce costs and the environmental impact of fleet operations. The training module offers fleet managers information on energy efficiency in all aspects of their fleet, including maintenance, operations and driving. An information toolkit, case studies and fleet profiles as well as workshops and technical demonstrations are provided. SmartDriver courses are also available for forestry truck drivers, motor coach drivers, and transit and school bus drivers.

The ecoENERGY for Personal Vehicles program offers driver education materials on fuel-efficient driving techniques. A number of driving schools throughout Canada are registered to deliver the ‘Auto$mart’ driver education program.

## 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, industry, transportation

**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 policy, codes and regulations, and works with partners to develop more energy efficient and cleaner technologies. Its goal is to ensure that Canada is at the leading edge of clean energy technologies to reduce air and greenhouse gas emissions, and provide a sustainable energy future. (See the CanmetENERGY website at http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/index.html.)

Efforts at CanmetENERGY include research, development and demonstration of energy efficient technologies in buildings and communities, industry and transportation.

1) Buildings and Communities - Net zero houses, buildings and communities, modelling and simulation software tools, advanced heating, ventilation, air conditioning and refrigeration technologies. For more information, see the website: http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/buildings_communities.html.
2) Industry - Includes knowledge and new technological tools for industrial energy systems and industrial systems optimisation. For more information, see the website: http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/industrial_processes.html.
3) Transportation - Includes advanced fuels, hybrid and electric vehicles, hydrogen and fuel cells. For more information, see the website: 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 88.3 million for the 2008–09 fiscal year. For more information on S&T expenditures, see the annual Report to Parliament under the Energy Efficiency Act.

### 1.6.2. Program: ecoENERGY Technology 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. OERD is responsible for the ecoENERGY Technology Initiative which support the energy-related R&D activities of federal departments, including CanmetENERGY at Natural Resources Canada.

**c) Objectives and period**

The ecoENERGY Technology Initiative is a CDN 230 million investment over five years by the Government of Canada to advance promising technologies designed to increase clean energy supply, reduce energy waste and reduce pollution from conventional energy sources. The initiative is a component of ecoACTION, the government's actions towards clean air and greenhouse gas emission reductions. (For more information, go to http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/technology-technologie-eng.cfm.)

**d) Applicable sectors**

Industry, transport, residential and commercial

**e) Financial resources and budget allocation**

CDN 230 million

**f) Expected results**

The ecoENERGY Technology Initiative will help in the search for long-term solutions to reducing and eliminating 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. OERD is also responsible for the Clean Energy Fund.

**c. Objectives and period**

The Clean Energy Fund is providing nearly $795 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, totalling $466 million from the Fund. Up to $146 million will also be invested over five years to support renewable, clean energy and smart grid demonstrations in all regions of the country. For a list of projects see: http://www.nrcan.gc.ca/eneene/science/renren-eng.php.

**d) Applicable sectors**

Industry, residential and commercial

**d. Financial resources and budget allocation**

CDN 795 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).

---

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, 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. The Energy Efficiency Act includes and enforces regulations on performance and labelling requirements for energy-using products that are imported into Canada or shipped across provincial borders for the purpose of sale or lease.

**c) Applicable sectors**

Equipment and consumer products

**d) Outline**

Canada's Energy Efficiency Act came into force in 1992, giving the Government of Canada the authority to make and enforce standards for the performance of energy-using products that are imported to Canada or that are manufactured in Canada and shipped across provincial or territorial borders. The Act also gives the federal government the authority to set labelling requirements for these products so consumers can compare the energy efficiency of various models of the same product. The first set of regulations, based on standards and testing methods developed by the Canadian Standards Association, came into effect in 1995. These regulations applied to a variety of products, primarily major appliances such as dishwashers, water heaters, refrigerators, freezers and clothes washers and dryers. Since then, the Act and Regulations have been amended a number of times for several purposes: to include more products in the regulations, to tighten the standards as energy-efficiency technologies improve, and to adjust labelling requirements.

### 2.1.2. Canadian Environmental Protection Act

**a) Level**

Economy-wide (federal)

**b) Purpose**

Pollution prevention

**c) Applicable sectors**

All sectors

**d) Outline**

The Canadian Environmental Protection Act (CEPA) came into force in 2000. 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 is developing new fuel efficiency regulations under CEPA to reduce greenhouse gas emissions in the automotive sector.

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards and Labelling

**a) Level**

Economy-wide (federal)

**b) Purpose**

To improve the energy efficiency of energy-using products

**c) Applicable sectors**

Equipment and energy-consuming products

**d) Outline**

Regulations under the Energy Efficiency Act set minimum energy-performance levels for a number of energy-using products such as appliances, lighting, and heating and air-conditioning. Current efforts to broaden and strengthen the Act mean that products accounting for 80% of the energy used in homes and businesses will soon be regulated. The set of planned new regulations will address about 20 currently unregulated products such as commercial clothes washers and boilers, and will tighten requirements for 10 products such as residential dishwashers and dehumidifiers. Stricter regulations mean that, over time, inefficient products will disappear from the market, leaving only the best-performing items. For more information, go to http://www.nrcan-rncan.gc.ca/media/newcom/2007/200704b-eng.php.

Amendments will also improve product labelling so consumers have the latest information on the most energy-efficient products on the market. Canada's EnerGuide label is used to indicate the energy performance of a wide array of products, from residential appliances, to vehicles and entire houses. The EnerGuide label is mandatory for eight major household appliances and a recent amendment to the Energy Efficiency Regulations (December 2008) extends the labelling provisions to cover lightbulbs.

The test procedures used to determine labelling information and compliance with MEPS are developed by the Canadian Standards Association. Canada works with the United States to develop common test procedures.

**e) Financial resources and budget allocation**

The regulatory agenda for energy efficiency standards has received funding of CDN 32 million under the ecoENERGY Efficiency Initiative.

**f) Expected results**

Improvements in the performance of energy-using products in Canada

### 2.2.2. Model National Energy Code for Buildings

**a) Level**

Economy-wide (federal)

**b) Purpose**

The Model National Building Code has been established as a complement to provincial/territorial building codes and to provide a baseline for new energy-efficient building design. The Model National Energy Code for Buildings contains cost-effective minimum requirements for energy efficiency in new buildings in Canada.

**c) Applicable sectors**

Residential and commercial sectors

**d) Outline**

In Canada, building regulation is a provincial and territorial responsibility. The provinces and territories have recognised 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 Model National Energy Code for Buildings (MNECB) was released in 1997 with cost-effective minimum standards for energy efficiency in new buildings. In February 2007 the Canadian Commission on Building and Fire Codes agreed to update the MNECB as a progeny companion document to the National Building Code. This work is currently being undertaken with the financial and technical support of Natural Resources Canada. For more information see http://oee.nrcan.gc.ca/commercial/newbuildings/update.cfm?attr=0.

**e) Financial resources and budget allocation**

Funding for this initiative is provided through the ecoENERGY for Buildings and Houses program.

**f) Expected results**

Increase in the energy efficiency of new buildings.

### 2.2.3. Fuel Consumption Regulations

**a) Level**

Economy-wide (federal)

**b) Purpose**

To reduce GHG emissions and fuel consumption of motor vehicles

**c) Applicable sectors**

Transportation

**d) Outline**

The Government of Canada has announced that under the Canadian Environmental Protection Act, new fuel consumption regulations will be undertaken to reduce greenhouse gas emissions in automobiles and light-duty trucks. The new regulations are aligned with those in the United States, and take effect beginning with the 2011 model year. The regulated standards become more stringent over the 2011 to 2016 model years and will generate progressively larger emission reductions. As a result of the regulations, it is projected that the average GHG emission performance of new vehicles of the 2016 model year will be about 25% lower than that of the vehicles that were sold in Canada in 2008. Canada will also establish stringent regulated standards for heavy-duty vehicles which will be aligned with those of the United States.

**e) Financial resources and budget allocation**

CDN 3 million

**f) Expected results**

Reduced fuel consumption in the automotive sector.

## 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) represents a collaboration between government and private industry to improve Canada's industrial energy efficiency.

**c) Applicable sectors**

Industry

**d) Outline**

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

- Incentives for industrial energy assessments (studies)
- *Dollars to $ense* energy management workshops
- Employee Awareness Programs
- Information on innovative financing and accelerated capital cost allowances for energy efficient and alternative energy systems
- Benchmarking information, case studies, technical guides and the twice-monthly newsletter 'Heads Up CIPEC'
- Boiler Efficiency Calculator to quickly analyse the efficiency of boiler operations
- Energy Management Services Directory that helps companies locate contractors

Through CIPEC, the mining, manufacturing and construction sectors have voluntarily met and exceeded annual targets to reduce their energy intensity (that is, energy use per unit of output). Upstream oil and gas companies have implemented projects to reduce GHG

emissions by millions of tonnes and electrical utilities have dramatically increased their alternative energy production.

**e) Financial resources and budget allocation**

Funding for this initiative is provided through the ecoENERGY for Industry program (CDN 18 million over four years).

**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

**d) Outline**

The R-2000 Standard represents a joint effort between OEE and the Canadian building industry. The R-2000 Standard sets out a series of house performance requirements that are in addition to those required by building codes. It does not, however, specify how a house must be built. To receive R-2000 certification, homes must meet an energy consumption standard and incorporate certain energy efficient technologies. Builders can be trained and licensed to build to the R-2000 standard. R-2000 homes are expected to reduce energy costs and provide greater occupant comfort (see http://oee.nrcan.gc.ca/residential/personal/new-homes/r-2000/standard/standard.cfm?attr=0). The Canadian Mortgage Housing Corporation also offers mortgage assistance to buyers of R-2000 and other energy efficient certified homes (see http://www.cmhc-schl.gc.ca/en/co/moloin/moloin_008.cfm).

The OEE is also developing a system to benchmark energy consumption by commercial and institutional buildings. The system allows comparison of a building to other similar facilities in its region or across Canada. The Office of Energy Efficiency (OEE) has been working under the guidance of participating provinces, territories and other key stakeholders to develop this system. Efforts are being made to harmonise this system with existing, non-governmental building certification programs, such as LEED®. For more information go to: http://oee.nrcan.gc.ca/commercial/regulations-standards/labelling.cfm?attr=20.

**e) Financial resources and budget allocation**

No information available.

**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 investment in energy efficient and alternative energy technologies, in order to contribute to reductions in GHG emissions, improvements in air quality and diversification of the energy supply

**c) Application sectors**

Industry

**d) Outline**

A 50% accelerated capital cost allowance (CCA) is provided under Class 43.2 of Schedule II to the Income Tax Regulations for specified energy generation equipment. Eligible equipment must generate either 1) heat for use in an industrial process, or 2) electricity, by:

- Using a renewable energy source (for example, wind, solar, small hydro)
- Using waste fuel (for example, landfill gas, manure, wood waste) or
- Making efficient use of fossil fuels (for example, high efficiency cogeneration systems).

Class 43.2 was introduced in 2005 and is currently available for assets acquired on or after 23 February 2005 and before 2012. For assets acquired before 23 February 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. Systems that only meet the lower efficiency standard continue to be eligible for Class 43.1.

In 2007, the Government of Canada extended the eligibility of the CAA to an emerging source of renewable energy—wave and tidal energy—and to a broader range of applications involving active solar heating, photovoltaics, stationary fuel cells, production of biogas from organic waste, and pulp and paper waste fuels. Eligibility for Class 43.2 was also extended to assets acquired before 2020.

Budget 2008 expanded the accelerated capital cost allowance for clean-energy generation equipment to additional applications involving ground-source heat pump and waste-to-energy systems.

**e) 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**

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

**d) Outline**

Examples include Manitoba's PowerSmart Residential Loan program (see www.hydro.mb.ca/your_home/residential_loan.shtml), and the New Brunswick Existing Homes Energy Efficiency Upgrades program (see http://www.efficiencynb.ca/enb/1610/Existing-Homes-Energy-Efficiency-Upgrades-Program).

**e) Expected results**

Improved energy efficiency in the residential sector.

### 2.4.3. Subsidies and Budgetary Measures

ecoENERGY Retrofit

**a) Level**

Economy-wide (federal) and sub-federal (provincial/territorial)

**b) Purpose**

Natural Resources Canada's ecoENERGY Retrofit program provides financial support to homeowners, small and medium-sized businesses, public institutions and industrial facilities to help them implement energy-saving retrofits that reduce energy-related GHGs and air pollution. Canada's provinces and territories have complementary programs that offer matching incentives.

**c) Applicable sectors**

Industrial, residential, commercial

**d) Outline**

For more information, see http://oee.nrcan.gc.ca/corporate/retrofit-summary.cfm.

**e) Financial resources and budget allocation**

CDN 805 million in addition to provincial/territorial funds

**f) Expected results**

As of the end of 2009-2010, the ecoENERGY Retrofit program has resulted in an estimated 1.05 Mt of GHG savings. Over 275,000 homeowners have received grants in support of energy efficiency upgrades that will reduce their annual energy consumption by 22% and corresponding $CO_2$ emissions by 3 tonnes per house per year. Final results will be available on completion of the program.

### 2.4.4. Other Incentives

Provinces and territories offer a variety of incentives in their respective jurisdictions.

**a) Level**

Sub-federal level (provinces and territories)

**b) Applicable sectors**

All sectors

**c) Outline**

A 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 http://oee.nrcan.gc.ca/corporate/ statistics/neud/dpa/policy_e/programs.cfm?attr=0.

**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 Organisations

Office of Energy Efficiency programs cooperate with numerous interested partners, including NGOs (e.g. ecoENERGY for Personal Vehicles support of a pilot driver education program with New Brunswick Lung Association).

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

Canada continues to work with the United States and Mexico to promote the harmonisation of energy efficiency test methods, mutual recognition of conformity assessment systems for energy efficiency standards, and cooperation on trilateral energy efficiency labelling programs.

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 broad range of energy efficiency investment, especially in the public sector, such as through the Federal Buildings Initiative (FBI) that helps facilitate energy efficiency retrofit projects in buildings owned or managed by the Government of Canada. The FBI offers services and products to help simplify and remove much of the risk of implementing a retrofit project. Partnerships are also used extensively 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 CMHC and financial institutions.

## REFERENCES

Gazette (2009a). ‘Regulations Amending the Energy Efficiency Regulations’, *Canada Gazette*, Vol. 142, No. 26, December 12, 2008.

Gazette (2009b). ‘Notice of intent to develop regulations limiting carbon dioxide emission from new cars and light-duty trucks’, *Canada Gazette*, Vol. 143, No. 14, April 4, 2009.

# CHILE

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In 2011 the Chilean Government plans to publish the Action Plan on Energy Efficiency 2010–2020, which will contain overall and sectoral goals.

### 1.2. Sectoral Energy Efficiency Improvement Goals

See answer for 1.1.

### 1.3. Action Plans for Promoting Energy Efficiency

Chile has a number of government institutions working to achieve increased energy efficiency. The body directly responsible for promoting, developing and implementing energy efficiency policy and programs is the Chilean Energy Efficiency Agency (Agencia Chilena de Eficiencia Energética). This Agency is a private – public foundation. Furthermore, Chile has significant policy and program development related to energy efficiency that takes place within other government institutions responsible for transport, housing, economic development and technology transfer.

One of the most important policies on energy efficiency is the government's recently approved institutional structure involving the creation of the Ministry of Energy, an entity that will centralise the functions of developing, proposing and evaluating public policies in this area, including the definition of objectives, regulatory framework and strategies to be applied, as well as the development of public policy instruments. The new Ministry has created the Chilean Energy Efficiency Agency (Agencia Chilena de Eficiencia Energética, or ACHEE), a public-private organisation, a foundation, in charge of the implementation of the energy efficiency programs according to the policies developed by the ministry.

#### 1.3.1 Energy Efficiency Monitoring and Reporting

The National Energy Commission (CNE) annually publishes the National Energy Balance, as well as aggregate and energy intensity data by energy intensive areas. The Universidad de Chile - Programa de Estudios e Investigaciones en Energía (PRIEN) conducted a refined analysis to distinguish structural and activity changes in energy intensity.

The Studies Area of the National Energy Commission is responsible for gathering the necessary information to elaborate the energy balances.

### 1.4. Institutional Structure

#### 1.4.1 Central Institutional Structure

**a) Name of organisation**

Chilean Energy Efficiency Agency (Agencia Chilena de Eficiencia Energética) or ACHEE

**b) Status of organisation**

Policy and program implementer

**c) Roles and responsibilities**

Promote energy efficiency and constitute itself as a technical organisation

**d) Covered sectors**

Industry (including mining), transportation, residential, commercial, construction, government, education, research, development and innovation, armed forces, etc.

**e) Date of establishment**

2010

**f) Number of staff members**

25

**g) Description of AChEE**

The AChEE is part of a government initiative that has been given the characteristics of a foundation. The agency coordinates energy efficiency actions with a number of public and private institutions and organisations, including the Superintendence of Electricity and Fuels, Ministries of Housing, Public Works, Health and Education (for energy efficiency in construction), mining, retail, food, etc. companies organised in roundtables, etc. The AChEE's advisory committee is formed by public and private entities, where initiatives are discussed and coordinated.

The mission of the AChEE is to consolidate energy efficiency as a source of energy that contributes to Chile's sustainable energy development.

The strategic objectives of the ACHEE are to:

1) establish the institutional foundations and regulatory framework for energy efficiency
2) develop incentives and support tools for energy efficiency
3) develop useful and accessible information for public and private decision makers, as well as collective and individual ones
4) positioning and introduction of energy efficiency in all levels of training, both formal and informal
5) take advantage of international experiences and instruments to accelerate the development of energy efficiency and measure the emissions reduction.
6) strengthen institutional management through quality control processes (ISO).

### 1.4.2 Regional or Local Institutional Structure

**a) Name of organisation**

Regional (provinces) Working Committees

**b) Status of organisation**

These are public-private advisory committees for the implementation of ACHEE's regional projects. Currently, there are regional working tables in six out of the 15 administrative regions of the country.

**c) Roles and responsibilities**

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

**d) Covered sectors**

Industry, mining, transportation, residential, commercial, construction, government, education, research, development and innovation, armed forces, etc.

**e) Starting date**

2007

**f) Number of staff members**

One central coordinator, plus six regional ministry representatives (SEREMI).

## Information Dissemination, Awareness-raising and Capacity-building

**a) Information collection and dissemination**

Chile has a product labelling program that leverages the European comparative labelling scheme, which breaks-down all similar models of a product into one of seven efficiency categories: A (most efficient) through G (least efficient). This labelling is currently applied to five lines of products in Chile (incandescent and compact fluorescent light bulbs; and one- and two-door refrigerators, and microwaves), with another five to six planned for 2011 (motors, HVAC, housing, automobiles, television sets, and decoders). Products covered are mostly for residential applications. The future coverage is aimed at residential to small commercial applications.

**b) Awareness-raising**

Since 2007, Chile has carried out four communication campaigns aimed at residential users, through television, billboards and newspapers. The total cost for all three campaigns was USD 4.5 million[1] approximately.

**c) Capacity-building**

There are numerous opportunities for energy efficiency training for professionals of the area, including courses offered in about 20 universities, and two engineering associations with sub-groups focused on energy.

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

There are insipient policies on energy efficiency research, development and demonstration.

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

There are several universities that have carried out studies related to energy efficiency. However, University of Chile has a program working on energy issues with a special emphasis on energy efficiency - the Energy Studies and Research Program (Programa de Estudios e Investigaciones en Energía, or PRIEN). Other universities are Universidad Técnica Federico Santa María; Universidad de Santiago; Pontificia Universidad Católica de Chile; Pontificia Universidad Católica de Valparaíso; Universidad Austral de Valdivia, Universidad de Concepción, and Universidad del Bio-Bio

The applicable sectors are industry, mining, agriculture, transport, residential, commercial, power, government, etc.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

In 2008, a bill was presented to the Chilean Parliament to create the Ministry of Energy, which was finally approved and signed by the Republic's President in November 2009. The objectives of the new ministry include the strengthening of policy development, techno-economic regulation, as well as the energy efficiency.

The new ministry will centralise the functions of developing, proposing and evaluating public policies, including the definition of objectives, regulatory frameworks and strategies to be applied, as well as the development of public policy instruments.

### 2.2. Regulatory Measures

#### 2.2.1. Mandatory Labelling

Chile has a product labelling program that leverages the European comparative labelling scheme, which breaks all similar models of a product into one of seven energy efficiency

[1]Exchange rate: USD1 = CLP481.

categories: A (most efficient) through G (least efficient). This has been applied to five products in Chile: incandescent and compact fluorescent light bulbs, one- and two-door refrigerators, microwaves, with another five to six planned in 2011-2012. Products covered are mostly for residential applications, with future coverage aimed at residential to small commercial applications:

- Refrigerators (update)
- Single-phase induction motors (1 – 10 hp)
- Three-phase induction motors (1 – 10 hp)
- Single-capped fluorescent lamps
- Double-capped fluorescent lamps
- Air conditioners
- Standby in microwave ovens, TV and Decoders
- Metal halide lamps.

### 2.2.2. Minimum Energy Performance Standards

Chile is in the process of developing a strategy to establish MEPS, following the recent approval of the law that creates the Ministry of Energy, which establishes the faculty of the Minister to dictate MEPS. The first MEPS under development are for light bulbs.

The institution of MEPS to cover residential products is build as an umbrella to further introduce others later on. These includes the ones already labelled and planned for labelling, as well as a suite of commercial and industrial products that would have a great impact on reducing energy use and electricity demand in Chile.

### 2.2.3. Minimum Thermal Standards

**a) Name**

Minimum Thermal Standard for Residential Buildings

**b) Purpose**

To improve the energy efficiency of residential buildings

**c) Applicable sectors**

Construction

**d) Outline**

In 2000, the Ministry of Housing and Urbanism (Minvu) began a process to establish a Minimum Thermal Standard for Residential Buildings. This process consists of three milestones, two of which have been achieved:

- *Thermal Regulation for Roofs*: This regulation went into effect in March 2000 and includes minimum transmittance and thermal resistance requirements.
- *Building Envelope Regulation*: This went into effect in January 2007 and applies to the entire building envelope including roof, walls, ventilated floor and windows.
- *Maximum energy demand regulation for housing*: This is under development, and is aimed at regulating the maximum demand of a housing unit, which is understood as a system rather than the sum of different construction elements.

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

**g) Other regulatory measures**

No information available

### 2.3. Voluntary Measures

**a) Name**

Mining Roundtable on Energy Efficiency (MMEE)

**b) Level**

Economy-wide

**c) Purpose**

The promotion of energy efficiency research; dissemination of results coming out of energy efficiency projects in the mining sector; evaluation of energy efficiency pilot projects; fostering technology development and innovation in or the mining sector and fostering an energy efficiency culture within the mining companies that are members of the roundtable.

**d) Applicable Sectors**

Mining sector

**e) Outline**

Started in 2007

**f) Financial resources and budget allocation**

No information available

**g) Expected results**

Demonstrate the reduction of 500 000 GJ of energy and improve workers' energy efficiency technical capacity.

**h) Description**

MMEE consists of a voluntary affiliation by the 14 largest mining companies in the economy* in addition to other participants, such as the Chilean Chapter of the International Copper Association (ICA and Procobre), Mining Council, ACHEE and Mining Ministry.

*Anglo American, Antofagasta Minerals, Barrick, BHP Billiton Base Metals, Pacific Steel Company (CAP), CODELCO, Collahuasi, ENAMI, Los Pelambres Mining, Freeport, McMoran Copper & Gold, Polpaico Cement, Soquimich, Xstrata Copper and Bio Bio Cement.

**i) Other voluntary measures**

There are several other sectorial roundtables already established, all of them are conducting studies to determine consumption characteristics and are working on publications with energy efficiency recommendations for their members. These industrial sector roundtables are: retail, food processing, chemical, graphic and metal-mechanic.

### 2.4. Financial Measures Taken by the Government

#### 2.4.1. Tax Scheme

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

#### 2.4.2. Low-interest Loans

**a) Name**

National Economic Development Agency (CORFO) Energy Efficiency Credit

**b) Purpose**

This credit finances investments with a value up to UF[2] 25 000 (USD 890 000) and enables companies to finance needed investments in projects for optimising energy use. This instrument is aimed at investments in machinery and equipment; execution of construction, facilities and civil works; engineering and assembly services; or other services that companies require in order to engage in productive activities. This also includes working capital related to such investments.

**c) Applicable sectors**

Included are companies that produce goods and services with annual revenue up to the equivalent of UF 1 million (excluding value-added tax), which equals about USD 39 million. The credit is available for companies in a variety of sectors, such as industry, agriculture, mining, fishing, tourism and healthcare, among others.

**d) Outline**

No information available

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

### 2.4.3. Subsidies and Budgetary Measures

**a) Name**

Subsidy on Electric Motors

**b) Purpose**

The replacement of 700 motors in 2009 and 4673 in 2010

**c) Applicable sectors**

Industry (including mining)

**d) Outline**

No information available

**e) Financial resources and budget allocation**

USD 1 million

**f) Expected results**

This program is expected to improve the energy efficiency of motors between 1 and 10 horsepower by up to 12%

**a) Name**

Energy Efficiency Pre-investment Program

**b) Purpose**

Energy efficiency studies geared towards optimising consumption. There is a consultancy subsidy available for energy efficiency audits, plans for implementing energy efficiency measures, and development of an investment project that can be presented to financing providers.

[2]The Unidad de Fomento (UF) is a unit of account that is used in Chile. The exchange rate between the UF and the Chilean peso (CLP) is constantly adjusted to inflation so that the real value of the Unidad de Fomento remains constant.

**c) Applicable sectors**

Companies that produce goods and services with annual revenue up to the equivalent of UF 1 million (excluding value-added tax) or about USD 39 million. The credit is available for companies from a number of sectors, such as industry, agriculture, mining, fishing, tourism and healthcare, among others.

**d) Outline**

No information available

**e) Financial resources and budget allocation**

Up to 70% of the total cost of the consultancy, to a maximum of CLP 6 million (equivalent to USD 11 200)

**f) Expected results**

Expected results not available

**a) Name**

National Light Bulb Replacement Program

**b) Purpose**

The replacement of 2.9 million incandescent lamps with compact fluorescent light bulbs (CFLs)

**c) Applicable sectors**

Residential (low-income homes)

**d) Outline**

This includes subsidies for 2008 and 2009

**e) Financial resources and budget allocation**

The financial resource for this program was equivalent to USD 8.8 million for both years.

**f) Expected results**

Energy savings of 806 GWh in four years for both programs

**a) Name**

National Truck Replacement Program

**b) Purpose**

Replace 500 trucks that are older than 25 years during 2009–10 (225 in 2009 and 275 in 2010) with new and efficient ones that fulfil the EURO III or EPA 98 standards.

**c) Applicable sectors**

Transport

**d) Outline**

No information available

**e) Financial resources and budget allocation**

The financial resource for this program was equivalent to USD 4 million in 2009.

**f) Expected results**

No information available

#### 2.4.4. Other Incentives

Information not available

### 2.5. Energy Pricing

There is a government-regulated pricing mechanism for small clients. The price of electricity for regulated consumers is set by the regulator (National Energy Commission / Commission Nacional de Energia), who calculates the cost of production for the generation utilities and the added value for distribution utilities. This regulation applies to customers with power demand below 2 MW. Above that, customers are free to sign contracts directly with the generation utilities.

For residential users of electricity, there is an overcharge for the consumption in winter that goes above the summer consumption.

### 2.6. Other Efforts for Energy Efficiency Improvements

#### 2.6.1. Cooperation with Non-Government Organisations

There is a number of NGOs that provide feedback to ACHEE. A study of the economy-wide energy efficiency potential was financed by NGOs.

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

Chile participates in COPANT for the harmonisation of energy efficiency standards, and is participating in the design discussions of the ISO 50.001 standard.

On the other hand, Chile has an active participation in energy efficiency meetings developed by Energy Working Group (EWG) of the Asia Pacific Economic Cooperation (APEC). During 2009 and 2011, Chile attended two energy efficiency workshops through the Cooperative Energy Efficiency Design for Sustainability (CEEDS), the first one on “Appliance EE Standards and Labeling” (October 2009 – Phase One; February 2010 – Phase Two) and the second one on “Building Energy Codes and Labeling” (September 2010 – Phase One; January 2011 – Phase Two).

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

##### 2.6.3.1. Cooperation Agreements

In 2005 the governments of Chile and Germany signed a cooperation agreement for EUR 2 million to support activities through the German Cooperation Agency (GTZ). Energy efficiency is supported by the financing of studies and the hiring of energy experts to work specifically in the fields of construction and industry. This agreement expires in December 2010.

In addition, Chile has signed several non-binding cooperation agreements with institutions from different economies, which include some kind of assistance on energy efficiency. These include:

- Memorandum of Understanding between the State of California and the Republic of Chile (June 2008)
- Memorandum of Understanding between the Republic of Chile’s National Energy Commission and the Kingdom of Spain’s Ministry of Industry, Tourism and Commerce (October 2008)
- Memorandum of Understanding between the Department of Energy of the United States of America and the National Energy Commission of the Republic of Chile (June 2009)

- Memorandum of Cooperation between Ministry of Economy, Innovation and Development of the Republic of Portugal and the National Energy Commission of the Republic of Chile (December 2009).
- Memorandum of Understanding between the Ministry of Energy of Chile and the California Air Resources Board and the California Energy Commission (September 2010)
- Memorandum of Understanding between the Collaborative Labeling and Standards Programs (CLASP) and the Ministry of Energy of Chile (Oct 2010)

#### 2.6.3.2. Energy Efficiency Awards

The National Energy Efficiency Program (ACHEE) of the National Energy Commission (CNE) has implemented the Energy Efficiency Award as an incentive to improve energy efficiency management in public institutions. This award is given as an initiative of the Production and Commerce Confederation (CPC) which is working with ACHEE for the recognition of the energy efficiency efforts in both the industrial and commercial sectors.

## REFERENCES

SERNAC (2005), *Eficiencia Energética Comportamiento de Consumo Energético, en Familias Urbanas Tipo Gran Santiago*, Servicio Nacional del Consumidor, Gobierno de Chile, Convenio SERNAC-CNE, Programa País Eficiencia Energética (PREE), Santiago, Chile, August 2005.

SERNAC (2005), *Análisis Comparativo del Desempeño Energético de Ampolletas Residenciales Incandescentes y Fluorescentes Compactas*, Sistema Nacional del Consumidor, Departamento de Estudios, Santiago, Chile, November 2005, Santiago, Chile.

APEC (2009), *Peer Review on Energy Efficiency in Chile – Final Report*, Asia-Pacific Economic Cooperation, Endorsed by the APEC Energy Working Group, Santiago, Chile, April 14, 2009.

INAP – Universidad de Chile (2008), *'Estimación del potencial de ahorro de energía mediante mejoramientos de la eficiencia energética de los distintos sectores'*, Programa de Estudios e Investigaciones en Energía (PRIEN), Santiago, Chile, January 28, 2008.

CNE (2008), *Política Energética: Nuevos Lineamientos*, Comisión Nacional de Energía, Santiago, Chile, 2008, www.cne.cl.

CLASP (2009), *Standards & Labelling Worldwide Summary – Chile*, Collaborative Labeling and Appliance Standards Program,www.clasponline.org/clasp.online.worldwide.php?rc=290|1.

IEA (2009), *Chile: Energy Policy Review 2009*, International Energy Agency, October 2009, Paris, France, www.iea.org.

.

# CHINA

## INTRODUCTION

For the 30 years from 1979 to 2009, the average annual growth rate of primary energy consumption in China was 5.6%, and the average annual growth rate of Gross Domestic Product (GDP) was 9.9%. The goal of quadrupling GDP was achieved basically with the support of a doubling of energy consumption.

China's government has paid unprecedented attention to energy conservation efforts. According to the economy's basic policy, the resource-saving target was set so that during the period of the 11th Five-year Plan the unit GDP energy consumption would be reduced by about 20%. In order to accomplish the goal of energy conservation, China's government established a series of policy, legal and economic measures. Progress has been made towards achieving the 20% energy intensity reduction target, having achieved reductions of 2.74% in 2006, 5.04% in 2007, 5.20% in 2008 and 3.61% in 2009(revised according to the 2nd national economic survey), for a total reduction of more than 15% so far.

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

China has a long history of pursuing energy efficiency and conservation. Having recognised the threat to energy security, sustainable economic growth, and the environment that is posed by rapid energy demand growth, China has made energy efficiency and conservation its highest priority energy strategy. Since issuing the Medium- and Long-term Plan for Energy Conservation in 2004, several important high-level actions have been taken to put China on a path towards less energy-intensive development. More recently, in the 11th Five-year Plan (2006–10), a 20% reduction in energy consumption per unit of GDP by 2010 from the 2005 level was set as an obligatory target.

### 1.2. Sectoral 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 all the way from the economy-wide target down to the shares of the target that must be achieved at the local level. All provinces (along with municipalities and autonomous regions) have specified overall goals. The provincial goals of reduction in local energy consumption per unit of GDP by 2010 from the 2005 level are as follows:

**Table 1: Provincial energy efficiency improvement goals in China from 2005 to 2010**

| **Province/City** | **Anhui** | **Beijing** | **Chongqin** | **Fujian** | **Gansu** | **Guangdong** | **Guanxi** |
|---|---|---|---|---|---|---|---|
| **Goal** | 20% | 20% | 20% | 16% | 20% | 16% | 15% |
| **Province/City** | **Guizhou** | **Hainan** | **Hebei** | **Henan** | **Helongjiang** | **Hubei** | **Hunan** |
| **Goal** | 20% | 12% | 20% | 20% | 20% | 20% | 20% |
| **Province/City** | **Inner Mongolia** | **Jiangsu** | **Jiangxi** | **Jilin** | **Liaoning** | **Ningxia** | **Qinghai** |
| **Goal** | 22 % | 20% | 20% | 22% | 20% | 20% | 17% |
| **Province/City** | **Shaanxi** | **Shandong** | **Shanghai** | **Shanxi** | **Sichuan** | **Tianjin** | **Xinjiang** |
| **Goal** | 20% | 22% | 20% | 22% | 20% | 20% | 20% |
| **Province/City** | **Xizang** | **Yunnan** | **Zhejiang** | | | | |
| **Goal** | n/a | 17% | 20% | | | | |

*Source:* State Council document, 2006, No. 94

According to the opinion of the Ministry of Housing and Urban Rural Development (MOHURD, formerly the Ministry of Construction) on the implementation of 'State Council's decision on strengthening energy conservation' in September 2006, an energy savings goal of 110 million tonnes of coal equivalent (tce) (77 million tonnes of oil equivalent (Mtoe)) in building energy consumption from 2005 to 2010 has been issued.

### 1.3. Action Plans for Promoting Energy Efficiency

A comprehensive work plan of energy conservation and emission reduction was issued in June 2007 to promote energy efficiency in China.

#### a) Objectives

The plan aims to stress the importance of leadership and coordination mechanisms for energy conservation and emission reduction, define the goals and tasks of energy conservation and emission reduction, clarify responsibilities and to propose general requirements.

#### b) Applicable sectors

It contains a comprehensive set of measures that cover all sectors, such as industry (including agriculture), transport, residential, commercial, power, government, etc.

#### c) Outline

The plan focuses on promotion of industrial structural adjustment and elimination of outdated production through a series of policies. It also launched actions such as 'ten key energy conservation projects' and the '1000-enterprises implementation plan of energy conservation action' to promote the progress of energy conservation technology and to transform energy conservation projects. Furthermore, it aims to increase fund support and promote energy conservation through economic instruments and so on. This plan was issued in June 2007, consisting of 45 measure packages.

#### d) Financial resources and budget allocation

The central government arranges energy conservation funds and lends the provincial and local municipal governments finance to improve their energy conservation investment, forming a mechanism of investment with a persistent effect. In 2008, the central government arranged CNY15.6 billion for supporting energy conservation and in 2008 the number reached CNY19.7 billion, 26.6% higher than the previous year.

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

China has set up an energy conservation and emission reduction leadership group chaired by Premier Wen Jiabao. The Chinese Government assigned energy conservation goals to local governments and major enterprises, as a 'one-vote veto' assessment for their performance. The assessment was based on the 'Energy Conservation and Emission Reduction Statistics and Monitor Evaluation System and Method', and the evaluation results provide important insights for government officials and enterprise leaders. The local government will be commended and rewarded if their assessment level for the completion is met or surpassed. Conversely, local governments whose assessment level is an incomplete grade cannot participate in the annual awards or receive an honorary title and so on. New high energy consuming projects in these regions cannot be approved. Provincial leaders must make a written report to the State Council and indicate a deadline for correction measures. The National Development and Reform Commission is responsible for monitoring and reporting such cases.

Statistics departments at all government levels are to develop an improved energy statistics system. Key energy-consuming entities must contract energy managers and provide annual reports on EE&C activities.

A comprehensive evaluation of target realisation for provincial governments is carried out every year by the central government, which is helpful to understand the local energy conservation situation, identify problems and promote energy conservation efforts.

**f) Expected results**

The expected results include establishing the energy conservation supervision agency, increasing energy conservation efforts based on laws and regulations, and introducing administrative measures, economic incentives, capacity building, and so on. This is expected to promote the realisation of energy conservation goals.

**g) Future tasks**

China will likely introduce a goal for further reduction in energy consumption per unit of GDP by 2015 compared to 2010.

### 1.4. Institutional Structure

The Chinese National People's Congress (NPC) is the highest organisation of state power in China. The outline of the 11th Five-year Plan was approved at the 10th NPC and with it the 20% reduction target that now underlies China's drive for energy efficiency and conservation. But, the actual drafting and implementation of the 11th Five-year Plan for economic and social development is tasked to the administrative organisation of the government, the State Council. In June 2007, China's government set up a 'National leading group for climate change and energy conservation and emission reduction', which is responsible for all coordinating work for energy conservation in China. The National Development and Reform Commission (NDRC) undertake the daily work of leading group's general office, which means the NDRC plays a crucial role in both the design and the execution of policies on energy efficiency and conservation. The Resource Conservation and Environmental Protection Department of NDRC is an organisation specialising in day-to-day efforts for energy efficiency improvement.

**a) Name of organisation**

Resource Conservation and Environmental Protection Department of National Development and Reform Commission (NDRC)

**b) Status of organisation**

Policymaker

**c) Roles and responsibilities**

The NDRC, formerly the State Planning Commission and State Development Planning Commission, is a macroeconomic management agency under the State Council in China, which has broad administrative and planning control over the Chinese economy. The functions of the NDRC are to study and formulate policies for economic and social development, maintain the balance of economic development, and guide the restructuring of China's economic system. The NDRC has 28 functional departments, bureaus, and offices with an authorised staff of 890 civil servants.

The Resource Conservation and Environmental Protection Department of the NDRC is specifically responsible for energy conservation. It aims to promote the strategy of sustainable development and undertake comprehensive coordination of energy conservation and emission reduction; it also organises the formulation and coordinates the implementation of plans and policy measures for recycling economy, energy and resource conservation and comprehensive utilisation, etc.

**d) Covered sectors**

All sectors of the economy are covered

**e) Established date**

The Resource Conservation and Environmental Protection Department of the NDRC was established in 2003

f) **Number of staff members**

There are currently about 45 staff members in the agency

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

#### a) Information collection and dissemination

A wide range of information is readily available to Chinese energy consumers. For example, China established a dependent and authoritative non-profit Energy Conservation Information Dissemination Centre, which was replaced by the National Energy Conservation Centre following an organisational adjustment in 2009. The centre made use of market mechanisms to bring China's energy conservation information dissemination in line with international practices, and transform the mechanism from management to service to serve the whole society. A number of dissemination activities were adopted including meetings, media, exhibitions, websites, and so on. In addition, there are more than 20 journals related to the energy conservation field in China to improve information dissemination.

#### b) Awareness-raising

China has organised 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' every year, carried out 'energy conservation and emission reduction, actions by all people' through CCTV and a series of awareness activities, enhanced the public consciousness about energy conservation and environmental issues. At present, energy conservation and emission reduction have already become hot topics that have the attention of society collectively.

#### c) Capacity-building

The government of China organises energy management training in key energy-consuming enterprises, such as for energy auditing, energy planning, energy measurement and statistics, and so on. China has developed a series of energy conservation standards, strengthening the standard basis. Energy consumption statistics and indicators are more accurate than before, and enterprises are improving their energy consumption measuring devices. All of these efforts have made the foundation of energy conversation more solid.

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

The energy conservation technology policy of China has been the specific policy for energy efficiency research and development and demonstration in the economy, which was the responsibility of the Ministry of Science and Technology. Through progress in energy conservation technology, the policy aims to promote the building of a conservation-oriented industrial structure, product structure and consumption structure, and provide a basic guide for the development of a long-term plan and annual plans for various localities and industries in regard to technological innovation and scientific research in the field of energy conservation.

There are a number of programs that encourage research and development in energy efficiency, such as the 'State Key Basic Research Program', 'National Science and Technology Support Program', the 'High-tech Development Projects', and so on. There are a number of major energy conservation technology and emission reduction projects underway to overcome a number of key common problems. China's government has arranged more than USD 10 billion to support hundreds of research projects and topics concerning energy conservation, new energy, recycling, clean production, pollution control, climate change technology development, demonstration and extension during the period of the 11th Five-year Plan. China increased support for research on energy conservation, emission reduction, and climate change, and achieved important results.

# 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1. Government laws, decrees, 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 industry, transport, residential, commercial, power, government, etc.

### d) Outline

The 'Energy Conservation Law of the People's Republic of China' was enacted in 1997 and amended in 2007. On 1 April 2008, the newly revised 'Energy Conservation Law of the People's Republic of China' formally went into effect. It improved the basic system of energy conservation and established basic system requirements for energy conservation management. It also reflected the organic combination of the market and the government; focused on using the market mechanism while strengthening government regulation; and paid attention to the use of the economic instruments and market economy rules, through taxation, pricing, credit, government procurement policies to encourage and guide energy conservation. The new 'energy conservation law' added content about construction, transportation and public energy conservation.

### e) Financial resources and budget allocation

No information available

### f) Expected results

The energy conservation and emission reduction targets of the 11th Five-year Plan, from a legal standpoint, were expected to be completed on time. Also, the Law is conducive to long-term development.

## 2.2. Regulatory Measures

China has special regulatory provisions concerning the government sector. The 'Energy conservation regulations for state-funded institutions' are designed to promote energy conservation by public institutions in China, focusing on improved energy efficiency. Public institutions can play an exemplary role in energy conservation. The document calls for state-funded institutions to show leadership by taking an active role in energy management and implementing technically feasible and economically reasonable measures to reduce consumption. Enforcement responsibilities are given to the Government Offices Administration (GOA) at all levels of government down to the county level.

The 'Energy conservation regulations for state-funded institutions' formally went into effect on 1 October 2008. The state-funded institutions referred to are the government, institutions and organisations that are all or partially state-funded. The regulations include specific requests regarding planning, management, measures, monitoring and protection of energy conservation in public institutions. The head of this state-funded institution has overall responsibility for energy conservation. This law clearly strengthens the guiding role of the energy conservation plan. There are eight basic management systems for the major problems

existing now. Procedures are set forth for conducting energy audits. Specific actions are also prescribed, such as reducing standby consumption of office equipment, utilising natural lighting, and using 'intelligent' elevator controls. The act authorises criticism and/or punishment for noncompliance.

### 2.2.1. Minimum Energy Performance Standards and Labelling

**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 from the source.

**c) Applicable sectors**

Industry

**d) Outline**

Since 2007, 46 efficiency standards have been set by the Standardization Administration of the People's Republic of China, to support the implement of Energy Conservation Law. Most of the standards formally went into effect on 1 June 2008, including 36 mandatory energy efficiency standards.

There are 22 MEPS for high energy consuming products, which connect with 22 kinds of high energy consuming products in the thermal power, steel, nonferrous metals, building materials and petrochemical industries, setting the energy consumption limitation for the existing producers and potential entrants, as well as pointing out the advanced efficiency levels producers are encouraged to approach.

In addition to the MEPS for high-energy consuming products, China has 11 energy efficiency standards for end-use products in the residential, commercial, and industry sectors. Their purpose is to encourage manufacturers to improve the energy efficiency of products, which would be useful to reduce the energy consumption of end-use products. Their standard numbers are GB20665-2006, GB18613-2006, GB20943-2007, GB19762-2007, GB21454-2008, GB21455-2008, GB21456-2008, GB21518-2008, GB21519-2008, GB21520-2008, and GB21521-2008. They apply to end-use products, such as, room air conditioners, water heaters, household cookers, computer displays, copiers and so on, and they provide energy efficiency limits, grades and results of energy-saving evaluations. These standards are expected to help reduce the energy consumption of end-use products. For example, the average thermal efficiency of gas-burning water heaters would increase 4% to 10% after the implementation of the standard on energy efficiency rating and energy efficiency limit of domestic gas burning instantaneous water heaters and gas burning water heaters, which is expected to result in savings of 560 billion litres of gas and emissions reductions of 305 400 tonnes $CO_2$ before 2010.

Based on efficiency standards, China uses an 'Energy efficiency labelling management approach' which is designed to enhance the interaction of producers and consumers, and guide consumers to purchase energy-efficient products, while promoting producers to use energy-efficient technologies. It applies to the residential, commercial, and industry sectors. Since the 'Energy efficiency labelling management approach' went into effect on 1 March 2005, China has put out four lists of product catalogues for labelling as of December 2010.

Catalogue No. 1 was implemented on 1 March 2005, and covered refrigerators and room air conditioners. Catalogue No. 2 was implemented on 1 March 2007, which covered washing machines and unit air conditioners. Catalogue No. 3 was implemented on 1 June 2008, and covered fluorescent lights, high-pressure sodium lamps, motors, chillers, domestic gas burning instantaneous water heaters and gas burning water heaters. Catalogue No. 4 was implemented on 1 March 2009, and covered speed-controlled air conditioners, multi-

connected air conditioner units, household cookers, computer displays and copiers. Catalogue No.5 was implemented on 1 March 2010, and covered automatic rice cookers, AC electric fans, AC contactors, and displacement air compressors. Catalogue No.6 was implemented on 1 November 2010, and covered power transformers and ventilators. Catalogue No.7 will be implemented on 1 March 2011, and will cover flat panel displays, and microwave ovens for household and other purposes.

### 2.2.2. Building Energy Conservation

**a) Name**

Energy conservation regulations for civil buildings and building energy code

**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, and so on.

**c) Applicable sectors**

Residential and commercial

**d) Outline**

On 1 October 2008, the ‘Energy conservation regulations for civil buildings’ came into force, there are a total 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.

The construction administration department has authority for preparing building energy conservation plans at all levels of government down to the county level. Energy consumption standards for civil buildings are called for and governments are required to set aside funds for energy conservation improvements. All actors in the construction process are required to ensure compliance with the energy standards for civil buildings. The regulations also require specific measures in new construction, such as the installation of unit-level heat metering in residential buildings and the use of energy saving lamps. Energy efficiency retrofits are required to be implemented ‘step by step systematically in accordance with actual conditions’. Building owners are required to operate buildings in a manner consistent with energy conservation goals. Penalties for non-compliance are specified.

In the 1980s, the Ministry of Housing and Urban-rural Development (formerly the Ministry of Construction) began to promote energy efficiency in buildings, starting with energy codes/standards for residential buildings in the north area. The building energy codes/standards system has been improved and developed step by step from north to south, from residential to public buildings, and from new buildings to existing buildings.

Up to now, the Ministry of House and Urban-rural Development has issued three energy efficiency design standards for residential buildings and one for public buildings. All four of these standards have two main parts. One is the thermal performance requirements for the building envelope, others are the requirements for HVAC equipment and system efficiency. In addition, the Ministry of Construction has also issued one design standard for efficient lighting system. All of these codes include both mandatory and voluntary items or indexes. The mandatory items or indexes are mainly for energy saving purposes and must be complied with by all the buildings covered. The voluntary items are suggested for upgrading efficiency.

### 2.2.3. 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**

There are five vehicle fuel economy standards providing fuel consumption limits and test methods for different types of vehicles, in which the standards for three-wheeled vehicles, low-speed trucks, and light commercial vehicles are mandatory. The standard numbers are GB21377-2008, GB21378-2008, GB/T4352-2007, GB/T4353-2007, and GB20997-2007 respectively.

## 2.3. Voluntary Measures

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

### 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 and to assist social and economic sustainable development in order to harmonise social values and economic benefits by stimulating technical development in industry, increasing public awareness of resource consumption and environment protection and ultimately increasing the market share of energy-efficient products.

**c) Applicable sectors**

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

**d) Outline**

Certification for energy-efficient products is a voluntary program aiming to save energy and reduce emissions through stimulating manufacturers to produce more resource efficient products and helping consumers to make more sustainable purchase decisions. In 1998, the Certification Centre for Energy Conservation Products (CCECP) started to run the energy conservation certification program with residential refrigerators. This soon expanded to more than 90 product categories covering appliances, lighting, electronic, office equipment, industrial products, water-saving products, and environmental-friendly products.

**e) Financial resources and budget allocation**

Primarily from the private sector (enterprises)

**f) Expected results**

To help encourage consumers to use energy-efficient products as well as encourage the promotion of energy-efficient products and technological progress

### 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 and so on, helping to set a technological foundation for energy measurement and unify energy consumption calculation and equipment operating efficiency.

**c) Applicable sectors**

Industry

**d) Outline**

Since 2006, there have been eight energy conservation basic standards issued in China, which provided for the management of energy measurement, methods of energy consumption calculation, and economical operation of equipment and energy systems, etc. Their standard numbers are GB/T20901-2007, GB/T20902-2007, GB/T21368-2008, GB/T21367-2008, GB/T17954-2007, GB/T12497-2006, GB/T12723-2008, and GB/T2589-2008.

**e) Financial resources and budget allocation**

Primarily from the private sector (enterprises)

**f) Expected results**

To set a technological foundation for energy measurement, unify energy consumption calculation and equipment operating efficiency, and so on

### 2.3.3. Energy Audits

**a) Name**

Energy Audits

**b) Purpose**

Energy audits of enterprises help diagnose the state of energy consumption, identify problems, analyse the energy conservation potential and also make suggestions that could help enterprises improve energy efficiency.

**c) Applicable sectors**

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

**d) Outline**

Since 2006, 1000 key energy consuming enterprises in China went through the activities of energy audits, the annual comprehensive consumption per unit of which is more than 0.18 million tce. In some provinces, such as Shandong Province, there were more than 1000 enterprises whose annual comprehensive consumption per unit was more than 0.016 million tce. Also, 103 key energy consuming enterprises carried out energy audits.

**e) Financial resources and budget allocation**

Financial support comes from the government and private sectors.

**f) Expected results**

The energy audit is an energy management measure that could help enterprises to discover problems and improve their energy 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, and others. One example is provided below.

**a) Name**

Energy-efficient or water-saving equipment directory of corporate income tax concessions (2008)

**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 as well as stimulating technological innovation and energy efficiency improvement.

**c) Applicable sectors**

Industry (including agriculture), transport, commercial, and power

**d) Outline**

The 'directory' has been in effect since 1 January 2008. Enterprises that purchased and used the energy-efficient equipment listed in the directory are eligible for preferential tax benefits. Of total investment, 10% is set aside for corporate income tax credits. Corporate tax losses can be carried forward for a maximum of five years.

**e) Financial resources and budget allocation**

Government-sponsored scheme

**f) Expected results**

To benefit the promotion of energy-efficient products, stimulate technological innovation, and improve energy efficiency

### 2.4.2. Low-Interest Loans

**a) Name**

Low-interest loans for the national debt projects

**b) Purpose**

To stimulate the flow of social capital to enterprises with less financial resources, so enterprises can get loans at below-market interest rates and improve their borrowing capacity in the credit market. This would increase the inputs of other social funds for energy efficiency improvement projects.

**c) Applicable sectors**

Industry (including agriculture), transport, residential, commercial, power, and so on

**d) Outline**

Since 1999, China's government has arranged a certain amount of funds for enterprises to reduce the interest rate on loans for technological upgrading (including energy conservation). This increases the inputs of other social funds for energy efficiency improvement projects. According to preliminary statistics, every USD 1 in funds from the economy's debt can drive USD 10 in social investment, and USD 6 in bank loans. In 2006, the investment for energy efficiency technological transformation of enterprises driven by state funds totalled about USD 10 million.

**e) Financial resources and budget allocation**

Government-sponsored

**f) Expected results**

To help stimulate the investment of social funds for energy efficiency improvement projects, and to promote the energy efficiency improvement of enterprises

### 2.4.3. Subsidies and Budgetary Measures

#### 2.4.3.1. Supporting Energy Saving Technological Innovation

**a) Name**

Interim measures for financial incentive funds for energy efficiency technological transformation projects

**b) Purpose**

To encourage and motivate enterprises to invest in energy conservation technological transformation, to promote the implementation of key energy conservation projects, and to facilitate achievement of the energy conservation goal of the 11th Five-year Plan

**c) Applicable sectors**

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

**d) Outline**

Financial incentive funds are given to enterprises that would achieve annual energy savings of more than 10 000 tce through energy efficiency technology transformation in the top ten key energy efficiency projects. Energy conservation funds are used as an incentive for the enterprises undertaking the projects, with the amount of funding linked with the amount of energy savings. The standard for funds is based on the energy savings, with CNY 200 per unit tce in the eastern area and RMB250 per unit tce in the western area of China. The interim measures were implemented in August 2007.

**e) Financial resources and budget allocation**

Government-sponsored

**f) Expected results**

To ensure the actual energy savings of energy efficiency technological transformation projects, improve efficiency in the use of funds, and stimulate energy efficiency improvement

#### 2.4.3.2. Benefiting the Public through Energy Efficient Products

**a) Name**

Subsidy to public for energy efficiency products program

**b) Purpose**

The implementation of the program aims to effectively 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 the energy conservation and emission reduction.

**c) Applicable sectors**

Residential and commercial

**d) Outline**

The ‘Subsidy to public for energy efficiency products’ program refers to financial subsidies for energy efficiency products whose energy efficiency level is up to first or second grade, these include; air conditioners, refrigerators, flat-panel TVs, washing machines, etc.. The program has been running since May 2009and as of December 2010 the range of products have covered efficient lighting, efficient air conditioners, energy-saving cars, and high efficiency motors. The standards for subsidies are based on the price gap between energy efficiency products and general products and revised with an update of energy efficiency

standards. For example, after 1 June 2010, the subsidy for high-efficiency air conditioners has been set at CNY 200–250 per set for grade 1, and CNY 150–200 per set for grade 2. Air conditioners were the first product subsidised.

**e) Financial resources and budget allocation**

Government-sponsored

**f) Expected results**

The implementation of the program is expected to increase demand by USD 60-75 billion each year. It would increase market share of energy efficient products 10-20 percentage points, to 30%, and may save more than 75 billion kWh of electricity each year, in addition to the emission reduction of 75 million tonnes $CO_2$.

### 2.4.4. Other Incentives

**a) Name**

Energy performance contracting

**b) Purpose**

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

**c) Outline**

Energy Performance Contracting is a market-based service mechanism, that reduces the financial and technical risk for users which in turn increases energy users' enthusiasm to promote energy-efficiency. In 2010, The Chinese government decided to accelerate the implementation of energy performance contracting, and actively develop the energy services industry through the following measures, a) bring contracts that include energy performance contracting projects into a range of both the central budget for investment and special funds for energy saving-to provide financial subsidies or incentives; b) implement preferential taxation policies, for example, energy service companies'(referred as EMCOs) taxable income obtained from energy performance contracting is temporarily exempt from sales tax; c) improve the accounting system related to the energy performance contracting; d) encourage banks and other financial institutions to create innovative credit products that broaden the range of collateral and simplify application and approval procedures for EMCOs. According to the Interim Measures for Funding Financial Incentives for Projects, jointly issued by the Ministry of Finance and NDRC on 3 June 2010, the project whose energy saving is 10,000 tce in less than 100 tce (industry project 10,000 tce in less than 500 tce), as well as more than 70% of its investment is from EMCOs and the measures to share the energy efficiency is contracted, could receive rewards not less than CNY 300 per tce incentives 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 an 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, and so on. 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 to implement higher prices for restricted or outdated enterprises. This policy

can promote industrial adjustment and stimulate the energy efficiency 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, and so on. Provisional measures on urban heating price control were issued to promote payment for unit of heat, rather than fixed or no-fee services, in the centralised heating system.

## 2.6. Other Efforts for Energy Efficiency Improvements

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

China's 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 and so on. At present, China has established bilateral cooperation mechanisms with 36 economies and regions, and is involved in multilateral energy cooperation mechanisms in 22 international organisations and international conferences.

For example, in June 2008, China and the United States held the fourth strategic economic dialogue in Washington, and signed the 'Decade Cooperation Framework Agreement in Energy and Environment'. Energy efficiency is under the cooperation framework of the six priority areas of cooperation. In November 2009, during the United States of America, President 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 made an agreement on the Decade Action Plan for Energy Efficiency. An important part of the plan is that both sides will jointly hold a China-US Energy Efficiency Forum once a year, alternately in the two countries, to exchange experience and best practices on energy efficiency of buildings , communities, industry, end-use products , as well as an 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, energy efficiency technology trade and investment.

### 2.6.2. Cooperation with Non-Government Organisations

China's government cooperates with non-government organisations to stimulate energy efficiency improvements as appropriate.

For example, WWF China, which is the first international conservation organisation invited to work in China, has about four energy efficiency improvement programs: 1) Low Carbon City Initiative in China—LCCI will explore low carbon development models in different cities, working to improve energy efficiency in the industry, building and transportation sectors. It is also addressing the development of renewable energy and ensures that other cities in China can learn from successful experiences and replicate them; 2) Business engagement; 3) Climate change post-Kyoto negotiations; and 4) '20 ways to 20%'.

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

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

For example, 'the World Bank and the Global Environment Facility China Energy Conservation Project' is a significant international cooperation project since 1997, which is jointly organised and implemented by China's government (NDRC), the World Bank and the Global Environment Facility(GEF)in the areas of energy conservation and greenhouse gases emission mitigation. The project was implemented to build a model of EMCOs and an

'energy management contract' mechanism based on the market economy system in China, setting up the support for EMCOs and technical institutions technically and financially.

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

## REFERENCES

APERC (2009), *Understanding Energy in China Geographies of Energy Efficiency*, Tokyo.

EOC (2009), *Energy Industry Outstanding Accomplishments over Sixty Years, Prop up Economy in Energy of China*, No. 09, September 2009, ERI, Beijing, China.

ERI (2009), Daiyande, Baiquan, et al., *The realization of energy conservation objective of '11th Five-year' in China: strategy and implementation*, Beijing: Guangming Daily Publishing House.

NDRC (2010), Policy published online --www.ndrc.gov.cn.

MOF(2010), Policy published online--www.mof.gov.cn

# HONG KONG, CHINA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

Reduction of energy intensity by 25% by 2030 from 2005 levels

### 1.2. Sectoral Energy Efficiency Improvement Goals

Not applicable

### 1.3. Action Plans for Promoting Energy Efficiency

Since the adoption of the Sydney Declaration, the Hong Kong, China (HKC) Government has been stepping up efforts in energy efficiency and conservation monitoring and reporting by means of an end-use energy database[3]. Action plans include:

- The promotion of building energy efficiency through legislation for mandatory implementation of Buildings Energy Codes, and the provision of subsidies under Building Energy Efficiency Funding Schemes
- The implementation of the first phase and second phase of the Mandatory Energy Efficiency Labelling Scheme
- The provision of incentives in the post 2008 Scheme of Control Agreements with power companies to encourage investment in renewable energy facilities and enhance energy efficiency
- To enhance utilisation of landfill gas for town gas production
- To implement a district cooling system at the Kai Tak Development to supply chilled water to buildings in the new development area for centralised air-conditioning
- To promote environmental protection and energy conservation in government buildings through setting targets in various environmental aspects of new government buildings and through identifying demonstration projects
- To promote environmental protection and energy conservation in government buildings through setting targets in various environmental aspects of new government buildings and through identifying demonstration projects to promote the replacement of incandescent light bulbs by compact fluorescent lamps through various means, including consultation on progressively restricting the sales of incandescent light bulbs.

### 1.4. Institutional Structure

**a) Name of organisation**

Energy Efficiency Office (EEO) of Electrical and Mechanical Services Department (EMSD) under the directive of the Environment Bureau (ENB) which is the energy policy maker

**b) Status of organisation**

ENB as the policy maker and EEO of EMSD as the regulator and implementer

**c) Roles and responsibilities**

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

[3]HKEEUD (2010).

**d) Covered sectors**

Public and private sectors

**e) Established date**

EEO of EMSD was established in 1994

**f) Number of staff members**

There are 54 employees of 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**

HKC organise and/or participate in various exhibitions, seminars, and workshops to promote energy efficiency within various sectors. There are also websites to promote energy efficiency and renewable energy.

Technical information related to energy efficient products is promoted and disseminated through publication of information leaflets and technical guidelines, and posting the information for the public via dedicated websites—HK EE Net (http://ee.emsd.gov.hk), HK RE Net (http://re.emsd.gov.hk) and HK GBT Net (http://gbtech.emsd.gov)—and media programs.

HKC also launch publicity programs and campaigns to promote awareness of energy efficiency in particular regarding specific measures (e.g., Energy Efficiency Labelling Scheme, Buildings Energy Efficiency Funding Schemes, etc.).

**c) Capacity-building**

Capacity-building is achieved by organising strategic and specific briefings, presentations and workshops for industry and the general public. Professional bodies and educational institutions are also involved in sharing experience 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. Examples of projects include:

- Installation of Energy Efficiency and Conservation Technologies in Government Facilities for Application Studies
- Energy efficiency demonstration projects
- Projects funded by the Innovation and Technology Fund, Environment and Conservation Fund and General Research Fund.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

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

**a) Name**

1) Energy Efficiency (Labelling of Products) Ordinance (Chapter 598)

2) Building (Energy Efficiency) Regulation (Chapter 123M)

**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 an appropriate overall thermal transfer value such that the energy consumption of commercial buildings and hotels can be controlled.

**c) Applicable sectors**

1) All sectors
2) Commercial buildings and hotels.

**d) Outline**

1) The Energy Efficiency (Labelling of Products) Ordinance, enacted on 9 May 2008, provides the basis for implementation of the Mandatory Energy Efficiency Labelling Scheme. The scheme requires that the energy label be shown on prescribed products 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 9 November 2009. The second phase extends the coverage to washing machines and dehumidifiers, and commenced on 19 March 2010 with an 18-month grace period.
2) The Building (Energy Efficiency) Regulation, enacted in 1995, regulates the design and construction of external walls and roofs of buildings to have a suitable overall thermal transfer value such that the energy consumption of commercial buildings and hotels can be controlled and thus the emission of greenhouse gases from power generation can be reduced.

**e) Financial resources and budget allocation**

No information available

**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.

### 2.2. Regulatory Measures

See 2.1.

### 2.3. Voluntary Measures

**a) Name**

1) Voluntary Energy Efficiency Labelling Scheme
2) Scheme for Wider Use of Fresh Water in Evaporating Cooling Towers for Energy-efficient Air Conditioning Systems
3) HK Energy Efficiency Registration Scheme for Buildings (HKEERSB)[4].

**b) Purpose**

See 2.3. (d)

**c) Applicable sectors**

[4]www.emsd.gov.hk/emsd/eng/pee/eersb.shtml.

All sectors

**d) Outline**

1) EMSD operates a voluntary Energy Efficiency Labelling Scheme for appliances and equipment used at home and at the office as well as for vehicles to make it easier for the public to choose energy efficient products. The scheme aims to save energy by informing potential customers of a product's energy performance, which enables buyers to take these factors into consideration when making their purchasing decision. The scheme now covers 18 types of household appliances and office equipment. Ten of these types are electrical appliances including refrigerators (voluntary scheme), washing machines, non-integrated type compact fluorescent lamps, dehumidifiers, electric clothes dryers, room coolers (voluntary scheme), electric storage water heaters, television sets, electric rice-cookers, and electronic ballasts. The seven types of office equipment include photocopiers, fax machines, multifunction devices, laser printers, LCD monitors, computers and hot and cold bottled water dispensers. There is one type of gas appliance (domestic gas instantaneous water heaters). The scheme has also been extended to cover petrol passenger cars. With the full implementation of the Energy Efficiency (Labelling of Products) Ordinance on 9 November 2009, the Voluntary Energy Efficiency Labelling Scheme for room coolers (voluntary scheme) and household refrigeration appliances (voluntary scheme) will cover only those products not regulated under the ordinance. Details can be found at: www.emsd.gov.hk/emsd/eng/pee/eels_vlntry. shtml.

2) The 'Pilot Scheme for Wider Use of Fresh Water in Evaporative Cooling Towers for Energy-efficient Air Conditioning Systems' was launched in 2000 to promote the wider use of energy-efficient water-cooled air conditioning (WACS) and facilitate the territory-wide implementation of WACS.

3) Over the years, the number of designated areas of the scheme for fresh water cooling towers has been expanded to 102. In September 2010, the scheme covered about 75% of the non-residential floor area of HKC. The scheme has been operating on a standing status from June 2008 and was re-titled as 'Scheme for Wider Use of Fresh Water in Evaporative Cooling Towers for Energy-efficient Air Conditioning Systems'. The requirements and procedures of the Scheme are now under review to facilitate participation in the scheme.

4) The HKEERSB was launched in October 1998 to promote the application of the Building Energy Codes (BEC). The BEC covers lighting, air conditioning, electrical, lift and escalator installations, and stipulates the minimum energy performance standards of these installations. Adoption of the BECs is now at the discretion of the building designers or owners. Under the Scheme, if the designer or owner of a building submits application to EMSD, a registration certificate will be issued to the building that successfully meets the individual BEC standards. As at September 2010, 2750 registration certificates were issued to 1196 building venues involving 2907 installations. In order to further promote building energy efficiency, the Hong Kong Government introduced the Buildings Energy Efficiency Bill into the Legislative Council (LegCo) of the Hong Kong Special Administrative Region (HKSAR) in December 2009 for mandatory implementation of the BEC. The Bill is still under vetting by the LegCo up to October 2010. It is estimated that for new buildings (constructed after the new legislation comes into effect), the proposed mandatory scheme will result in energy saving of 2.8 billion kWh in the first decade, which will help avoid carbon dioxide emissions of 1.96 millions tonnes. Further energy saving will be resulted from improving the energy efficiency of existing buildings (constructed before the new legislation comes into effect) by requiring compliance with BEC in prescribed major retrofitting works.

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

1) To enable consumers to make a better choice when purchasing energy efficient appliances and 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

For energy saving and conservation in the building sector, the Financial Secretary announced in the 2008-09 Budget Speech that the depreciation period for building service installations registered under the HKEERSB and renewable energy installations would be reduced from 25 years to 5 years.

### 2.4.2. Low-Interest Loans

**a) Name**

Building Safety Loan Scheme

**b) Purpose**

To provide loans to individual owners of all types of private buildings to carry out maintenance work for improving energy efficiency among other things

**c) Applicable sectors**

Industrial, residential and commercial buildings

**d) Financial resources and budget allocation**

No information available

**e) Expected results**

Energy saving and promoting energy efficiency

### 2.4.3. Subsidies and Budgetary Measures

**a) Name**

Buildings Energy Efficiency Funding Schemes (BEEFS)[5] and budgetary allocation for energy efficiency improvement work at government facilities and venues

**b) Purpose**

For energy saving and conservation and to reduce $CO_2$ emissions

**c) Applicable sectors**

Residential, commercial, industrial and government

**d) Outline**

BEEFS were launched in April 2009 to subsidise owners of residential, commercial and industrial buildings to conduct energy-cum-carbon audits and energy efficiency projects in private buildings. Resources have been allocated in the 2009-10 budgets to carry out minor work for improving the energy efficiency of government buildings and public facilities.

**e) Financial resources and budget allocation**

[5]Energy Wits, Issue No. 15 (May 2009), p. 2.

BEEFS—HKD 450 million

Energy improvement projects in government buildings—HKD 130 million

**f) Expected results**

To promote energy saving and conservation in buildings

#### 2.4.4. Other Incentives

No information available

### 2.5. Energy Pricing

No information available

### 2.6. Other Efforts for Energy Efficiency Improvements

#### 2.6.1. Cooperation with Non-Government Organisations

The government cooperates with the professional sector and non-government organisations on 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 to harmonise the adoption of appropriate energy efficiency standards and approaches.

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

There are some efforts for energy efficiency improvements:

1) To extend the coverage of the energy efficient public transport system, in particular the mass transit railway network and high-speed train system
2) To implement measures to promote wider adoption of electric vehicles
3) For the government to lead by example in implementing energy efficiency demonstration projects to showcase energy efficient designs and emerging technologies, and to adopt advanced energy saving products such as LED traffic lights
4) To mandate that government capital works projects and minor works projects incorporate various energy efficiency features into the projects
5) The Hong Kong Green Building Council (HKGBC), which was established in November 2009 to advance green building initiatives in HKC, is a professional organisation driving the promotion and creation of green, energy efficient buildings and standards throughout HKC and seeking to engage the community, industry and government in creating a more sustainable environment.

## REFERENCES

HKEEUD (2010), *Hong Kong Energy End-use Data 2010,* issued by the Energy Efficiency Office of Electrical and Mechanical Services Department, www.emsd.gov.hk/emsd/e_download/pee/HKEEUDB2010.pdf.

HKEERSB, *Hong Kong Energy Efficiency Registration Scheme for Buildings,* issued by the Energy Efficiency Office of Electrical and Mechanical Services Department, www.emsd.gov.hk/emsd/e_download/pee/hkeersb2007.pdf.

Energy Wits, Issue No. 15 (May 2009), *Buildings Energy Efficiency Funding Schemes*, issued by Energy Efficiency Office of Electrical and Mechanical Services Department, www.emsd.gov.hk/emsd/e_download/pee/Energy_Wits_15.pdf.

# INDONESIA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

- The National Energy Conservation Master Plan (2005)—(*Rencana Induk Konservasi Energi Nasional*, or RIKEN) states that Indonesia's goal is to decrease energy intensity by an average of 1% per year to 2025.
- The National Energy Management Blueprint (2006)—(*Blueprint Pengelolaan Energi Nasional*, or PEN)[6] states Indonesia's goal of achieving 41% reduction of total primary energy supply (TPES) in 2025 against TPES forecast in the business as usual case, though measures of RIKEN in energy efficiency and conservation (EE&C).
- The National Energy Policy (2006)[7] states that Indonesia's goal is to achieve energy elasticity of less than 1 in 2025. Note: energy elasticity is defined, in this case, as the rate of change of total primary energy supply, over the rate of change of GDP.

### 1.2. Sectoral Energy Efficiency Improvement Goals

RIKEN identified energy saving potential in the sectors, as follows:

- Industry sector (for select industries)—15% to 30%
- Commercial building sector—electricity savings of 25%
- Residential sector—10% to 30%.

### 1.3. Action Plans for Promoting Energy Efficiency

#### a) Objectives

The objective of Indonesia's energy conservation program is "to conserve natural energy resources and increase energy supply resilience to support sustainable development".[8]

#### b) Applicable sectors

Industry, commercial building, households, and vehicles; beginning with those buildings and vehicles of government departments and agencies, provincial governments, and state-owned enterprises.

#### c) Outline

Energy programs:

- *Mandatory energy conservation of government office buildings*: Government departments and agencies and regional governments are mandated to implement best-practice energy saving measures as explained in the government's guidelines and directives on energy saving in government buildings, and are required to report their monthly energy use in buildings to the National Team on Energy and Water Efficiency, every six months[9].
- *State-owned energy service company (ESCO)*: The state-owned ESCO (established in 1986) is expected to take a leading role in providing energy conservation related services, particularly to industry. The government expects its ESCO to maintain forefront expertise in the field of energy efficiency and conservation in Indonesia, and

[6] Ministry of Energy and Mineral Resources (2005), Blueprint Pengelolaan Energi Nasional (PEN) 2006-2025, in accordance with Presidential Regulation No. 5/2006 regarding National Energy Policy.
[7] Presidential Regulation No.5/2006 regarding National Energy Policy.
[8] Chapter 2, Article 2 – Presidential Decree (KEPRES) No. 43/1991 regarding Energy Conservation.
[9] Presidential Decree No. 2/2008 on Energy and Water Efficiency.

to encourage a greater role for private-sector ESCOs in the future.[10]

- *Public—Private Partnership Program on Energy Conservation*: The Partnership Program on Energy Conservation is a government-funded energy audit program that is available to industries and commercial buildings. Participating industries and commercial buildings are required to implement the recommended energy saving measures identified in the energy audit.
- The *Energy Conservation Clearinghouse* was created for the purpose of data and information exchange on energy efficiency and conservation, particularly for the industry sector and commercial buildings.
- *Energy benchmark and best practice guide* for specific industrial energy use, and energy use in commercial buildings.
- *Energy Labelling*

  Indonesia's energy labelling program began in 1999. A dual energy rating system was considered for electrical appliances, initially for refrigerators. The energy labelling system design shows: (1) information about the kWh per year energy consumption of a product and its relative position on a line from the lowest to highest case of kWh per year consumption of similar products in the market (Indonesia), and (2) an energy consumption star rating—of four stars—that shows the product's energy efficiency rank, relative to similar products in the market (Indonesia) at the time of assessment.[11]


  This energy labelling system was discontinued, however, to be replaced by a new energy labelling system and design.

  A new energy labelling system is currently being developed. The design will provide information on: (1) the absolute energy efficiency or performance of a product; and (2) an energy efficiency star rating of four stars. The star rating is to be assigned by an independent and accredited test facility that tested the product. The new energy label design is shown (right). It shows an example for the case of an energy label for compact fluorescent lamps—CFLs; the energy label provides information on the lumens produced per watt.


- *BRESL*: To remove barriers in implementing energy standards and labelling (ES&L), Indonesia is currently participating in a UNDP-GEF project: Barrier removal to the cost effective development and implementation of energy efficiency standards and labelling project—BRESL. The program involves six developing economies of Asia. BRESL has five major programs in promoting ES&L. The programs are: (1) policy making, (2) capacity building, (3) manufacture support, (4) regional cooperation, and (5) pilot projects.[12]

[10]DJLPE (2009).
[11]CLASP (2008).
[12]Han Wei, UNDP-GEF (2009).

- *Energy efficient lighting program in the residential sector*: The lighting program in the residential sector is primarily a demand-side management (DSM) programme, in addition to energy savings. There are two lighting programs. They are: (1) the Caring Program (*Program Perduli*)—a program of the state owned electricity company—PLN and (2) Brightness Program (*Program Terang*)—a government program. The programs provide subsidised, and in certain cases, free CFLs to eligible households.
- *Energy Awards*: Indonesia is an active participant in the ASEAN Energy Award program, specifically the Best Practice Competition for Energy Efficient Buildings and Best Practice Competition for Energy Management in Buildings and Industries. Indonesia has won several awards in these programs.

**d) Financial resources and budget allocation**

An annual government budget is allocated for energy conservation programs and R&D. The government budget for the Energy Conservation Partnership Program—energy audit was USD 400 000 in FY2009.

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

Energy consumption data is obtained on a regular basis by the Central Statistical Agency—(*Badan Pusat Statistik*, or BPS). Specific data are collected through various government programmes on EE&C. The Partnership Program of (the former) Directorate General of Electricity and Energy Utilization provides data on energy intensity and energy saving potential in industry and commercial buildings. As of 2009, 292 industries and commercial buildings had been audited by the program. Data on energy use in buildings of government departments and agencies and regional governments is obtained regularly. Voluntary reporting within the activities of the Energy Conservation Clearinghouse provides further information and data on the effects of measures.

**f) Expected results**

Indonesia's energy conservation program expects to realise the goal of energy savings identified in RIKEN, which are based on studies on energy saving potential and energy audits.

**g) Future tasks**

Implementation of Governmental Regulation No. 70/2009 regarding Energy Conservation (issued in 16 November 2009). The regulation was called for by the Law No. 30/2007 regarding Energy (the Energy Law).

## Institutional Structure

Under the Energy Law, energy policies are formulated by the National Energy Council (*Dewan Energy Nasional,* or DEN), established in 2008. DEN consists of stakeholders of energy that includes seven ministers and high-ranking government officials, and eight stakeholder members from industry, academia, technology experts, representative of environmental concerns, and consumers.

Presidential Decree No. 43/1991 mandates relevant government ministries and agencies to issue coordinated government rulings and programs within their respective jurisdictions and regulatory roles, to promote and encourage energy conservation[13]. This Decree is directed to establish cross-sector regulations to provide incentives and disincentives to conserve energy.

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

[13] Presidential Decree (KEPRES) No. 43/1991 regarding Energy Conservation

**a) Name of organisation**

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

**b) Status of organisation**

Government

**c) Role and responsibility**

Formulation of energy conservation policies; implementation of energy conservation policies; establish norms, standards, process, and criteria regarding energy conservation; provide technical training and evaluation of energy conservation programmes.

**d) Covered sectors**

All economic sectors of industry, transport, commercial, and the residential sector

**e) Established dates**

August 2010.

**f) Number of staff**

The number of staff of the Directorate of Energy Conservation is to be established (information at time of writing, January 2011).

## 1.4. Information Dissemination, Awareness-raising and Capacity-building

**a) Information collection and dissemination**

The Clearing House of Energy Conservation (CHEC) is the centre for data and information related to energy efficiency and conservation activities. The operation of CHEC is currently limited, its capacity as a data and information centre is being up-rated. The Government of Indonesia received bilateral assistance from the Danish International Development Agency (DANIDA) in the creation of CHEC.

**b) Awareness-raising**

The 'National Energy Efficiency Movement' of the Ministry of Energy and Mineral Resources promotes energy conservation awareness through seminars and workshops, talk shows, public advertisements, brochures and leaflets; it is directed to households, specific industries and transport. The state-owned electricity company PLN promotes energy conservation in electricity use. Other institutions also promote awareness, including the Agency for the Assessment and Application of Technology (BPPT).

**c) Capacity-building**

Indonesia is instituting mandatory training and accreditation for energy managers and energy assessors. In addition, training is given to government officials responsible for mandatory energy saving and reporting of energy use in government office buildings. The Education and Training Centre for Electricity and New Renewable Energy of the Ministry of Energy and Mineral Resources (*Pusdiklat Ketenagalistrikan dan Energi Baru Terbarukan,* or KEBT) actively organises training on energy efficiency and energy conservation, new and renewable energy technologies, and in energy planning and modelling. The centre will be responsible for training of energy managers and energy assessors.

### Research and Development in Energy Efficiency and Conservation

PLN Electricity R&D Centre (PLN-LITBANG) conducts research and development related to the power industry and provides testing services for certain electric appliances, electric

lighting, including compact fluorescent lamps (CFLs). The Agency for the Assessment and Application of Technology (BPPT) had developed an energy audit mobile unit, for energy auditing and assessment of energy saving potential in industrial energy use and energy use in commercial buildings.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

**a) Name**

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

**b) Purpose**

The Energy Law is the legally binding legislation regarding energy, including energy conservation.

**c) Applicable sectors**

All sectors of the economy, and government departments and agencies, and regional governments

**d) Outline**

The Energy Law elucidates principles regarding the utilisation 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 outline of the National Energy Policy (*Kebijakan Energi Nasional*, or KEN); 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 will address the sufficiency of energy to meet the economy's needs, energy development priorities, utilisation of indigenous energy resources, and energy reserves.

**e) Financial resources and budget allocation**

The Government allocates budget for its energy efficiency and conservation programmes.

**f) Expected results**

Achieve significant energy saving levels identified in the new National Energy Policy (KEN) and in the new National Energy Conservation Master Plan (*Rencana Induk Konservasi Energi Nasional*, or RIKEN).

### Regulatory Measures

On 16 November 2009, the government issued Governmental Regulation No. 70/2009 regarding Energy Conservation, as called for by the Energy Law.

Regulatory measures include:

- the formulation of a National Energy Conservation Master Plan (RIKEN), which is to be updated every five years, or annually, as required
- the mandatory assignment of an energy manager, energy auditing, and the implementation of an energy conservation program for users of final energy of 6000 toe (tonnes of oil equivalent) or more
- mandatory energy-efficiency standards and energy labelling

- the 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
- the implementation of government disincentives, including written notices to comply, public announcements of noncompliance, monetary fines, and reductions in energy supply for noncompliance.

In 2010, Indonesia issued the first set of implementing regulations, specifically:

- Ministerial Regulation No. 13/2010 regarding Enactment of Mandatory Competency Standard for Energy Manager in Industry.
- Ministerial Regulation No. 14/2010 regarding Enactment of Mandatory Competency Standard for Building Managers in the Field of Management.

At the time of writing, the government was drafting other specific rulings and regulatory frameworks to implement Governmental Regulation No. 70/2009 regarding Energy Conservation in Indonesia.

Regulations on energy conservation that were issued prior to the Energy Law that may still apply or provisionally apply include:

- Presidential Instruction No. 9/1982 on Energy Conservation (in government departments and agencies, and state owned enterprise office buildings and official vehicles).
- Presidential Decree No. 43/1991 on Energy Conservation.

  This Presidential Decree calls for inter-ministerial coordination on policies and programs on energy conservation that includes, policy on investment, funding of energy conservation programs and pricing of energy in relation to achieving energy conservation goals. The contents of this regulation appear in Government Regulation No. 70/2009.
- Ministerial Decree No. 100.k/48/M.PE/1995 National Energy Conservation Master Plan (RIKEN) and revision in 2005. RIKEN was revised in 2005. RIKEN is an economy-wide plan on energy conservation.
- Ministerial Decree No. 0002/2004 regarding Development Policy on Renewable Energy and Energy Conservation - *The Green Energy Policy*. The Green Energy Policy is an economy-wide policy.
  - Presidential Instruction No. 10/2005 regarding Energy Saving (for government and regional government office buildings).
  - Ministerial Regulation No. 0031/2005 regarding Process of Energy Saving, which is the guidelines of implementation of Presidential Instruction No. 10/2005.
- Presidential Regulation No. 5/2006 regarding National Energy Policy.
- Blueprint National Energy Management 2008 – (Blueprint Pengelolaan Energi Nasional – Blueprint PEN) revises the National Energy Policy of Presidential Regulation No. 5/2006. Blueprint PEN elaborates on the energy policy, including on energy conservation.
- Presidential Instruction No. 2/2008 regarding Conservation of Energy and Water as revised version of Presidential Decree No. 10/2005 on Energy Efficiency. Under the Instruction, government agencies should report energy and water use twice a year.

### 2.1.1. Minimum Energy Performance Standards and Labelling

**a) Name**

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

**b) Purpose**

Purpose of these standards is to specify technical requirements with regard to energy efficiency and to safety, and for purpose of energy labelling.

**c) Applicable sectors**

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

**Table 1: MEPS and EPTS**

| | 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**

SNI standard on electrical appliances and equipments in general are drafted and registered under the strict system and guidelines of the National Standardization Agency (*Badan Standardisasi Nasional*, or BSN). Additional energy standards on electrical appliances are being developed.

### 2.1.2. Building Energy Codes

By Government Regulation No. 36/2005, under Law No. 28/2002 regarding Buildings, all buildings must comply with existing standards. Indonesia has four energy standards (SNI) for buildings, the standards cover: (1) the 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**

Applicable sectors: residential and commercial buildings

**d) Outline**

The standards outline:

- *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 procedure:* energy audit procedures for offices, hotels, shopping centres, 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 envelope of building (*Konservasi energy selubung bangunan pada bangunan gedung*) |
| 2. | SNI 03-6390-2000 | Energy conservation for air conditioning systems in building (*Konservasi energy system tata udara pada bangunan gedung*) |
| 3. | SNI 03-6197-2000 | Energy conservation for lighting systems in building structures (*Konservasi energy system pencahayaan pada bangunan sedung*) |
| 4. | SNI 03-6196-2000 | Energy auditing procedure for building (*Prosedur audit energy pada bangunan gedung*) |

**e) Financial resources and budget allocation**

The Government provides funding for the Partnership Programme, while follow-up of the programme and voluntary EE&C measures are self and commercially financed.

**f) Expected results**

The standards are expected initiate construction of more energy efficient buildings and improved overall energy efficiency of existing buildings (through retrofit).

### 2.1.3. Fuel Efficiency Standards

Indonesia currently does not have minimum fuel efficiency standards; however, fuel efficiency standards are expected to be implemented in the near future, as they were confirmed at COP-15 in December 2009.

Current emissions standards are equivalent to Euro II compliance, implemented in 2006. Indonesia expects to advance to Euro IV-equivalent emission standards by 2012. The state-owned oil company Pertamina is working on plans to upgrade their refineries to produce Euro IV compliant gasoline. The refinery upgrading projects are expected to be completed during 2014-16.

## 2.2. Voluntary Measures

Voluntary energy efficiency and conservation measures are being implemented by industry and commercial buildings through commercial financing. Certain energy intensive industries such as the fertiliser, cement, pulp and paper and steel industries; and certain commercial buildings have implemented EE&C measures including installation of automated energy management.

## 2.3. Financial Measures Taken by the Government

### 2.3.1. Tax Scheme

The government currently does not have a tax scheme, such as tax deductions, in relation to investments in energy efficiency and conservation.

#### 2.3.2. Low-Interest Loans

The government currently does not have low-interest loans for investments in energy efficiency and conservation measures, devices and equipment, to reduce energy use and conserve energy.

#### 2.3.3. Subsidies and Budgetary Measures

Government subsidies and budgetary measures are provided for energy conservation programs such as the (1) partnership program on energy conservation in energy auditing, (2) the lighting program—for eligible households in relation to demand-side management (DSM) programs and saving energy, (3) BRESL, and (4) other programs such as for information dissemination.

#### 2.3.4. Other Incentives

However, in accordance with the action plan (Governmental Regulation No. 70/2009), the government is expected to introduce government incentives that include tax exemption and fiscal incentives on imports of energy saving equipment and appliances, and special low interest rates on investments in energy conservation in the near future.

### 2.4. Energy Pricing

The government seeks to gradually remove fuel and electricity subsidies, and to bring their retail price to reflect the cost of supply.

Government subsidy for gasoline RON 88 octane, which is the gasoline grade most consumed in Indonesia, will be restricted for use in commercial vehicles and government vehicles only, to be effective as of March 2011. There is remaining government subsidy in automotive diesel oil for transport, kerosene for households, LPG in the government kerosene-to-LPG conversion program for households; and in electricity supply contracts for small households and small businesses.

### 2.5. Other Efforts for Energy Efficiency Improvements

#### 2.5.1. Cooperation with Non-Government Organisations

Currently, most non-government organisations (NGOs) that are working in the field of energy are involved in small scale new and renewable energy development, their programmes are nonetheless contributing to conservation of fossil energy reserves, through use of locally available energy resources.

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

Ongoing cooperation in energy efficiency and conservation are: (1) Indonesia-JICA (Japan): Study on Energy Conservation and Efficiency Improvement in the Republic of Indonesia; (2) Indonesia—Denmark: Energy Efficiency in Industrial, Commercial, and Public Sector (EINCOPS); (3) Indonesia—UNDP/GEF: Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling (BRESL); (4) Indonesia—the Netherlands: Energy Efficiency Improvement in Industry; (5) Indonesia—ASEAN: Promotion of Energy Efficiency and Conservation; (6) Indonesia-UNIDO: Promoting Energy Efficiency in the Industries through System Optimization and Energy Management Standard.

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

Indonesia has announced that it will be hosting the APEC—Energy Working Group (EWG) Peer Review on Energy Efficiency in 2011.

## REFERENCES

Ministry of Energy and Mineral Resources (DESDM), 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 Energy*, *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 –KEPRES) 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/.

CLASP, Energy Efficiency Standards & Labelling Information Clearinghouse, Standards & Labelling Program Summary Worldwide, Refrigerators – Indonesia, www.clasponline.org/.

Han Wei (2009), Barrier removal to the cost-effective development and implementation of energy efficiency standards and labelling (BRESL), UNDP-GEF (2009).

# JAPAN

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Sectoral Energy Efficiency Improvement Goals

**a) Sector**

Power (Federation of Electric Power Companies)

**b) Goals**

Reducing $CO_2$ emissions intensity (emissions per unit of user-end electricity) by an average of approximately 20% (0.34kg-$CO_2$/kWh)

**c) Base year**

FY1990

**d) Goal year**

FY2008-2012 (average over five years)

**e) Description**

On 17 December 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as a $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in industrial, commercial, transportation and energy-conversion sectors. For details see: Environmental Action Plan by The Federation of Electric Power Companies of Japan at www.fepc.or.jp/ english/library/environmental_action_plan/index.html.

**a) Sector**

Industry (Petroleum Association of Japan)

**b) Goals**

Improve energy efficiency by 13%

**c) Base year**

FY1990

**d) Goal year**

FY2008-2012 (average over five years)

**e) Description**

On 17 December 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in the industrial, commercial, transportation and energy-conversion sectors. For details see: Global Environmental Voluntary Action Plan by Petroleum Association of Japan at www.paj.gr.jp/paj_info/topics/ 2009/20090120.html (Japanese only).

**a) Sector**

Industry (Japan Iron and Steel Federation)

**b) Goals**

Improve energy efficiency by 10%

**c) Base year**

FY1990

**d) Goal year**

FY2008-2012 (average over five years)

**e) Description**

On 17 December 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in industrial, commercial, transportation and energy-conversion sectors. For details see: Voluntary Action Plan by Japan Iron and Steel Federation at www.jisf.or.jp/en/activity/warm/commit/index.html.

**a) Sector**

Industry (Japan Cement Association)

**b) Goals**

Improve energy efficiency by 3.8%

**c) Base year**

FY1990

**d) Goal year**

FY2008-2012 (average over five years)

**e) Description**

On 17 December 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in industrial, commercial, transportation and energy-conversion sectors. For details see: Voluntary Action Plan by Japan Cement Association at www.jcassoc.or.jp/cement/1jpn/jg1a.html (Japanese only).

**a) Sector**

Industry (Japan Chemical Industry Association)

**b) Goals**

Improve energy efficiency by 20%

**c) Base year**

FY1990

**d) Goal year**

FY2008-2012 (average over five years)

**e) Description**

On December 17, 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in industrial, commercial, transportation and energy-conversion sectors. For details see: Voluntary Action

Plan by Japan Chemical Industry Association at www.nikkakyo.org/upload/2314_3011.pdf (Japanese only).

**a) Sector**

Industry (Japan Paper Association)

**b) Goals**

Improve energy efficiency by 20%

**c) Base year**

FY1990

**d) Goal year**

FY2008-2012 (average over five years)

**e) Description**

On 17 December 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in industrial, commercial, transportation and energy-conversion sectors. For details see: Voluntary Action Plan by Japan Paper Association at www.jpa.gr.jp/file/topics/20090318110739-1.pdf (Japanese only).

**a) Future tasks**

See (f), above

### 1.2. Institutional Structure

Continuous information exchange for necessary coordination is conducted among relevant divisions of energy-related ministries as follows.

**a) Name**

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

**b) Status of organisation**

Policymaker, regulator, implementer

**c) Roles and responsibilities**

Policymaker, regulator, implementer

**d) Covered sectors**

Energy matters in general

**e) Established data**

No information available

**f) Number of staff members**

No information available

**a) Name**

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

**b) Status of organisation**

Policymaker, regulator, implementer

**c) Roles and responsibilities**

Policymaker, regulator, implementer

**d) Covered sectors**

Transport, building

**e) Established date**

No information available

**f) Number of staff members**

No information available

### 1.3. Information Dissemination, Awareness-raising and Capacity-building

**a) Information collection and dissemination**

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

**b) Awareness-raising**

Relevant information is available from 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 government

**b) Name of policy**

Cool Earth-Innovative Energy Technology Program

**c) Responsible department/agency**

Ministry of Economy, Trade and Industry (METI)

**d) Applicable sectors**

All relevant sectors

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

21 categories of technology were selected as innovative energy technologies and JPY 83 billion (approximately USD 995 million) in the 2009 fiscal year was allocated for R&D investment.

**f) Outputs**

Relevant R&D reports of the 21 categories of technology are published and uploaded to the websites of the responsible organisations.

**g) Outcomes**

R&D results of the 21 categories of technology are expected to contribute to achieving a 50% reduction in $CO_2$ emissions throughout the world by 2050.

**h) Description**

Amog the selected 21 innovative technologies, the following 4 technologies are related with energy conservation. The measures for introduction and dissemination of each technology are also shown.

*1) High-efficiency house and building*

- Diffusion of energy-saving housing by financing, tax system, etc
- Establishment, expansion and diffusion of housing performance indication system, etc
- Insulation wall and easy construction system
- Technologies to utilize insulation walls and windows (structure, design and construction)

*2) Next-generation high-efficiency lighting*

- Creation of initial demands by subsidiary, tax system reform, etc for individual houses
- Effective management with top-runner method for industry
- Active promotion of cooperation to developing nations

*3) Ultra high-efficiency heat pump*

- Subsidiary, preferential treatment in tax system
- Diffusion promotion by top-runner program
- Research and development with industry-academia-government cooperation
- Information provision to public
- International cooperation promotion through IEA etc.

*4) High-efficiency information device and system*

- Promotion of energy saving technology development with industry-academia-government cooperation and diffusion promotion by top-runner program, etc for Technology development
- Green IT promotion council and holding of international symposium for system

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

**a) Level of government**

Central government

**b) Name of program**

Several R&D programs have been conducted based on the ‘Cool Earth-Innovative Energy Technology Program’ by relevant organisations.

**c) Responsible department/agency**

METI and other relevant ministries, New Energy and Industrial Technology Development Organization (NEDO), National Institute of Advanced Industrial Science and Technology (AIST), relevant companies and universities/colleges.

**d) Objectives and period**

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

**e) Applicable sectors**

All relevant sectors in the 21 categories

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

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

**g) Outputs**

Relevant R&D reports of the 21 categories of technology will be published and uploaded to websites of the responsible organisations.

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

Japan's "New Strategy"(June 2010) puts emphasis on science & technology as a prior investment for the future and sets the amount of more than 4% equivalent for GDP as investment by public and private combined by fiscal 2020. Japan would reconstruct the systems for science & technology policies. Japan would accelerate research and development in the field of energy and environment within the framework of "Green Innovation".

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government laws, decrees, acts

**a) Name**

Law Concerning the Rational Use of Energy (Energy Conservation Law)

**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 to promote rational use of energy by industries, business establishments and others. The law was revised in May 2008 and enacted in April 2010.

**d) Applicable sectors**

Industry, transport, residential, commercial

**e) Outline**

See 2.2 below

### 2.2. Regulatory Measures

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

### 2.2.1. Business Energy Reporting

Business organisations (manufacturers, service companies, etc.) of which the energy usage in each fiscal year amounts to 1500 kilolitres (crude oil equivalent) or more are obliged to report annually on the amounts of energy they actually consume, to prepare and submit medium-term (3–5 year) plans for the rational use of energy, and to assign responsible persons for energy management. The measure aims to reduce business energy consumption intensities by 1% or more a year on average over the medium term.

Headquarter of franchise chain business operator, whose franchise stores use in each fiscal year amounts to 1500 kilolitres (crude oil equivalent ) or more in total has also the same

responsibility as above-mentioned business organisations.

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

**a) Name**

Top Runner Program

**b) Purpose**

To improve energy efficiency of machinery and equipment

**c) Applicable sectors**

Machinery and equipment

**d) Outline**

The Top Runner Program sets target standard values for energy using machinery and equipment, calling for manufacturers and importers to be obliged to enhance the energy efficiency of their products. Manufacturers are obliged to exceed a weighted average value for all their products per category for each predetermined target year. This is one way of setting energy efficiency target values for machinery and equipment and is 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 23 categories of products are designated in the program as of March 2010: passenger vehicles, freight vehicles, air conditioners, electric refrigerators, electric freezers, electric rice cookers, microwave ovens, fluorescent lights, electric toilet seats, TV sets, video cassette recorders, DVD recorders, computers, magnetic disk units, copying machines, space heaters, gas cooking appliances, gas water heaters, oil water heaters, vending machines, transformers, routers and switching units. Detailed information can be found at www.enecho.meti.go.jp/policy/saveenergy/toprunner2010.03en.pdf

**Financial resources and budget allocation**

No information available

**e) Expected results**

No information available

**a) Name**

Energy Conservation Labelling Program

**b) Purpose**

To provide consumers with energy efficiency information

**c) Applicable sectors**

Machinery and equipment

**d) Outline**

The Energy Conservation Labelling 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 products indicate the achievement ratio of the energy conservation standards in question. The scope of products under the system has been expanded, and 16 categories of products are subject to the labelling as of March 2010. Another labelling program also applies to retailers - a uniform label indicates a multi-step rating of energy performance based on the estimated annual power consumption and the achievement ratio of the energy conservation standards. Currently, three categories of products (air conditioners, TV sets and refrigerators) are covered by this program.

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

### 2.2.3. Building energy codes

Construction business organisations are obliged, when they construct, extend, reconstruct or repair a large house or building with floor area of 2000 square metres 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 or building. The relevant authority is able to give orders or penalties (in addition to make an official announcement) to the construction business organizations, whey they are not able to achieve satisfactory performance on energy conservation.
Construction business organisations are obliged, when they construct, extend, reconstruct or repair a house or building with floor area of 300 to 2000square metres (newly defined as “Type 2 House/Building), to report their energy conservation measures to the relevant authority beforehand and periodical (every three years) report on the state of maintenance of building (no need for periodical report for a house).

### 2.2.4. Transport

Transport business organisations (freight transport companies, passenger service companies, consignors) that are larger than a certain size (freight transport companies with 300 railway cars or more, 200 trucks or more, 200 buses or more, 350 taxis or more, 20 000 tonnages of ships or more and 9000 maximum takeoff weight of aircrafts or more, defined as “Specified Carriers”) are obliged to prepare and submit energy conservation plans as well as an annual report on their energy consumption amounts and other related matters.
Business organisations which consign their own freights with 30 million ton-kilometres are defined as “Specified Consignors”. Specified consignors are obliged 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**

Not applicable

**c) Purpose**

On 17 December 1996, the Keidanren Voluntary Action Plan on the Environment was presented. Goals of voluntary action plans such as the $CO_2$ unit goal and energy efficiency goal are individually formulated in 36 industries (represented by 137 organisations) in industrial, commercial, transportation and energy-conversion sectors. (See section 1.2.).

**d) Applicable sectors**

Not applicable

**e) Outline**

The Keidanren Voluntary Action Plan set a goal of reducing average $CO_2$ emissions from targeted businesses in fiscal 2008–12 to below fiscal 1990 levels. The plan also set different goals according to business types, and it encourages voluntary actions by different industries. Today, 60 industrial organisations and companies are participating in the plan.

METI has implemented a follow-up to the implementation of the action plan by industry. To ensure the achievement of the target set by the action plan, monitoring is undertaken for each business category and has been implemented since fiscal 1998. There were 39 targeted business categories in FY 2008 under the administrative jurisdiction of METI. Of those, 28 categories are in the industry and energy conversion sector, and 11 categories are in the commercial sector. Detailed information in Japanese can be found at www.keidanren.or.jp/japanese/policy/ vape/index.html.

**f) Financial resources and budget allocation**

No information available

**g) Expected Results**

No information 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 purchase the specified energy conservation equipment are able to choose either of the following options

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

B) Special depreciation of 30% of the equipment acquisition cost in the year of acquisition, in addition to ordinary depreciation and 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 they received their new car registration and are becoming harmful to the environment**
- The owners of the target automobiles would pay automobile tax in the next year of acquisition of automobiles

In FY2010, the following tax benefits will be granted (In case that the automobiles are registered in FY2009).

- For electric vehicles, fuel-cell vehicles and plug-in-hybrid vehicles, automobile tax is reduced by 50%.
- For natural gas vehicles with the weight of under 3.5 tonnes, which have achieved 75% reduction or more of exhaust gas compare to 2005, automobile tax is reduced by 50%
- For natural gas vehicles with the weight of over 3.5 tonnes, which have achieved 10% reduction or more of nitrogen oxide($NO_X$) or particulate molecular(PM) compare to 2005, automobile tax is reduced by 50%

- For gasoline and LPG vehicles with the achievement of 75% reduction or more of exhaust gas compare to 2005, which have achieved a fuel efficiency target of 25% or higher(target year:2005), automobile tax is reduced by 50%.
- For gasoline and LPG vehicles with the achievement of 75% reduction or more of exhaust gas compare to 2005, which have achieved a fuel efficiency target of 15% (target year:2010), automobile tax is reduced by 25%.
- For diesel vehicles with the achievement of 75% reduction or more of exhaust gas compare to 2005, which have achieved a fuel efficiency target of 25% compare to 2005, automobile tax is reduced by 50%
- For diesel vehicle with the achievement of 75% reduction or more of exhaust gas compare to 2005, which have achieved a fuel efficiency target of 15% compare to 2020, automobile tax is reduced by 25%

### *3) Eco-car tax reduction*

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

- The conditions for exemption(100% reduction) of automobile acquisition and automobile tonnage tax
  - ・ Electric vehicles, fuel cell vehicles and plug-in hybrid vehicles
  - ・ Natural gas vehicle with the weight of under 3.5 tonnes, which have achieved 75% reduction or more of exhaust gas compare to 2005
  - ・ Natural gas vehicle with the weight of over 3.5 tonnes, which have achieved 10% reduction or more of nitrogen oxide ($NO_X$) compare to 2005
  - ・ Hybrid vehicles with the weight of under 3.5 tonnes, which have achieved 75% reduction or more of exhaust gas compare to 2005 and also have achieved a fuel efficiency target of 25% or higher(target year: 2010)
  - ・ Hybrid vehicles with the weight of under 3.5 tonnes, which have achieved 10% reduction or more of NOx or PM compared to 2005 and also have achieved a fuel efficiency target of 2015
  - ・ Diesel Passenger vehicle with the weight of under 3.5 tonnes
- The conditions for 75% reduction of automobile acquisition and automobile tonnage tax
  - ・ Diesel vehicles with the weight of over 3.5 tonnes, which have achieved both the target of regulation of exhaust gas emissions of FY2009-2010 and a fuel efficiency target of FY2015
  - ・ Trucks and buses (diesel-driven) with the weight of from 2.5 to 3.5 tonnes, which have achieved both the target of exhaust gas emissions of FY2009-

2010 and a fuel efficiency target of FY2015

・ Truck and buses(gasoline-driven) with the weight of from 2.5 to 3.5 tonnes, which have achieved both 75% reduction or more of exhaust gas emissions of FY2009-2010 and a fuel efficiency target of FY2015(In this case, automobile tonnage tax is reduced by 50%)

- The conditions for 50% reduction of automobile acquisition and automobile tonnage tax

・ Diesel vehicles with the weight of over 3.5 tonnes, which have achieved both 10% reduction or more of NOx or PM and a fuel efficiency target of FY2015

・ Trucks and buses(gasoline-driven) with the weight of from 2.5 to 3.5 tonnes, which have achieved both 50% or more of exhaust emissions and a fuel efficiency target of FY2015

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

**a) Name**

A tax scheme to promote investment for housing renovation to improve energy efficiency

**b) Level**

Central

**c) Purpose**

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

**d) Applicable sectors**

Industry, transport, residential, commercial

**e) Outline**

When renovating a house with improvement of energy efficiency at a certain level (thermal insulation of windows as an essential condition plus thermal insulation of floorings, walls and ceilings, or installation of solar photovoltaic facilities), 10% of the renovation cost (maximum amount of the cost: JPY 2 million or JPY 3 million when installing solar photovoltaic facilities) will be deducted from that year's income tax.

**f) Financial resources and budget allocation**

No information available

**g) Expected Results**

No information available

### 2.4.2. Low-Interest Loans

**a) Name**

Environment and Energy Measures Loans

**b) Level**

Central

**c) Purpose**

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

**d) Applicable sectors**

Industry

**e) Outline**

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

**f) Financial resources and budget allocation**

No information available

**g) Expected Results**

No information available

### 2.4.3. Subsidies and Budgetary Measures

**a) Name**

1) *Subsidy project for the business operators promoting the rational use of energy*:

The introduction of energy-saving facilities (as replacement of the existing facilities) as planned by business operators are subsidized if the planned new facilities are considered highly significant in terms of "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 and efforts by small and medium companies. Budget allocation is JPY 24.0 billion(for fiscal 2010).

2) *Subsidy project for promoting the introduction of high-efficiency energy systems into homes and buildings*:

In order to help achieve net-zero-energy in homes and buildings by 2030, subsidies are provided to those who plan to introduce energy-saving, high-efficiency energy systems (capable of reducing annual energy consumption by about 25%) into homes/buildings or building energy management system (BEMS). As part of the subsidy project, the effects of introducing such systems are monitored for verification and the data obtained utilized for further advancement of energy conservation drive. Budget allocation is JPY 5.0 billion (for fiscal2010).

3) *Support for dissemination and promotion of solar photovoltaic equipment*:

Subsidy to the household sector for the introduction of solar photovoltaic equipment for residential houses and buildings, for which JPY 70 000 per kW is subsidised under the scheme for installation of such equipment. This scheme is revitalised to accelerate dissemination of solar photovoltaic equipment for residential houses and buildings. Budget allocation is JPY 22.0 billion (for fiscal 2009).

4) *Promotion of development of energy conservation technology*:

This project pursues energy conservation technology development over a medium- and long-term basis, with four phases consisting of pioneering research, preparatory research, practical application development and demonstration research, while keeping the "Cool Earth – Innovative Energy Technology Program" in mind, in order

to contribute to the reduction in greenhouse gas emissions by 2020.Budget allocation is JPY 7.0 billion (for fiscal 2010).

**b) Level**

Central

**c) Purpose**

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

**d) Applicable sectors**

Industry, transport, residential, commercial

**e) Outline**

See above

**f) Financial resources and budget allocation**

See above

**g) Expected results**

No information available

### 2.4.4. Other Incentives

## 2.5. Energy Pricing

**Outline of electricity prices:**

USD 0.227 per kWh (for residential sector) and USD 0.157 per kWh (for business sector)—averages in 2009.

As for customers in the contract category of 50 kW or larger, their electricity rates are decided freely between the customer and suppliers. As for customers in the contract category of less than 50 kW, it is necessary to receive 'approval' of the central government to raise their electricity rates, and submit '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 electricity rates. While promoting demand levelling 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', and energy conservation is promoted by imposing higher rates on customers of large usage.

**Outline of gasoline prices:**

USD 1.285 per litre—as of December 2009.

Gasoline prices are decided by the oil price (A) that is decided by the price components other than taxes such as crude oil prices and refining and distribution costs, the petroleum tax and coal tax (B = JPY2.04 per litre), the gasoline tax (C = JPY53.8 per litre) and the tax on transactions of gas oil (D = JPY32.1 per litre).

- Gasoline = (A + B + C) x 1.05*
- Gas oil = (A + B) X 1.05 +D
- Kerosene = (A + B) x 1.05

*Consumption tax = 5%

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organisations

Information not applicable

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

Information not applicable

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

Information not applicable

# KOREA

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The National Energy Basic Plan (2008–2030), announced in September 2008, stipulates that Korea will reduce its energy intensity to 0.185 TPES/GDP (tonnes of oil equivalent per thousand USD) in 2030 from 0.341 TPES/GDP in 2006. The improvement in 2030 from the 2007 base year is 46%, which is the equivalent to an annual improvement of 2% on average.

### 1.2. Sectoral Energy Efficiency Improvement Goals

Following the overall energy efficiency improvement goal, the government set sectoral energy efficiency improvement goals for 2017 with a 2007 base year as follows:

- *Industry sector*: reduction in energy use of 34.4 million tonnes of oil equivalent (Mtoe)
- *Transport sector*: reduction in energy use of 12.3 Mtoe
- *Residential and commercial sector*: reduction in energy use of 15.5
- *Public sector and others*: reduction in energy use of 1.9 Mtoe

### 1.3. Action Plans for Promoting Energy Efficiency

The 4th Rational Energy Utilization Basic Plan (2008–2012), or Energy Efficiency Initiative, is the latest action plan for promoting energy efficiency. It is part of the National Energy Basic Plan (2008–2030), which is expected to result in a 46% improvement in energy efficiency by 2030.

#### a) Objectives

The 4th Rational Energy Utilization Basic Plan aims for an 11.3% improvement in energy efficiency by 2012, compared with 2007. The average improvement rate of primary energy use is 2.3% per year during the period of the plan.

#### b) Applicable sectors

Industry, transportation, residential and commercial, public and others

#### c) Outline

The Energy Efficiency Initiative or Energy Efficiency Action Plan was approved at the 17th meeting of the National Energy Conservation Committee, presided over by Prime Minister Han Seung Soo. The plan is designed to cope with high global oil prices and climate change and improve the trade balance. Under this action plan, sectoral energy saving programs have been implemented using various incentives and regulation policies such as, financing, tax reduction, R&D subsidy, certification, etc. The incentives provided by the governments include those for companies that invest in energy efficiency, the phase- out of incandescent lamps by 2013, and the implementation of a program modelled after the Japanese Top Runner Program to complement the current Energy Efficiency Label and Standard Program.

Furthermore, the government will take the following steps:

- The government will invest KRW 1.2 trillion (about USD 930 million) in seven core technologies—building energy management systems, electric power IT, energy storage, green vehicles, LEDs, technologies to improve energy efficiency of the most energy intensive appliances, and green home appliances
- Increase the average fuel economy of automobiles by 16.5% by 2012
- Increase the maximum floor area ratio by 6% for buildings with the highest level of energy efficiency (grade 1)

- Will give preference to models with the grade 1 energy efficiency label and to products that deliver less than 1 watt of standby power when purchasing appliances for use in government buildings
- To encourage businesses to improve energy efficiency, the government will divide businesses into four categories depending on how much energy they consume. Specific measures such as negotiated and voluntary agreements will be made for each category.

**d) Financial resources and budget allocation**

The government has allocated USD 18.3 billion for the 4th Rational Energy Utilization Basic Plan (2008–2012), including USD 6.2 billion for the Rational Energy Utilization and USD 12.1 billion for the Land and Transport Infrastructure plans. The budget for Rational Energy Utilization includes government special accounts, electric power infrastructure funds, and so on. The plan promotes tax reduction in investment in industry and commercial buildings (20% reduction from the corporate or individual income taxes for the installation of specified energy efficiency facilities).

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

MKE (Ministry of Knowledge Economy) and KEMCO (Korea Energy Management Corporation) are responsible for monitoring and reporting on their individual programs, which are conducted through the activities of energy efficiency program evaluation, statistics (information gathering), benchmarking, etc. Monitoring projects usually have relied on R&D budgets from MKE to some extent. These efforts are compiled into the Report to National Energy Saving Promotion Committee. The latest report was submitted to the 16th National Energy Saving Promotion Committee (available only in Korean).

**f) Expected results**

Savings of 34.2 Mtoe of TPES in 2012 (USD 10.3 billion in energy imports, which amounted to 1.2% of GDP in 2007)

**g) 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 organisation**

MKE, KEMCO and MLTM (Ministry of Land, Transport and Marine) are responsible for energy efficiency improvement in Korea

**b) Status of organisation**

MKE and MLTM are policymakers, while KEMCO is a policy implementer

**c) Roles and responsibilities**

Overall energy efficiency policy is driven by MKE. Energy saving activities in industrial and building sectors is managed by MKE, while construction-related work for energy efficiency in the transport and building sectors is managed by MLTM. The Prime Minister has coordinated overall economy-wide energy efficiency programs through the National Energy Saving Promotion Committee. KEMCO's role is to improve energy efficiency, diffuse renewable energy, and reduce greenhouse gases. For this purpose, KEMCO implements various projects aimed at rationalising energy use. KEMCO has eight regional energy/climate change centres, and four subsidiary branches.

Local governments have promoted energy efficiency by setting up the regional energy basic plans for a five-year period. Regional energy efficiency programs can be partially supported

by MKE, especially focusing on public sector innovation and demonstrations for energy efficiency.

KEMCO's regional centres have cooperated with regional NGOs and research institutes to implement regional energy efficiency activities based on the plan.

More information on KEMCO can be seen at the websites
www.kemco.or.kr/new_eng/pg01/pg01050000.asp and
www.kemco.or.kr/new_eng/pg01/pg01060000.asp.

**d) Covered sectors**

Industry (including agriculture), transport, residential and commercial, and public and others

**e) Established date**

MKE was established in 2008 through merging the Ministry of Commerce, Industry, and Energy (MOCIE) with elements of the Ministry of Information and Communications, the Ministry of Science and Technology, and the Ministry of Finance and Economy, with the aim of creating an enhanced government instrument capable of meeting new challenges of the 21st century.

KEMCO was established in 1979.

**f) Number of staff members**

KEMCO had 475 staff members in 2008.

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

**a) Information dissemination**

A wide range of information is readily available to Korean energy consumers. For example, the purchase of energy efficiency products is generally promoted through the internet by providing energy efficiency and related cost saving information. For public institutions including government, mandatory procurement guidelines for purchasing energy efficiency products has been applied.

**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, as well as public relations (PR) through the media (television, radio), a prize contest for PR materials (poster, catch phrases), an economy-wide exhibition (Korea Energy Show) and mobile exhibitions, and early education in elementary and middle school.

**c) Capacity-building**

Capacity building programs have been undertaken such as training energy managers (appointed in the high energy-consuming industries or buildings above 2000 toe per annum), training operators for boilers and pressure vessels, education for regional energy planning officials and training courses for energy auditors.

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

Technological innovations, adoption of new energy technologies and the diffusion of existing highly efficient energy technology play important roles in achieving the overall energy efficiency improvement goal in Korea. In May 2006, the government announced the Basic Scheme for National Energy Resource Technology Development (2006–2015), which includes promotion of research and development in energy efficiency and conservation.

Reinforcing the support for technological innovation in the energy sector is also one of the key elements of the National Energy Basic Plan (2008–2030). In the industrial sector, Korea

will increase its support for R&D to improve the energy efficiency of industrial equipment and facility upgrades, and provide support for companies that invest in energy efficiency.

The Korea Institute of Energy and Resources Technology Evaluation and Planning (KETEP) was established in December 2007, with a key mission of advancing energy technology R&D in Korea. Their main function is to support MKE in formulating energy technology policies. As energy efficiency technology is a KETEP focus, the Energy Efficiency R&D Program has been undertaken by KETEP with the objective of securing additional energy saving potential of 5% of TPES during the period 2006–15. Financial support for this program was USD 117 million in 2007, where government funding was USD 79 million.

The seven Runner Programs that focus on typical energy consuming end-use devices have been prioritised in energy efficiency R&D. Seven objects identified for R&D that cover about 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.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENT

### 2.1. Government Laws, Decrees, Acts

**a) Name**

Energy Use Rationalization Act(EURA)

**b) Purpose**

EURA is designed to result in sustainable development of the economy by stabilising energy demand and supply, increasing rational and efficient energy use, and reducing environmental damage caused by energy consumption.

**c) Applicable sectors**

EURA applies to all energy end use sectors

**d) Outline**

In the wake of the second oil shock in 1979, the Ministry of Energy and Resources was established to exclusively administer the planning and enforcement of energy policies (it was later incorporated into the Ministry of Trade, Industry and Energy). In the following year, EURA was promulgated in an attempt to ensure energy security and promote energy efficiency and conservation.

Article 1 of EURA stipulates the purpose of the act, namely, to contribute to the sound development of the national economy and the promotion of welfare and international efforts to minimize global warming by realising the stability of demand and supply of energy, increasing the rational and efficient use of energy, and reducing the environmental damage caused by the consumption of energy.

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, Panel Provisions

Since its enactment, EURA has been amended several times, the latest amendment was passed in January 2010. The full text is available at the website, www.unescap.org/ esd/energy/publications/compend/ceccpart4chapter8.htm.

**e) Financial resources and budget allocation**

About USD 750 million was provided in 2008 by the rational energy utilisation special accounts.

## 2.2. Regulatory measures

### 2.2.1. Minimum Energy Performance Standards (MEPS) and Labelling

**a) Name**

Energy Efficiency Label and Standard Program

**b) Purpose**

The purpose of the Energy Efficiency Labelling program is to save energy by enabling consumers to identify high-efficiency, energy saving type products easily, and thus encourage manufacturers (importers) to produce (import) and sell these products from the beginning stage, through indicating the energy efficiency grade from the 1st to 5th grade. The minimum energy performance standard is to prohibit low efficiency products from spreading, and to 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 industry sectors

**d) Outline**

The Energy Efficiency Labelling and Standard Program enables consumers to identify highly energy-efficient products easily by mandatory indication of the energy efficiency grade, mandatory reporting and applying MEPS.

Energy consumption efficiency grade labels are based on five grades, with 1st grade products having the best energy-saving quality. A 1st grade product saves 30%–40% more energy than a 5th grade product. To enhance the energy consumption efficiency grade, MKE and KEMCO make a constant effort to analyse each product's market state and skill standardisation, and they have been continuously upgrading the standard. If the standard is strengthened, different grades can be seen even among the same products.


The MEPS is the minimum energy efficiency standard suggested by the Government. It bans the production 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. MEPS is applied to 24 items. In case of a violation, a fine up to USD 16 000 is issued.

Detailed information is available at www.kemco.or.kr/new_eng/pg02/pg02100200_2.asp

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

### 2.2.2. Building Energy Codes

**a) Name**

Energy saving design criteria for buildings

**b) Purpose**

The aim of energy saving design criteria for buildings is to improve the energy efficiency of the design and construction of new buildings.

**c) Applicable sectors**

Residential and Non-Residential

**d) Outline**

By encouraging low energy consumption-type buildings from the design stage, the increase in demand for energy in the building sector is expected to be suppressed.

*MLTM developed building energy codes*: local government building officials execute 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 local government offices to obtain a building permit.

The submission of energy saving plans has become mandatory for buildings bigger than certain sizes to reinforce insulation, increase the supply of high-efficiency and new/renewable energy facilities, and promote the energy saving mindset among owners of buildings being constructed.

More information can be obtained at the following websites:

www.kemco.or.kr/new_eng/pg02/pg02010200.asp;
www.energycodes.gov/implement/pdfs/CountryReport_Korea.pdf.

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

### 2.2.3. Fuel Efficiency Standards

**a) Name**

Average Fuel Economy (AFE) Program

**b) Purpose**

This is a system for managing the fuel efficiency of domestic passenger cars through the average fuel efficiency calculated by dividing the sum of fuel efficiencies of passenger cars sold during the previous year by each car manufacturer by the quantity sold.

**c) Applicable sectors**

Transport

**d) Outline**

If a car manufacturer's average fuel efficiency does not satisfy the limit set by the government, it may order the improvement of fuel efficiency by a certain period. If the improvement order is not performed, a corresponding announcement may be published through the press.

Average fuel efficiency standard:

1) By 2011—1600cc or less displacement : 12.4 km/l, more than 1600cc displacement; 9.6 km/l
2) From 2012 to 2015(gradually)—Fuel economy : above 17km/l, CO2 emission : under 140g/km

More information can be found at www.kemco.or.kr/new_eng/pg02/pg02030200.asp.

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

### 2.2.4. Energy Auditing

**a) Name**

Energy Process Consulting

**b) Purpose**

To improve the efficiency of energy use of businesses using large amounts of energy

**c) Applicable sectors**

Industry and commercial

**d) Outline**

In Korea, energy process consulting started in 1990 as a voluntary program. In 2007, the government made energy process consulting mandatory to improve the efficiency of energy use of businesses using large amounts of energy in response to the implementation of the UN Convention on Climate Change and the Kyoto Protocol, aiming to reinforce the foundation for energy saving and reducing greenhouse gas emissions in consideration of persistently high international oil prices. Accordingly, businesses using large amounts of energy (annual energy use of 2000 toe or more) are required to conduct an energy audit every five years.

The energy process consulting service is applied to the overall energy system of plant such as energy supply, heat transport and heat consumption facilities, every aspect influencing energy intensity of the product is being considered during energy consulting.

KEMCO has been implementing an energy consulting service more than 30 years in domestic industrial and building sector to secure competitiveness of the nation and the corporate by improving the energy efficiency. KEMCO has been also contributing to the nation and enterprises through activities such as finding of improvement methods, development and distribution of energy optimization models.

GHG Reduction Technology Consultancy Department achieved the ISO 9001 Quality Management System certification for the energy consulting service.

Energy auditing determines a business's energy use status across all energy-using facilities in the energy supply, transportation, and use sectors, identifies factors causing losses, and suggests the optimum improvement scheme for energy saving. The subjects of support in the form of subsidy of energy audit costs are limited to small and medium-sized businesses using less than 10000toe of energy per year; the amount of the audit cost subsidy shall be determined and announced by the Minister of Knowledge Economy at the beginning of each year.

More information can be obtained at the following website;
www.kemco.or.kr/new_eng/pg02/pg02060000.asp.

## 2.3. Voluntary measures

There are many voluntary measures in place. The following are the main voluntary measures. Voluntary measures that are not described here include certification for high efficiency products, eco-driving, no car once a week, demand-side management by energy suppliers, community energy supply systems, etc.

### 2.3.1. Voluntary Agreement (VA)

**a) Name**

The voluntary agreement (VA) system

**b) Purpose**

The Ministry of Knowledge Economy and the Ministry of Environment administer the Voluntary Agreement, as a joint program between government and industry.

A company that wishes to join the agreement should submit a letter of intent to KEMCO. The letter should include details on how its action plan will be organized, together with an energy efficiency enhancement target, GHG emissions reduction target and the process design. After submitting the letter of intent to KEMCO, the applicant company and the government will make a VA contract.

Within three months after the agreement has been signed, the company should submit a concrete action plan specifying its energy consumption and greenhouse gas emissions reduction targets.

A company that has joined the agreement will be offered low-interest loans and tax incentives to promote energy conversation and greenhouse gas reduction. Technical support for the company as well as PR/promotion for its energy saving activities will be also provided.

As of 2009, a total of 1,300 companies have participated in the agreement program, covering the fields of steel, chemicals, textiles, paper, ceramics and food industry. Energy supply companies such as the Korea Electric Power Corporation and the Korea District Heating Corporation as well as energy-consuming companies have been actively participating in Voluntary Agreement activities.

For details see the following website.
http://www.kemco.or.kr/new_eng/pg02/pg02090100.asp.

**c) Applicable sectors**

Industry and commercial

**d) Outline**

Businesses using larger amounts of energy (at least 2000 toe of energy annually; note, however, that the subjects are limited to businesses using at least 500 toe of fuel annually, the subjects for TGEM[Targets for the GHG emissions reduction and Energy saving Management Program] are excluded from the subjects for VA.) are subject to the VA. The industrial sector includes power generation companies in addition to general manufacturing businesses. Maintenance of agreements is effective for five years from the year of execution. The subjects of agreements are determined based on the amounts of energy used in the year immediately prior to the year of execution. The changed amounts of energy used after the agreement are determined regardless of the management group criteria and maintenance of the agreements. (the management group criteria determined at the times of the agreements are to be maintained during the terms of the agreements).

### 2.3.2. Building Energy Efficiency Rating

**a) Name**

Building certification system

**b) Purpose**

The purpose of the building certification system is to provide objective information regarding buildings' energy performance such as energy consumption, carbon dioxide emissions, and energy saving rates to the benefit of all parties related to the buildings such as construction project implementers, project owners, managing entities, and building users.

**c) Applicable sectors**

Office and Residential

**d) Outline**

Buildings subject to the certification system are apartments and office buildings. Upon the application by construction implementers of these buildings (contractors, implementers, etc.), preliminary certification is given before completion based on the result of evaluation performed through design drawings, etc. Final certification of the energy efficiency grade of the applicant buildings is provided at the time of completion based on the result of the final evaluation made using the final design drawing and field surveys.

### 2.3.3. ESCO (Energy Saving Company)

**a) Name**

Energy Saving Company

**b) Purpose**

The purpose of legislative measure for ESCO is to encourage investments in energy saving facilities through professional companies that provide a broad range of comprehensive energy saving solutions to energy users, with investment cost 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 3 registered ESCOs working in the field; the number has increased to 125 in 2009. ESCOs focus mainly on high efficiency lighting, waste heat recovery, heating and cooling system, and manufacturing process improvement.

When energy users want to replace or improve existing facilities and are unable to do so due to technical or financial problem, they can make a contract with ESCOs. After the contract, ESCOs will make an investment in energy saving facilities on behalf of the energy users and the ESCOs profit from the energy cost savings.

The legal grounds for energy service companies were established through the Energy Use Rationalization Act in 1991. Energy service companies have been registered and operated since 1992.

The scope of projects to be implemented include :

1) Projects related to energy saving-type facilities investments
2) Management/service projects for energy saving of energy using facilities
3) Projects related to energy saving such as energy management, diagnosis, etc.

More information can be obtained at the following website; www.kemco.or.kr/new_eng/pg02/pg02070000.asp

## 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**

Tax incentives are provided by the government for energy efficiency investments based on the Tax Reduction and Exemption Act of the National Tax Service. The purpose of these tax

incentives is to strengthen the competitiveness of business enterprises through promoting investment in energy saving facilities.

**c) Applicable sectors**

Industry and building (commercial)

**d) Outline**

If any domestic person invests in the installation of specified energy efficiency facilities, 20% of the relevant investment amount shall be deducted from their income tax or corporate tax. This scheme started in 1982, and has been applied temporarily during designated time periods. Current terms of the tax credit are valid until 2011. For details see www.kemco.or.kr/new_eng/pg02/pg02080000.asp.

### 2.4.2. Low-interest loans

**a) Name**

Energy Use Rationalization Fund (1980)

**b) Purpose**

To strengthen the competitiveness of business enterprises through promoting investment in energy saving facilities

**c) Applicable sectors**

Industry and commercial building

**d) Outline**

Since 1980, the government has provided long-term low-interest loans for energy efficiency and conservation investments, along with tax incentives. KEMCO is in charge of operation and monitoring. The rate of the loans is 2.25% per year, as of the fourth quarter of 2010. More information is available at the following website: www.kemco.or.kr/new_eng/pg02/pg02080000.asp.

**e) Financial resources and budget allocation**

USD 0.5 billion is allocated for the fund from a government financial source named Special Accounts for Rational Energy Utilization.

**f) Expected results**

No information available

### 2.4.3. Subsidies and Budgetary Measures

**a) Name**

Energy Efficiency Rebate Program for Electricity End-Use

**b) Purpose**

The Energy Efficiency Rebate Program for Electricity End-Use seeks to promote retrofitting for high-efficient products that have been designated for seven items, i.e. transformers, inverters, ballasts for 32W fluorescent lamps, ballasts for metal halide lamps, LED guide lights(emergency, hallway), LED lamps(internal converter), LED lamps(external converter).

**c) Applicable sectors**

Industry, residential, commercial (electric power use)

**d) Outline**

The rebate program was started in1995 by Korea Electric Power Corporation (KEPCO). The program has been supported by the Electric Power Industry Infrastructure Fund since 2002.

**e) Financial resources and budget allocation**

The amount of the Fund was USD 5 million in 2008. The fund has been raised from a 3.7% obligatory charge in the electricity bill of all customers.

### 2.4.4. Other Incentives

**a) Name**

Incentives for small-sized vehicles

**b) Purpose**

To promote low energy consuming lightweight passenger cars

**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 major parts of that price are taxes. Prices of electricity, city gas and thermal energy supply can be controlled by the government by adjusting the corporate investment maintenance ratio that is required by each tariff structure.

Currently, cumulative electricity pricing according to the amount of use has been applied to the residential sector. However, total balanced development of the energy efficiency pricing structure for energy use or GHG emission impacts would be courageous work, because restructuring the energy pricing system can be a heavy and difficult process in regard to social acceptance. Therefore, until now, subsidies and tax incentives have been urged to promote consumer behaviour for energy efficiency.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organisations

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 behaviour regarding citizens' energy efficiency.

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

Korea has been actively participating in international cooperation activities such as IEA 4E, APP BATF, APEC EGEE&C, IPEEC and so on, to develop policies to enhance energy efficiency in the facilities and equipment sectors and to strengthen international cooperation systems.

IEA 4E (Implementing Agreement on Efficient Electrical End-Use Equipment) is one of the execution agreements of IEA (International Energy Agency), which seeks to promote the adjustment and development of policies of various economies through collaborative research and forums, etc., aimed at enhancing machine efficiency.

APP (Asia-Pacific Partnership on Clean Development and Climate) is a partnership of seven Asia Pacific economies regarding clean development and climate, including Korea, United States, Japan, China, India, Australia, and Canada. Among the task forces under APP, the APP BATF (building, electric home appliance T/F) chaired by Korea is initially implementing international projects including the harmonisation of test procedures for motor systems among the seven economies for five years beginning over the period 2007–11. Currently, total 55 international projects are registered. APP BATF is officially determined to

be phased out. The 10th and the final meeting of APP BATF will be held on 13-14 December in Seoul, Korea.

EGEE&C (Expert Group on Energy Efficiency and Conservation) is one of the expert groups under the EWG (Energy Working Group), 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 labelling systems, it is operated using funds shared by all the economies (Korea paid USD 10 000 in 2007).

IPEEC(International Partnership for Energy Efficiency Cooperation) is an international partnership for energy efficiency cooperation among G8(United States of America, United Kingdom, France, Germany, Italy, Canada, Japan, Russia) + 5(China, India, Brazil, Mexico, Korea) countries. Under IPEEC task, 6 international projects including SEAD are currently being carried out.

- SEAD(Super-efficient Equipment and Appliance Deployment System) is a government-led global market transformation initiative which was proposed as a task under IPEEC by the United States.

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

Other efforts for energy efficiency improvement include ‘Low-income energy efficiency’ (USD 10 million in 2008), ‘no car once a week in the public sector’ (as for 2008, passenger cars were permitted only every other day), ‘central bus-only lanes in metropolitan areas (Bus Rapid Transit)’ and ‘bus-only highway lane’, etc

# 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 programmes were initiated in the Eighth Malaysia Plan (2001-2005), aimed at strengthening further the Utilisation Objective of Malaysia's Energy Policy (1979), which seeks "to promote the efficient utilization of energy and the elimination of wasteful and non-productive patterns of energy consumption". In our efforts to speed up the implementation of energy efficiency and conservation initiatives, the Ministry of Energy, Green Technology and Water is now in the midst of preparing an Energy Efficiency Master Plan with clear goals and targets to coordinate and implement energy efficiency and energy conservation in a systematic and holistic manner in the country. The Master Plan is scheduled for completion in June 2010

### 1.2. Sectoral energy efficiency improvement goals

The National Energy Efficiency Master Plan will be focused on the industrial, commercial and building sectors.

### 1.3. Action plans for promoting energy efficiency

The Ninth Malaysia Plan (2006-2010) has outlined strategies for promoting energy efficiency improvement. Energy efficiency will be given greater emphasis under the Tenth Malaysia Plan (2011-2015).

#### a) Objectives:

The primary objective of the energy efficiency programmes set out in the Malaysia Ninth Plan is to ensure the security of energy supply, enhance economic growth through efficient energy management and mitigate the negative impact of energy activities on the environment.

#### b) Applicable sectors:

Industry, Commercial, Residential and Government Buildings

#### c) Outline:

i) Enforce the Efficient Management of Electrical Energy Regulation 2008 to ensure more efficient use of electricity among large users;

ii) Incorporate the *Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings* (MS1525:2007) into the Uniform Building By-laws (UBBL);

iii) Promote the use of high energy efficient appliances and equipments;

iv) Develop local expertise in the manufacture of energy efficient appliances and equipments;

v) Improve energy efficiency in government buildings; and

vi) Develop human capacity in the area of energy efficiency.

#### d) Financial resources and budget allocation

Under the Malaysia Ninth Plan, RM 19.3 million is allocated to implement the stipulated actions

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

The progress and achievement is monitored through an outcome-based assessment method. The assessment report is prepared twice (at the middle of the Plan and at the end of the Plan period). The reports will be submitted to the Economic Planning Unit of the Prime Minister's Department.

### f) Expected results

#### a) Industry

i) The Efficient Management of Electrical Energy Regulation 2008, under the Electricity Supply Act. Under the regulation, all installations that consume 3 million kWh or more of electricity over a period of six months will be required to engage an electrical energy manager who shall, among others, be responsible to analyse the total consumption of electrical energy, to advise on the development and implementation of measures to ensure efficient management of electrical energy as well as to monitor the effectiveness of the measures taken;

ii) The *Energy Efficiency and Conservation Guidelines Part 1: Electrical Energy-use Equipment*. The guidelines to encourage industries to adopt EE practices as well as manage and improve their energy utilisation and environmental management. The guidelines, covering a number of commonly-used equipments such as fans, motors, pumps, chillers, transformers, air-compressors, also highlight the best practices in the selection and design with standard efficiency values as well as best practices in operation, monitoring and maintenance of the equipment;

iii) The *Industrial Energy Audit Guidelines. The guidelines is prepared based on* fifty-four (54) energy audits in eight energy-intensive industrial sub-sectors namely iron and steel, cement, wood, food, glass, pulp and paper, ceramics and rubber that carried out under Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP); and

iv) Energy-use benchmarks for eight energy-intensive industrial sub-sectors namely iron and steel, cement, wood, food, glass, pulp and paper, ceramics and rubber.

#### b) Commercial

i) 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, will be incorporated in the amendments to the Uniform Building By-Laws (UBBL). Once the UBBL is enforced, all non-residential buildings will have to comply with the energy efficiency requirements of the UBBL;

ii) Ten percent reduction of electricity use in all government buildings. The Ministry of Energy, Green Technology and Water is conducting energy audits in the top seven energy users in the government sector to estimate the real saving potential and to formulate a plan to achieve the stipulated target; and

iii) Showcase of Low Energy Office (LEO) building and Zero Energy Office (ZEO) to promote energy efficiency in building through demonstration. The first LEO building of the Ministry of Energy, Green Technology and Water was built in 2004 and the Green Energy Offfice of Pusat Tenaga Malaysia was built in 2008.

#### c) Residential

i) Dissemination of information and awareness to create a voluntary behavioural shift of residential energy users; and

ii) Voluntary energy performance labelling of refrigerators and promotion on the sale of energy-efficient refrigerators and efficient lightings.

#### g) Future tasks

Enhance the legal framework on energy efficiency improvement and drawing a comprehensive plan to promote energy efficiency improvement on a holistic manner.

### 1.4. Institutional structure

#### a) Name of Organisation

The key Malaysian Government ministries and agencies involved in energy efficiency improvement are the Energy Unit of Economic Planning Unit (EPU) of the Prime Minister's Office, the Ministry of Energy, Green Technology and Water (MEGTW) and the Energy Commission (EC) and

#### b) Status of Organisation

All agencies perform their duties for the central government.

#### c) Roles and responsibilities

The role of *MEGTW is* to formulate energy efficiency policy, in coordination with the *EPU. The EPU* provides the general direction, strategies and determines the level of implementation. *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 regulation for the electricity and piped gas supply industry, as the safety regulator for electricity and piped gas and to advise the Minister on all matters relating to electricity and piped gas supply including energy efficiency and renewable energy issues.

#### d) Covered sectors

Industry, commercial, residential and government sectors

#### e) Established Date

The MEGTW was established in April 2009 following the reshuffle of the Malaysian Cabinet. Formerly the Ministry was known as the Ministry of Energy, Water and Communications in 2004 and the Ministry of Energy, Communications & Multimedia in 1998. The EC has been established since 2001 replacing the Department of Electricity and Gas Supply (DEGS)

#### f) Number of Staff

The MEGTW has five officers to handle renewable energy and energy efficiency and The EC has four staff to handle energy efficiency matters

### 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 organisations involved in promoting energy efficiency, e.g. The Centre for Education, Training, and Research in Energy Efficiency and Renewable Energy (CETREE) which is located in the Universiti Sains Malaysia.

### 1.6 Research and development in energy efficiency and conservation

Technical research on energy efficiency and conservation are conducted mainly by government sponsored universities. The research works are funded by the Government through the Ministry of Science, Technology and Innovation.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1. Government laws, decrees, acts

### a) Name

Electricity Supply Act 1990 and the Electricity Supply Act (Amended) 2001 or Act A1116

### b) Purpose

The main purpose of the Act is to regulate the electricity supply industry. The A1116 also has provisions on efficient use of electricity

### c) Applicable Sectors

All electricity users are bound under the Act

### d) Outline

The Act has following provisions on efficient use of electricity

-Section 23A: The Minister may, from time to time, prescribe the standards, specifications, practices and measures to be adopted and any other matters in respect of 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 respect of 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 respect of the efficient use of electricity.

### e) Financial resources and budget allocation

The main financial resource is the fee collected from the licensees of the Act.

### f) Expected results

Electricity saving and better electrical load management

## 2.2. Regulatory measures

### a) Name

The Efficient Management of Electrical Energy Regulations 2008

### b) Purpose

To promote efficient use of electrical energy through better energy planning and management system

### c) Applicable Sectors

Industry and commercial

### d) Outline

The Efficient Management of Electrical Energy Regulations 2008 was gazetted on 15 December 2008, which required any installation with total electricity consumption of 3 million kWh or more over 6 consecutive months to appoint electrical energy managers and implement efficient electrical energy management.

### e) Financial resources and budget allocation

N/A

### f) Expected results

N/A

## 2.3. Voluntary measures

The Code of Practice on the Use of Renewable Energy and Energy Efficiency in Non-Residential Buildings (MS1525:2007) is a code that provides design recommendations for energy efficient of non-residential buildings. It provides the criteria and minimum standards for energy efficiency in the design of new buildings, retrofit of existing buildings and methods for determining compliance with these standards. MS1525:2007 is incorporated in the Green Building Index Malaysia (GBI Malaysia).

The GBI Malaysia is a profession driven initiative to lead the Malaysian property industry towards becoming more environment-friendly. Energy efficiency of a building is one of the criteria for the green building index certification.

The High-Efficiency Motor (HEM) program is a voluntary program to promote increased 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 showing the energy use of appliances.

The *Energy Efficiency and Conservation Guidelines Part 1: Electrical Energy-use Equipment* is to encourage industries to adopt EE practices as well as manage and improve their energy use The guidelines, covering a number of commonly-used equipments such as fans, motors, pumps, chillers, transformers, air-compressors, also highlight the best practices in the selection and design with standard efficiency values as well as best practices in operation, monitoring and maintenance of the equipment.

## 2.4. Financial measures taken by the government

### 2.4.1. Tax scheme

Tax scheme for energy efficiency improvements are as follows:

Companies providing services for energy efficiency improvement are eligible for:

- Pioneer Status with income tax exemption of 100% of statutory income for 10 years; or
- Investment Tax Allowance of 100% on the qualifying capital expenditure incurred within a period of 5 years. The allowance to be set-off against 100% of the statutory income for each year of assessment; and
- 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 which incur capital expenditure for improvements of their energy consumption are eligible for:

- Investment Tax Allowance of 100% of the qualifying capital expenditure incurred within 5 years. The allowance to be set-off against 100% of statutory income for each year of assessment; and

  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 which import energy efficient products are eligible for:

- 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 Green Building Index Certificate are eligible for:

- Tax exemption equivalent to 100% of the capital expenditure incurred to obtain the GBI certificate. The exemption is allowed to be set-off against 100% of the statutory income for each year of assessment. New buildings and retrofitted buildings are eligible for this incentive.

Buyers of buildings and residential properties awarded GBI certificates from real property developers are eligible for:

- Stamp duty exemption on instruments of transfer of ownership of such buildings. The amount of stamp duty exemption is on the additional cost incurred to obtain the GBI certificate.

### 2.4.2 Low-interest Loan

#### a) Name

Green Technology Fund

#### b) Level

Federal Government

#### c) Purpose

To promote green technology

#### d) Applicable Sectors

Industry and commercial

#### e) Outline

The fund provides soft loans to companies that supply or utilise green technology. For suppliers, the maximum financing is RM 50 million and for consumer companies RM 10 million. The Government provides interest rate subsidy of 2% of the loans procured. The Government also provides a guarantee of 60% on the loan amount, with the remaining 40% by banking institutions. Loan applications can be made through the National Green Technology Centre

#### f) Financial Resources and Budget Allocation

RM 1.5 billion

#### g) Expected Results

About 140 companies are expected to benefit from this fund and this will spur green technology development especially market creation and penetration of green technology in the economy.

## 2.5. Energy pricing

Energy prices are regulated by the Government and heavily subsidised. Under the Ninth Malaysia Plan the Government has stated the policy to review the energy pricing structure to reflect closely the market prices. As such, the Government had taken steps to gradually reduce subsidies on energy prices. Currently, the oil products prices, gas price for the primer and non-primer sectors as well as electricity tariffs had been reviewed to reflect close to market prices.

## 2.6. Other efforts for energy efficiency improvements

### 2.6.1. Cooperation with non government organisations

The government has developed cooperation with non government organisations such as Federation of Malaysian Consumers Associations and Water and Energy Consumer Association of Malaysia to promote energy efficiency activities. The promotion activities are mainly in the form of campaign, workshop, seminar and publication of energy efficiency related materials

### 2.6.2. Cooperation through bilateral, regional and multi-lateral schemes

Malaysia actively involves in regional and multi-lateral schemes on energy efficiency improvements. Malaysia and other South East Asia economies under the Association of South East Asia Nations (ASEAN) are agreed to improve energy efficiency through the ASEAN plan of Action for energy cooperation (APAEC). The current APAEC (2004-2009) has outlined strategies such as ASEAN Energy standards and Labelling, promotion of Energy Services Companies (ESCOs), information sharing and capacity building to improvement energy efficiency in ASEAN region. In the East Asia Summit (EAS), which Malaysia is one of the member, members are agreed to work together to improve energy efficiency in the EAS region. And as a member of United Nations, Malaysia hosted the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) with assistance and co-funding from United Nations Development Program (UNDP) and Global Environment Facility (GEF). The MIEEIP was aimed to address barriers to energy efficiency and energy conservation in Malaysian industrial sector.

## References

Economic Planning Unit, the Prime Minister's Department (2004) *The Ninth Malaysia Plan 2006–2010*.

Ministry of Finance (2009) *Malaysia 2010 Budget Speech*, delivered by the Prime Minister on 23 October 2009.

Ministry of Finance (2008) *Malaysia 2009 Budget Speech*, delivered by the Prime Minister on 28 August 2008.

# MEXICO

## 3. GOALS ON EFFICIENCY IMPROVEMENT

### 3.1. Overall energy efficiency improvement goals

**a) Key Indicator**

Savings in the electrical power consumption

**b) Goals**

To reduce the electrical power consumption

**c) Base year**

2006: 21 685 GWh

**d) Goal year**

2012: 43 416 GWh

### 3.2. Sectorial energy efficiency improvement goals

**(a) Sector**

The following goals cover several sectors - residential/commercial, public, industrial, transport – as Daylight Saving Time; Energy Efficiency Standards Program; Energy Saving Program for the Federal Public Administration; CFL's Massive Substitution Program and The Electric Power Saving Trust Fund (FIDE) Programs.

**(b) Goals**

There are different goals for each program for 2012

- Daylight Saving Time Program (1 363 GWh)
- Energy Efficiency Standards Program (17 850 GWh)
- Energy Saving Program for the Federal Public Administration (221 GWh)
- The Electric Power Saving Trust Fund (FIDE's) Program (4 414 GWh)

**(c) Base Year**

2007

**(d) Goal Year**

2012

### 3.3. Action plans for promoting energy efficiency

**h) Name**

Energy Efficiency, Renewable Energies and Biofuels

**i) Objectives**

To promote energy efficient use and production

**j) Applicable sectors**

Residential, municipal, industrial, commercial and services, Government (entities and dependencies)

**k) Outline**

Strategy III.1.1 - to propose financial policies and mechanisms to accelerate the adoption of energy efficiency technologies in public and private sectors

Strategy III.1.2 - to drive optimization in the supply and use of energy from entities and organizations that make up the Federal Public Administration

Strategy III.1.3 - to extend coordinated actions among public, social and private sectors, to encourage the efficient use of energy in the population

Strategy III.1.4 - to promote the reduction of energy consumption in residential and buildings

Strategy III.1.5 - to promote the efficient generation of electricity through self supply and cogeneration

Strategy III.1.6 - to integrate public policy proposals to boost the potential of efficient cogeneration

Strategy III.1.7 - to promote a series of regulations that allows the Regulatory Energy Commission (CRE) to broaden and strengthen its regulatory powers in regulating and promoting efficient cogeneration

Strategy III.1.8 - to support research activities related to increasing efficiency in generation activities, distribution and electrical energy consumption

**l) Financial resources and budget allocation**

The National Commission for the Efficient Use of Energy (CONUEE's) budget (formerly CONAE) is allocated by the Ministry of Finance and Public Credit (SHCP) and the Budget of PAESE (Programa de Ahorro de Energía en el Sector Eléctrico / Energy Savings Program for the Electric Sector), the Program of Integral Systematic Saving (ASI-Fipaterm) and The Electric Power Saving Trust Fund (FIDE) Programs with some contributions of the Federal Electricity Commission (CFE).

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

The monitoring of results is done every six months or annually and they are reported in the following documents: Activities Report of the Ministry of Energy, Government Report, Sectoral Prospectives, and National Energy Balance.

**n) Expected results**

43 416 GWh of electricity savings

**o) Future tasks**

Goals are expected to be achieved by 2012

## 3.4. Institutional structure

### 1.4.1 Central Institutional Structure

**a) Name of organisation**

In Mexico, the organization in charge of the energy policy is the Ministry of Energy (Secretaría de Energía – Sener). The Ministry conducts several policies and programs related energy demand and supply, energy forecast, energy regulation, energy efficiency, and research and development through the state-owned energy companies, public energy research institutes and energy commissions as shown in Figure 1.

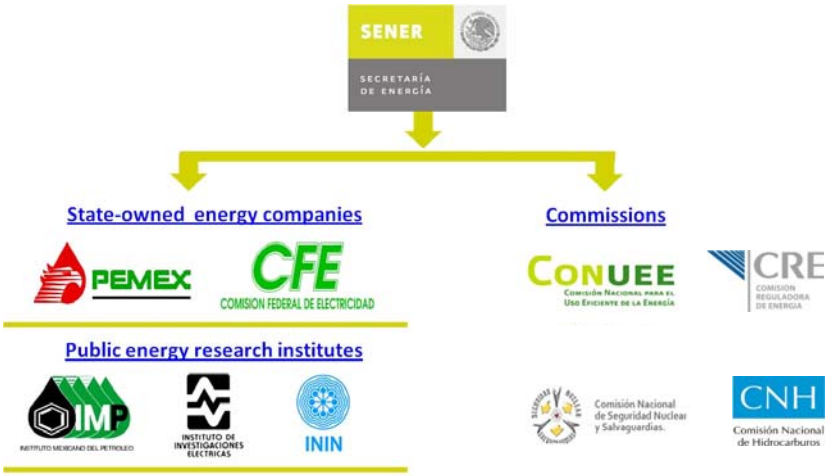



Figure 1. Organization of the Ministry of Energy (Sener)

The organization in charge of the energy efficiency programs is the National Commission for the Efficient Use of Energy – CONUEE (formerly CONAE) which is a decentralized administrative agency of the Ministry of Energy, with technical and operative autonomy. It aims to promote energy efficiency and establish itself as a technical body, in terms of sustainable use of energy.

Within the current framework, energy efficiency means all actions leading to an economically viable reduction of the quantity of energy required to satisfy energy needs of the services and goods demanded by society, ensuring an equal or higher quality level, as well as a decrease in the negative environmental impacts resulting from the generation, distribution and consumption of energy. This includes the replacement of non-renewable sources for renewable sources.

Responsibilities of CONUEE are:

- Regulations
- Public policies for sustainable use of energy
- Promotion and dissemination
- Information and evaluation

**b) Status of organisation**

Policymaker, regulator and implementation entity

**c) Roles and responsibilities**

Promote energy efficiency and act as a technical regulator

**d) Covered sectors**

Industry, transport, residential, commercial and services, power, government

**e) Established date**

CONUEE was created from the entry into force of the Law for Sustainable Use of Energy, published on 28 November, 2008, which states that all human and material resources of the National Commission for Energy Saving (CONAE) shall be allocated to this new Commission**.**

**f) Number of staff**

86 employees

### 1.4.2 Activities on energy efficiency improvement.

**a). Normalization (Standardization)**

Standards on energy efficiency have been the most effective mechanism to save energy in Mexico, given that annually more than eight million systems, equipment and products are traded and have to comply with the standard. The 18 energy efficiency standards (Official Mexican Standards – NOM's) in 2006 were estimated to energy savings up 16 065 GWh.

The activities for the standardization are:

1) Elaboration and updating Energy Efficiency Standards or Official Mexican Standards (NOM's);

2) Evaluation of the conformity, jointly with certification organizations, verification units and research laboratories.

**b). Technical assistance**

1) Elaboration of energy diagnoses and studies;

2) Attention to specialized technical consultations of public, private and social sectors

**c) Promotion and dissemination**

1) Organization of regional, national and international events;

2) Elaboration and dissemination of technical studies and documents: disseminating scientific publications, results of studies and projects that promote sustainable use of energy;

3) Coordination of committees and working groups specialized in the development of projects of energy saving and renewable energy;

4) Provide technical assistance on sustainable use of energy to the agencies of the Federal Public Administration, as well as to state governments and municipalities that request it, and the signing of agreements to that effect;

5) Participate in the dissemination of information between government and social sectors.

**d) Design and development of programs**

Operation of the Commission's main programs:

1) Normalization (Standardization)

2) Federal Public Administration

3) Efficient industry

4) Residential, commercial and services

5) Promotion and dissemination

6) Efficient transport

### 1.4.3 Regional or Local Institutional Structure

**a) Name of organisation**

Mexico has established a National Network of Energy State Commissions (RENACE) to streamline state and federal efforts to achieve energy sustainability of the economy. RENACE contributes to building a sustainable energy policy at a federal and local level, through the development of projects and programs related to energy sustainability and conservation. RENACE also promotes the creation of information systems and information network in most states.

**b) Status of organisation**

Policymaker, regulator and implementer

**c) Roles and responsibilities**

To achieve the combined efforts of the states with the federal government to ensure energy sustainability of the economy

**d) Covered sectors**

Industrial, commercial and services, residential, transport, government

**e) Established date**

2008

**f) Number of staff**

The personnel depends on each State Commission

### 3.5. Information dissemination, awareness raising and capacity building

**a) Information collection and dissemination**

The monitoring of results is done every six months or annually and they are reported in the following documents:

- Activities Report of the Ministry of Energy
- Government Report
- Sectoral Prospectives
- National Energy Balance

**b) Awareness raising**

Electrical Energy Savings of 19 774 GWh by 2008 (Energy Efficiency Standards, Industrial, Commercial and Public Sector, Daylight Saving Time and Residential Sector)

**c) Capacity building**

No information available

### 3.6. Research and development in energy efficiency and conservation

The main goals of the Hydrocarbon Sectoral Funds are scientific research and applied technology for the exploration, operation and refinement of hydrocarbons, like production of basic petrochemicals, as well as the adoption, innovation, assimilation, technological development and training of specialized human resources in the aforementioned issues.

The resources of the Sectoral Fund for Energy Sustainability will be allocated for the financing of projects whose main objectives are scientific research and applied technology for renewable energy sources, energy efficiency, usage of clean technologies, diversification of primary sources of energy, as well as the adoption, innovation, assimilation and technological development in the indicated matters.

Both funds will receive resources from the annual payment of duty for scientific and technological research on energy to which the National Oil Company (Petróleos Mexicanos – Pemex) through its subsidiary Pemex Exploration and Production (PEP) is subject and which in 2012 will reach a rate of 0.65 percent of the annual crude oil and natural resources. For 2008 the Income Law considers an amount of 1.100 million Mexican pesos (mxn), 55 percent of which will be allocated to the Sectoral Fund of Hydrocarbons; 10 percent to the Sectoral Fund for Sustainable Energy and 35 percent to the Scientific Research and Technological Development Fund of the Mexican Petroleum Institute (IMP).

The Sectoral Funds will contribute to the development and technological innovation of two main national priorities: to ensure the energy supply and the care of the climate change.

**a) Level of Government (central/regional)**

Central and Regional

**b) Name of Policy**

Sectorial Funds of Hydrocarbons and Energy Sustainability

**c) Responsible Department / Agency**

Ministry of Energy (Sener) – Science and Technology National Council (CONACYT)

**d) Applicable Sectors**

Industry, transport, commercial and services, power, government

**e) Financial Resources**

USD 100 million in 2008

## 4. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 4.1. Government Laws, Decrees, Acts

**a) Name**

LASE - Ley para el Aprovechamiento Sustentable de la Energía *(*Law for Sustainable Use of Energy).

**b) Purpose**

To promote sustainable use of energy through its optimum use in all its processes and activities from holding to consumption

**c) Applicable sectors**

Industry, transport, residential, commercial, power, government

**d) Outline**

Created in November 2008

**e) Financial resources and budget allocation**

The financial resources are outlined in the Federal Expenditure Budget (Presupuesto de Egresos de la Federación – PEF) 2008

**f) Expected results**

The Mexican government expects to carry out the Sectoral Program and the National Program of Energy Sustainability.

### 4.2. Regulatory measures

#### 4.2.1. Minimum Energy Performance Standards (MEPS) and labelling

**a) Name**

Energy Efficiency Standards

**b) Purpose**

Create standards to effectively contribute to the saving and efficient use of energy

**c) Applicable sectors**

Industry, residential, commercial and services, government

**d) Outline**

Mexico's mandate for Energy Efficiency Standards comes from a generic law, the Ley Federal sobre Metrología y Normalización (Federal Metric and Standarization Law) of July 16, 1992, which defines the Normas Oficiales Mexicanas – NOM (Official Mexican Standards). The NOMs are enacted by the Federal Secretariats, according to their areas of competence. In the case of energy efficiency, it is the Ministry of Energy, through the National Commission for the Efficient Use of Energy – CONUEE (formerly CONAE), that enacts the mandatory standards.


Figure 2. Official Mexican Standards (NOM's) logo

Mexico first adopted energy standards in 1995 and has since established standards for eighteen products. Many of these standards are modelled on those of the U.S., but have been adapted to local situations and experience from their own programs.

| Norm Code | Product |
|---|---|
| NOM-006-ENER-1995 | Pumps (Deep Well) |
| NOM-009-ENER-1995 | Insulation (Thermal) |
| NOM-001-ENER-2000 | Pumps (Vertical) |
| NOM-003-ENER-2000 | Water Heaters (Gas) |
| NOM-005-ENER-2000 | Clothes Washers |
| NOM-022-ENER/SCFI/ECOL-2000 | Refrigerators (Commercial) |
| NOM-015-ENER-2002 | Freezers |
| NOM-015-ENER-2002 | Refrigerator |
| NOM-015-ENER-2002 | Refrigerator – freezer |
| NOM-016-ENER-2002 | Motors (3-phase Induction) |
| NOM-007-ENER-2004 | Lighting System (Indoor) |
| NOM-010-ENER-2004 | Pumps (Submersible) |
| NOM-013-ENER-2004 | Lighting System (External) |
| NOM-014-ENER-2004 | Motors (1-phase Induction) |
| NOM-011-ENER-2006 | Central Air Conditioner (Packaged Terminal) |
| NOM-011-ENER-2006 | Central Air Conditioner (Split Type) |
| NOM-004-ENER-2008 | Pumps (Centrifugal) |
| NOM-017-ENER/SCFI-2008 | CFL's |
| NOM-021-ENER/SCFI-2008 | Room Air Conditioners (Window) |
| NOM-021-ENER/SCFI-2008 | Room Air Conditioners (Packaged Terminal) |

Source: Ministry of Economy, Mexico. (www.economia-noms.gob.mx)

Under Mexican law and as an element of the standards, CONUEE also implements a mandatory (as shown in Figure 3) comparative labelling 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.

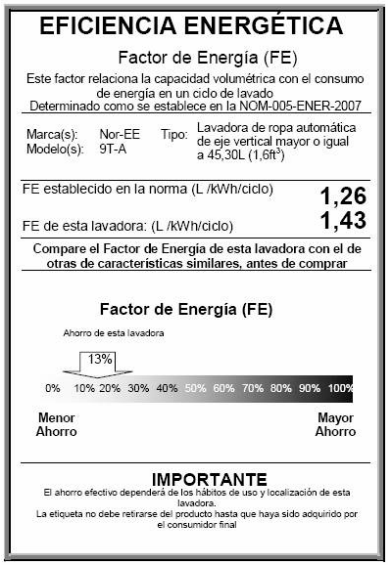



Figure 3. Energy Efficiency label for a washing machine

Labelling 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)

### e) Financial resources and budget allocation

For 2009, the budget considered was 10 million Mexican pesos (or USD 0.76 million)[14]

### f) Expected results

From 17 850 GWh (2007) to 28 414 GWh (2012)

## 4.3. Voluntary measures

[14] At average currency of 2009: 1 US$ = 13 MXP.

### 2.3.1 Mexican Standards (NMX)

The Ley Federal sobre Metrología y Normalización (Federal Metric and Standarization Law) of 16 July 1992, defines the voluntary standards called Normas Mexicanas – NMX (Mexican Standards). In Mexico, the Asociación de Normalización y Certificación - ANCE (Standardization and Certification Association) is in charge of elaborating the NMX related to the electric sector. It can also certify other sectors and has its own laboratory for conducting various standardized test procedures.

Mexican Standards are voluntary; however, if an Official Mexican Standard (NOM) makes reference to one or more Mexican Standards (NMX), the product must comply with the requirements on those Standards, as well.

### 2.3.2 The Electrical Power Saving Trust Fund (FIDE) label

Mexico has the Sello FIDE, a voluntary energy efficiency endorsement seal given by the Electric Power Saving Trust Fund (FIDE) since mid-1995. Manufacturers have to submit certified test results on their products to confirm that they cover the Sello FIDE requirements. The product is selected and tested by a certified laboratory to verify manufacturer claims. If approved, manufacturers pay for certification and sign an agreement stipulating length of validity of the Sello FIDE endorsement, how it can be displayed, renovation and cancellation of certification, etc. Manufacturers can then display the Sello FIDE on their products as shown in Figure 4. FIDE advertises the Sello FIDE in order to entice consumers to look for it when purchasing electrical equipment.


Figure 4. FIDE's Label logo

**a) Name**

Responsible Energy Users Registry (Registro de Usuarios Energéticamente Responsables)

**b) Level**

Central, regional and local

**c) Purpose:**

To develop a registry

**d) Applicable Sectors:**

Industry, transport, commercial and services

## 4.4. Financial measures taken by the government

### 4.4.1. Tax scheme

No information available

### 4.4.2. Low interest loans

**a) Name**

Electric Sectoral Energy Saving Program (PAESE), Integral Systematic Saving Program (ASI-Fipaterm), The Electrical Power Saving Trust Fund (FIDE) and Shared Risk Trust Fund (FIRCO)

**b) Purpose**

To promote energy-efficiency improvement programs in Mexico

**c) Applicable sectors**

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

**d) Outline**

According to PROSENER (Sectoral Energy Program 2007-2012)

**e) Financial resources and budget allocation**

The budget provides its own resources, having CFE as sponsor (only for FIDE, PAESE and ASI-Fipaterm)

**f) Expected results**

Differs according to each entity and trust

### 4.5. Energy pricing

The prices and tariffs of electricity, natural gas and liquefied natural gas are regulated by the Energy Regulation Commission (CRE).

### 4.6. Other efforts for energy efficiency improvements

#### 4.6.1. Cooperation with non-government organisations

Mexican Government cooperates with Non-Government Organizations (NGO's) to stimulate energy efficiency; some of these organisms 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
- Comisión de Estudios del Sector Privado para el Desarrollo Sustentable (CESPEDES)
- Foro para el Desarrollo Sustentable, A.C.
- Fundación México – Estados Unidos para la Ciencia (FUMEC)
- Fundación para el Desarrollo Sustentable, A.C.
- Greenpeace – México
- Grupo de Estudios Ambientales
- Presencia Ciudadana
- Transición Energética
- Fundación Mario Molina

### 4.6.2. Cooperation through bilateral, regional and multi-lateral schemes

The Mexican Government cooperates through bilateral schemes with European countries. In Europe, Mexico has bilateral cooperation with Germany by the German Technical Cooperation (GTZ) for the promotion of renewable energies and energy efficiency, and recently with the Netherlands though the "Understanding Memorandum" for bilateral cooperation in energy matters.

The Mexican Government is also involved in multi-lateral schemes as the North American Energy Working Group (NAEWG) consisting of Canada, United States and Mexico, to fostering communication and cooperation among the governments and energy sectors of the three economies; enhancing North American energy trade, development, and interconnections; and promoting regional integration and increase energy security for the people of North America.

In the Asia-Pacific region, Mexico has multilateral schemes with member economies of the Asia-Pacific Economic Cooperation (APEC) region, and participates actively in the Energy Working Group (EWG) of APEC.

### 4.6.3. Other cooperation/efforts for energy efficiency improvements

Mexico is non-member of the International Energy Agency (IEA), however, the economy has active participation to pool resources and to foster the research, development and deployment of particular technologies through the IEA's legal contract – Implementing Agreements – (or Energy Technology Agreements) and a system of standard rules and regulations. Mexico participates in nine IEA's Implementing Agreements:

- Clean Coal Science
- Energy Technology Data Exchange (ETDE)
- Geothermal Energy
- Multiphase Flow Science
- Ocean Energy Systems
- Photovoltaic Power Systems
- Solar Heating and Cooling
- SolarPACES
- Wind Energy Systems

## References

Asia-Pacific Economic Cooperation (APEC) (2010). Energy Working Group (EWG). www.ewg.apec.org

CONUEE (2010), Comisión Nacional para el Uso Eficiente de la Energía, México. www.conuee.gob.mx

DOF (2008), *Programa de Eficiencia Energética en la Administración Pública Federal 2009*, Diario Oficial de la Federación, November 28, 2008, México.

German Technnical Cooperation (GTZ) (2010), Programmes and projects in Mexico. www.gtz.de/en/weltweit/lateinamerika-karibik/1238.htm

International Energy Agency (IEA) (2010), Multilateral Technology Initiatives (Implementing Agreements), Paris, France. www.iea.org/techno/index.asp

Ministry of Economy (2010), *Normas Oficiales Mexicanas – NOMs*, México. www.economia-noms.gob.mx

NAEWG (2002), *North American Energy Efficiency Standards and Labelling*, North American Energy Working Group, US Department of Energy (DoE), US, 2002. www.pi.energy.gov/naewg.htm

Official Mexican Standards (NOM) and Mexican Standards (NMX), Asociacion de Normalización y Certificación, A.C., México. www.ance.org.mx

SENER (2007), *Programa Sectorial de Energía 2007-2012*, Secretaría de Energía, Noviembre 2007, México. www.energia.gob.mx

SENER (2009A), *Programa Especial para el Aprovechamiento de Energías Renovables*, Secretaría de Energía, Subsecretaría de Planeación Energética y Desarrollo Tecnológico, México, 2009. www.energia.gob.mx

SENER (2009B), *Estrategia Nacional para la Transición Energética y el Aprovechamiento Sustentable de la Energía*, Secretaría de Energía Subsecretaría de Planeación Energética y Desarrollo Tecnológico, México, 2009. www.energia.gob.mx

SENER (2010), Cuarto Informe de Labores de la Secretaría de Energía 2010, México, 2010. www.energia.gob.mx

Stephen Wiel and Laura Van Wie McGrory, *Regional Cooperation in Energy Efficiency Standard-Setting and Labelling in North America*, Lawrence Berkeley National Laboratory (LBNL), Paper # 125, April 30, 2003.

Stephen Wiel, Laura Van Wie MacGrory and Lloyd Harrington, *Energy Efficiency Standards and Labels in North America: Opportunities for Harmonization*, Lawrence Berkeley National Laboratory (LBNL) and Energy Efficiency Strategies, February 2004. www.clasponline.org

# NEW ZEALAND

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The programs contained in the New Zealand Energy Efficiency and Conservation Strategy (NZEECS) 2007 are expected to support the attainment of the following goals[15]:

- Savings of 30 petajoules (PJ) in non-transport energy by 2025
- 9.5 PJ of additional direct use renewable energy a year by 2025
- Savings of 20 PJ in the transport sector by 2015
- 90% of total electricity generation from renewable sources by 2025.

In addition, the Government has agreed in principle under the NZEECS to halve the 2007 per-capita greenhouse gas emissions in the transport sector by 2040.

### 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 NZEECS.

**Table 1. Sector goals**

| | Goals | | | | | |
|---|---|---|---|---|---|---|
| **Sector** | PJ | $CO_2$ | Energy savings (NZD) | Other | Goal year | Base year |
| Households | 3.45 | 0.67 Mt | 2012: 47m year<br>2025: 110m a year | NZD 97 million health benefits | 2025 | |
| Products/ Equipment | 12 | 2.3Mt | 179m a year | | 2025 | |
| Industry (including renewable energy promotion) | 2012: 2.4<br>2025: 10.5 | 2009: 0.0014 Mt<br>2012: 0.272 Mt<br>2025: 0.6 Mt | | | 2025 | |
| Commercial buildings | 1.0 | 0.194 Mt a year | | | 2025 | |
| Transport | 175.1 – represented by 4.826 million litres of fuel | 2025: 11.8 Mt<br>2040: reduce per capita GHG in transport by 50% | 333m by 2033 from vehicle fuel economy | | 2025 | 2007 |
| Power generation | | | | 90% renewable electricity generation | 2025 | |
| Government | | | | Six lead core public service agencies to be carbon neutral, the other 28 major agencies on the way to carbon neutrality | mid-2012 | 2007 |

### 1.3. Action Plans for Promoting Energy Efficiency

The New Zealand Energy Efficiency and Conservation Strategy (NZEECS) 2007 is the main program of work for promoting energy efficiency in New Zealand. The strategy can be accessed at www.eeca.govt.nz/sites/all/files/nzeecs-07.pdf.

#### a) Objectives

The NZEECS provides government leadership for the energy sector to respond to the challenges of energy security and climate change. It establishes the action plan for energy efficiency and conservation actions in New Zealand to support the increased uptake of energy efficiency and renewable energy. The strategy also assigns responsibility for the delivery of

[15]New Zealand government (2007).

each action to a central or local government agency. The overarching goals of the strategy are listed in section 1.1.

**b) Applicable sectors**

Transport, residential, business, renewable electricity and government

**c) Outline**

The NZEECS was completed as a requirement of the Energy Efficiency and Conservation Act 2000 and released in October 2007. The NZEECS replaced the inaugural National Energy Efficiency and Conservation Strategy released in 2001. The Strategy is written as a companion document to the New Zealand Energy Strategy (NZES) and sets out the government's detailed policies and actions on energy efficiency, energy conservation and renewable energy. It gives effect to the energy efficiency, energy conservation and renewable energy objectives set out in the NZES.

The aims for New Zealand, set out in the NZEECS, were:

- Warm, dry, healthy homes, improved air quality and reduced energy costs through:
  - Insulation
  - Energy efficiency
  - Clean heat retrofits or upgrades
  - Minimum energy performance standards (MEPS) and ENERGY STAR™ labelling for an increased number of product categories.
- To make businesses more energy efficient and competitive by using more renewable energy and emitting less carbon dioxide through:
  - Expanding the Emprove and Energy Intensive Business programmes
  - Implementing energy efficiency training for workers
  - Expanding the woody biomass programme
  - Measuring the potential for energy efficiency improvements in the rural sector
  - Increasing the uptake of energy efficiency measures in the rural sector.
- To increase the overall energy use and greenhouse gas emissions from New Zealand's transport system by:
  - Reducing the per capita transport greenhouse gas emissions
  - To widely deploy electric vehicles
  - To cut kilometres travelled by single occupancy vehicles
  - To increase the use of biofuel capable and electric cars
  - To investigate options for improving New Zealand's North Island main trunk line.
- To improve New Zealand's efficient and renewable electricity system by:
  - Having 90 percent of electricity generated from renewable sources by 2025.
- For Government to lead the way through:
  - Public sector carbon neutrality
  - Reducing fleet emissions
  - Reducing energy use per employee in core public sector buildings
  - Cutting workplace travel by core public service departments
  - Providing support to local government in delivering NZES and NZEECS programs.

A new draft New Zealand Energy Strategy and Energy Efficiency and Conservation Strategy is currently out for public consultation

(http://www.med.govt.nz/upload/73919/Developing%20Our%20Energy%20Potential%20July%202010.pdf). It is expected that this will be finalised in 2011.

**d) Financial resources and budget allocation**

Actions in the NZEECS are funded by a range of sources, including the government, private sector, voluntary sector and individuals. In 2007, an initial outlay of NZD 184 million over five years was devoted to the strategy. This figure is revised annually and includes the operating costs of the Energy Efficiency and Conservation Authority (EECA).

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

The Minister of Energy and Resources is accountable for the overall performance of the strategy. The Ministry of Economic Development (MED) reports progress on the implementation of the strategy to the Minister as published annual progress reports. All agencies involved in the implementation of the strategy are accountable for monitoring and report to MED on the impacts of their programs and the contribution to overall strategy objectives.

**f) Expected results**

To achieve the goals outlined in sections 1.1 and 1.2

**g) Future tasks**

The strategy is amplified in EECA's Statements of Intent, Output Agreements and Annual Reports.

### 1.4. Institutional Structure

**a) Name of organisation**

Energy Efficiency and Conservation Authority (EECA)

**b) Status of organisation**

EECA is a Crown entity, established under the Energy Efficiency and Conservation Act 2000 and subject to the Crown Entities Act 2004. EECA is governed by a Chairman and seven Board members who report to the Minister of Energy and Resources. EECA acts as a policy maker, regulator, program funder and implementer.

**c) Roles and responsibilities**

EECA is the main agency responsible for helping deliver the government's energy efficiency agenda. Its function is to encourage, promote and support energy efficiency, energy conservation and the use of renewable energy sources in New Zealand.

**d) Covered sectors**

Industry, commercial buildings, agriculture, transport (fuels), households, products and equipment, research and promotion, monitoring and reporting of energy efficiency/renewable energy data

**e) Established date**

2000 as part of the Energy Efficiency and Conservation Act 2000

**f) Number of staff members**

As at 1 July 2010 EECA had 106 full time equivalents (FTEs).

EECA works closely with government operational and policy agencies to help them design; implement; and monitor policies related to energy efficiency.

The Ministry of Economic Development (MED) has primary responsibility for providing energy policy advice to the Minister of Energy and Resources. It is also responsible for

monitoring EECA and ensuring integration between EECA and the Electricity Commission in delivering energy efficiency programs.

The Ministry of Transport and the New Zealand Transportation Agency are responsible for most transport-related energy efficiency initiatives with the exception of vehicle fuel consumption labels. EECA has a Letter of Understanding with the New Zealand Transportation Agency regarding the management of fuel consumption information.

Statistics New Zealand is responsible for the compilation of energy statistics. The Energy Domain Plan is a joint initiative between Statistics New Zealand, MED and EECA to assess the state of energy data and identify initiatives to help fill in information gaps.

The Electricity Authority was formed in 2010 and is responsible for promoting competition, reliable supply and efficient operation of the electricity market. The electricity efficiency functions of the previous Electricity Commission (Commission) were transferred to EECA on 1 November 2010. The electricity efficiency function of the Commission managed around 30 programmes across the residential, commercial and industrial sectors and was successful in delivering around 500GW pa electricity savings by November 2010 – or around 250MW reduction in peak system demand. In this report, the Commission's former energy efficiency programs are referred to as managed by EECA.

Other agencies that share responsibility for energy efficiency include the Ministry of Agriculture and Forestry (renewable fuels, industry); Department of Building and Housing (Building Code); Ministry for the Environment (clean heat grants to improve air quality); Ministry of Health (ENERGYWISE™ homes); Housing New Zealand Corporation (state housing improvement programs); 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 labelling.

There are 12 regional government authorities (called regional 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 the regional policy statements. Land transportation strategies must also be consistent with the NZEECS. Five regional councils have chosen to produce separate energy action plans in addition to their policy statements. Regional councils are granted low interest loans for energy efficiency improvements under the Crown Loan Scheme. EECA also collaborates with regional authorities on many regional energy efficiency projects. Government actions are coordinated through the Senior Energy Official Group and Energy Data Analysis and Coordination Group.

## 1.5. 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 behaviour change is also monitored. Survey results are published on a monthly and quarterly basis. The business sector also publishes case studies to promote energy technologies and behaviour change in industry.

### b) Awareness-raising

Information about energy efficiency is provided to New Zealanders through a number of channels. The main mechanisms include:

- An integrated strategy of marketing and communications which has three distinct actions:
  - An integrated brand architecture and the formation of a clear brand management strategy

  - An integrated marketing and communications budget
  - The consolidation of EECA's websites from seven to three integrated websites focusing on EECA's three distinct audiences – people at home, businesses and our corporate stakeholders. These are:
    - EECA (corporate website) www.eeca.govt.nz
    - ENERGYWISE (consumer-focussed website) www.energywise.govt.nz
    - EECA Business (all businesses) www.eecabusiness.govt.nz

- The 'Energy Spot', a series of one minute televisions programs giving New Zealanders practical, useful tips to make the most of the energy used in homes, businesses and vehicles
- The Right Light website (www.rightlight.govt.nz) provides facts about energy efficient lighting including information about available technologies and choice, electricity savings, safety and design and application. The site covers residential, business and trade sectors and also includes a specific and detailed section on street lighting for use by territorial authorities across New Zealand. Interactive tools allow consumers to evaluate the cost and potential electricity savings of energy efficient lighting in homes and businesses
- Business sector information programmes including a compressed air ratings scheme for small businesses and the motor systems website (www.motorsystems.co.nz) provide specific and targeted information and tools for industrial motor systems users.
- Product and appliance labelling programmes including vehicle fuel economy labelling and Energy Star™
- The biennial AA ENERGYWISE™ rally, aimed at raising awareness of energy efficiency practices in driving and transportation—www.aaenergywiserally.org.nz/
- EECA Awards that celebrate and promote energy efficiency practices in communities, businesses and industry—www.eeca.govt.nz/node/1243
- A number of e-zine electronic newsletters to our different audiences.
- A range of marketing and advertising campaigns for print, radio and television.

**c) Capacity-building**

The Energy Management Association New Zealand (EMANZ) is an industry association of energy management experts including energy auditors, energy managers and suppliers of energy efficiency products and services. EECA has provided funding for three years to EMANZ . This has enabled the appointment of an Executive Officer and development of a self-sustaining business model. The business model involves:

- delivering courses to improve electricity management and efficiency in the commercial building services industry – targeting energy specialists, facilities managers and commercial property valuers.
- administering an auditor scheme for Compressed Air Systems.

The Institute of Refrigeration, Heating and Air Conditioning Engineers of New Zealand (IHRACE) is a national industry organisation of approximately 800 members spread over eight regional branches. EECA financially supports IHRACE to deliver training to improve electricity management and efficiency in the refrigeration, air-conditioning and heating services industry focusing on systems components, new technologies and activities within the industry.

The University of Waikato and Massey respectively are contracted by EECA to deliver training programmes in compressed air system efficiency and lighting.

In residential lighting, EECA provides financial support to enable a national training programme for staff in DIY stores to provide detailed information on the range and benefits of efficient lighting products.

EECA has provided financial support and advice for an industry-lead residential rating tool, HomeStar, that rates the performance of a property based on its energy efficiency, health and comfort, water consumption, waste minimisation, home management and site location. The on line tool allows the homeowner to conduct a self assesssment of their property. The assessment gives an indication of the home's performance and suggestions of ways to make improvements. Should the homeowner decide to sell the property, and want to advertise the rating of the property, then an audit by a qualified auditor will provide the property with an independent certification of a rating, which may be used in the sales process.

Under the Warm Up New Zealand: Heat Smart programme (WUNZ:HS), service providers are required by EECA to provide proof that they have the internal capacity and capability to deliver the program to the standard required. Applicants were assessed on that criterion by an independent evaluation panel and are reviewed annually to ensure they have ongoing capacity to deliver the programme to standards.

EECA financially supports the Insulation Association of New Zealand (IAONZ) which has developed a four-stage training module for insulation installers. Around 100 installers operating under the Warm Up New Zealand: Heat Smart programme have completed the training module.

EECA financially supports the Aotearoa Wave and Tidal Energy Association (AWATEA) whose aim is to promote and foster a vibrant viable marine energy industry in New Zealand. EECA is a sponsor of the annual AWATEA conference and a sponsor of the publication of a bi monthly newsletter. AWATEA is the main driving force for raising the profile of this emerging technology. AWATEA also represents the New Zealand government on the International Energy Agency Implementing Agreement on Ocean Energy Systems (IEA/OES) and their membership is jointly sponsored by EECA and MED. One of the main benefits of participation in the IEA/OES has been to raise New Zealand's profile within the international marine energy community.

EECA also provides administrative support for the Sustainable Electricity Association of New Zealand (SEANZ) by providing targeted funding to initiatives to improve the quality and capability of the installation industry for small-scale renewable electricity technologies such as photovoltaics, small wind turbines, and small hydro.

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

New Zealand uses international research on energy efficiency and conservation while carrying out its own research to establish potential solutions for its distinctive mix of energy resources, infrastructure and cost structure. The government's policy on research and development is set out in chapter 11 of the New Zealand Energy Strategy—Sustainable energy technologies and innovation.

EECA Business works with companies and the public sector to improve energy efficiency, energy management and uptake of renewable energy. A key driver is to maximise cost-effective energy savings and the co-benefits for New Zealand businesses, and to stimulate the uptake of both large and small-scale renewable energy.
EECA Business work includes:

- programmes to assist business investment in energy efficiency and renewable energy, and to grow knowledge and expertise in this area (e.g. industry best practice energy management programmes which benchmark energy use across a range of companies within an industry through energy audits or assessments, mentoring and reporting)

- grant funding to support energy audits; capital grants to assist implementations; and conversion to renewable energy including wood energy, a cost-effective, renewable energy source.

Specific goals are determined by assessing the potential for cost-effective energy savings and emissions reductions. Additional energy savings that cost more to deliver may be sought where there are significant co-benefits such as health improvements or productivity improvements, on the basis that there is a total net benefit to the nation.

In terms of renewable energy, EECA administers the contestable Marine Energy Deployment Fund (MEDF) which was set up to bring forward the development of marine energy in New Zealand waters. The MEDF was established as part of the NZ Energy Strategy to accelerate innovation and assist with the costs associated with concept testing and device deployment.

For renewable transport fuels, EECA administers the Biodiesel Grants Scheme for biodiesel producers offering grants of up to 42.5 cents per litre for up to 28 million litres of biodiesel produced by June 2010. These grants are available to producers of New Zealand manufactured biodiesel meeting the Engine fuel Specifications Regulations 2008 and sold for use in New Zealand. The purpose of is to encourage the adoption of environmentally responsible fuels that reduce greenhouse gas emissions in the transport sector, diversify the fuel market and level the playing field between the two principal biofuels – bioethanol and biodiesel.

The New Zealand government carries out research and development activities through two agencies. The Ministry of Research, Science and Technology (MORST) undertakes research to help in the development of science-related policy. The Foundation for Research, Science and Technology (FRST) distributes public sector investments to public- and private-sector institutions, such as universities. Restructuring is currently away that will merge MRST and FRST into a new integrated Ministry for Science, Technology and Innovation

Central government funding in energy research and development for 2008 was NZD 18 million through FRST. In addition, NZD 8 million has been dedicated over four years for marine generation devices, NZD 12 million over three years to support low carbon energy technologies and a NZD 1.5 million grant has been allocated to funding the National Energy Research Institute.

FRST has undertaken the development of a new sector investment plan for 2010-2013 for energy and minerals. This is still in draft.

The Energy Efficiency and Conservation Act 2000 provides for EECA to undertake research. This is necessary for the optimal implementation of the NZEECS, EECA also administers an internal research program. This program focuses on providing research in the following areas:

- Better information – 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 modelling of energy efficiency potentials
- Behaviour change research and understanding end user service needs.

EECA has an Energy Research Committee and StageGate™ process for prioritising and managing EECA research .It prioritises high quality research and ensures that research is aligned with the corporate direction and purpose of EECA.

Individual programmes also encourage market and consumer based research. Warm Up New Zealand: Heat Smart has provided funding for university-lead energy efficiency projects aimed at specific groups for the purpose of ascertaining the positive benefits of insulation and clean heating in homes. One example is Warm Homes for Elder New Zealanders, a research

project insulating, and monitoring the benefits to, around 200 houses occupied by over-55 year olds suffering from Chronic Obstructive Pulmonary Disease.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

**a) Name**

Energy Efficiency and Conservation Act 2000

**b) Purpose**

The Act is the legislative basis for promoting 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#dlm54948

**c) Applicable sectors**

Undefined

**d) Outline**

Before the Act was passed, energy efficiency in New Zealand was addressed by the Energy Research Monitoring Agency which was attached to the Ministry of Commerce (now the Ministry of Economic Development). Legislation for the Act was introduced in 1998 and was passed in 2000.

The Act established the Energy Efficiency and Conservation Authority (EECA) as a stand-alone Crown entity with an enduring role to promote 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 labelling, as well as disclosure of information to compile statistics on energy efficiency, energy conservation and renewable energy. The Act provides the enabling legislation for the NZEECS.

**e) Financial resources and budget allocation**

The funds allocated vary each budget year. EECA's budgeted figures are confirmed by its Statement of Intent published annually. Funding comes from several sources including the government, private sector, voluntary sector and individuals. These funds cover all costs including administration, grants and financial assistance. In 2006/07, the figure was NZD 22 697 000; in 2007/08 NZD 36 361 000; 2008/09 NZD 52 124 000; and 2009/10 NZD 83 173 000.

**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 Labelling

**a) Name**

Energy Efficiency (Energy Using Products) Regulations 2002

**b) Purpose**

To reduce energy demand, energy related greenhouse gas emissions and provide savings to the end-user 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 available for sale in a product class and category; and requirements to display energy performance labels, stimulating the production and purchase of more energy efficient

products. This 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 but particularly 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 labelling are the main mechanisms the E3 uses to improve product efficiency where 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 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
- A common foundation for regulation.

A number of government agencies partake in intergovernmental and international cooperation efforts.

Labelling is mandatory for the following electrical products offered for sale in New Zealand:

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

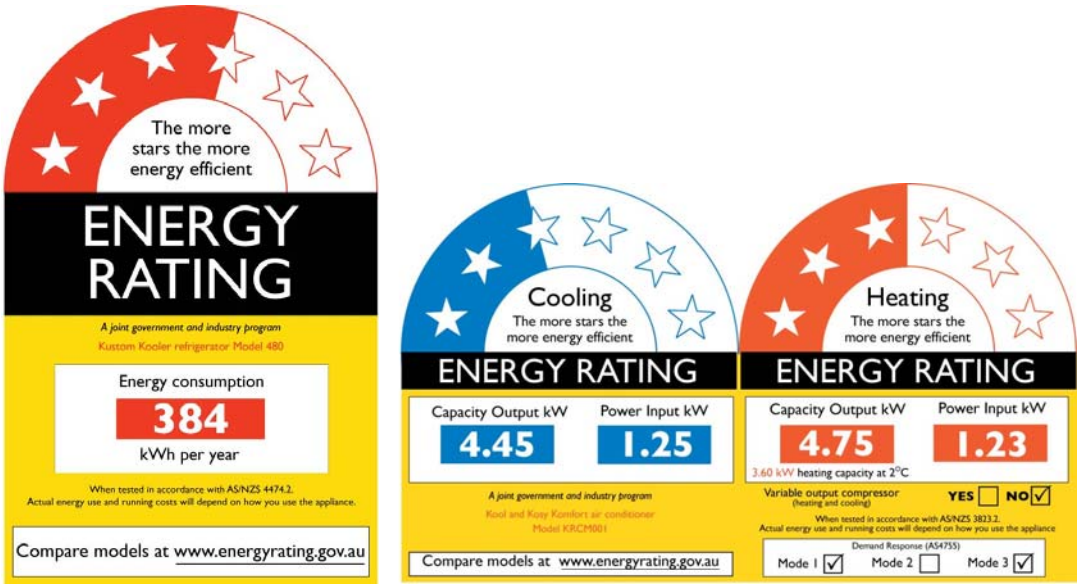
The following products are also regulated on the basis of Minimum Energy Performance Standards (MEPS) – this means that they have regulated minimum energy efficiency labels.

- Refrigerators and freezers (revised MEPS and labelling proposed for late-2010)
- Mains pressure electric storage water heaters (from 2002)
- Small mains pressure electric storage water heaters (<80L) and low pressure and heat exchanger types (from 1 October 2005)
- Three-phase electric motors (0.73kW to <185kW) (from 1 October 2001, revised April 2006)
- Single-phase air conditioners (from 1 October 2004, revised 1 April 2006 and 2007, further revision proposed for late 2010)
- Three-phase air conditioners up to 65kW cooling capacity (from 1 October 2001, revised 1 October 2007, another revision proposed for 2010)
- Distribution transformers (from 1 October 2004, revisions proposed for 2011)
- Ballasts for linear fluorescent lamps (from 1 March 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 1 October 2004)

- Commercial refrigeration (self contained and remote systems) (from 1 October 2004)
- Compact fluorescent lamps (proposed for late 2010)
- External power supplies (proposed for late 2010)
- Set top boxes (proposed for late 2010)
- Televisions (proposed for late 2010)
- Commercial building chillers (proposed for late 2010)
- Close-control air conditioners (proposed for late 2010).

The following products have been identified through the E3 program as potential areas for regulation in the future. This is subject to favourable cost-benefit analysis, regulatory process and approval from the Ministerial Council on Energy in Australia and New Zealand Cabinet.

- Standby power
- Home entertainment products
- Information and communication technology products (including computers and monitors)
- Gas products (including space and water heating products)
- Industrial products
- Hot water (solar and heat pump water heating)
- Heating and cooling products (various types of air conditioning).




**e) Financial resources and budget allocation**

NZD 2.9 million a year is allocated to MEPS and labelling, ENERGY STAR and Vehicle Fuel Economy Rating.

**f) Expected results**

It is expected that MEPS and labelling will result in 12 petajoules, 2.3 Mt $CO_2$-e and NZD 179 million in energy savings a year in 2025.

### 2.2.2. Building Energy Codes

**a) Name**

Compliance Document for New Zealand Building Code Clause H1: Energy Efficiency—Third Edition

**b) Purpose**

To facilitate the efficient use of energy

**c) Applicable sectors**

Residential and commercial

**d) Outline**

Mandatory provisions for building work are contained in the New Zealand Building Code (NZBC). Energy efficiency is covered in NZBC Clause H1.

In 2007 and 2008, new insulation and double glazing requirements were introduced for new houses, major extensions to existing houses, new multi-unit residential apartments and new small buildings with a floor area of up to 300 square metres. These changes are estimated to provide a 30% improvement in thermal performance over previous requirements. Hot water heating requirements, implemented in late-2000 remain unchanged.

In 2008, improved lighting requirements were introduced for new buildings with a floor area greater than 300 square metres. Thermal efficiency requirements for large buildings remain unchanged from 2000 levels, as are the energy efficiency requirements for domestic type hot water systems. Hot water systems over 700 litres are exempt from the Building Code.

In 2009, the Building Code introduced guidance for the energy performance of heating, ventilation and air conditioning systems.

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

Improved energy performance of residential and small commercial buildings

### 2.2.3. Fuel Efficiency Standards


**a) Name**

Vehicle Fuel Economy Labelling

**b) Purpose**

To achieve reductions in fossil fuel demand and emissions, and savings to end users, through improving the average fuel efficiency of the vehicle fleet

**c) Applicable sectors**

Transport

**d) Outline**

The Energy Efficiency (Vehicle Fuel Economy Labelling) Regulations were first published in 2007. The labels must be displayed on all new and late-model used cars available for sale through registered motor vehicle traders and on Internet listings, provided the information is available. They are intended to allow consumers to make informed decisions about purchasing a car, knowing the effect it will have on the environment and its fuel costs. This should stimulate the supply and purchase of more fuel efficient vehicles.

The label displays a star rating out of six, where six stars indicates the most fuel efficient cars; the indicative cost of running the vehicle and the vehicle's fuel economy[16].

**e) Financial resources and budget allocation**

[16]EECA (2010a).

NZD 2.9 million a year is allocated to MEPS and labelling, ENERGY STAR and Vehicle Fuel Economy Rating

**f) Expected results**

No information available

### 2.3. Voluntary Measures

**a) Name**

ENERGY STAR

**b) Purpose**

To achieve reductions in energy demand and energy-related GHG emissions and savings to the end user through stimulating the uptake of, demand for, and marketability of high efficiency products.

**c) Applicable sectors**

Residential

**d) Outline**

The ENERGY STAR™ concept was developed by the US Environmental Protection Agency in 1992 as a voluntary labelling program designed to promote energy efficient products to reduce GHG emissions. It provides an independent endorsement mark for high-efficiency products that can be used by industry/retail partners in product labelling, promotional material and advertising.

New Zealand became a licensed partner for ENERGY STAR™ in 2005 and has both adopted United States' specifications and developed New Zealand specifications for certain product classes (air conditioning, fridge/freezers, clothes washing machines, dishwashers and compact fluorescent lamps).

ENERGY STAR™ rated heat pumps are the only products specified for use under the Warm Up New Zealand: Heat Smart insulation and clean heating program.

**e) Financial resources and budget allocation**

NZD 2.9 million a year is allocated to MEPS and labelling, ENERGY STAR and Vehicle Fuel Economy Rating.

**f) Expected results**

No information available

### 2.4. Financial Measures Taken by the Government

#### 2.4.1. Tax Scheme

New Zealand does not have a tax scheme for stimulating conservation energy efficiency improvements.

#### 2.4.2. Low-Interest Loans

**a) Name**

Crown Energy Efficiency Loan Scheme

**b) Purpose**

To improve central government energy efficiency and ensure greater value for money from the public sector

**c) Applicable sectors**

Government (central)

**d) Outline**

The scheme was introduced in 1989 and provides funds to government agencies 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 payback period. The enduring energy savings accrue to the recipient for the remaining life of the project or measure.

**e) Financial resources and budget allocation**

EECA provides $2million per year baseline funding for Crown loans for Government organisations (public sector including health and local govt) for energy efficiency, technology or renewable energy initiatives.

**f) Expected results**

Expected results are improved government energy improvements (savings) of around $2 million per year.

### 2.4.3. Subsidies and Budgetary Measures

**a) Name**

Warm Up New Zealand: Heat Smart Programme

**b) Purpose**

To improve energy efficiency in the residential sector; improve the health of people living in cold, damp houses; stimulate the market for energy efficiency services, including employment in the insulation manufacturing the installation industries; and reduce economy-wide energy demand

**c) Applicable sectors**

Residential

**d) Outline**

The New Zealand Insulation Fund was announced by the New Zealand government on 28 May 2009 and came into effect on 1 July 2009 as Warm Up New Zealand: Heat Smart. It is now the centrepiece energy program in the residential sector alongside the Ministry for the Environment-funded Clean Heat Grant program. Funding is provided to fit homes with insulation and clean heating devices such as heat pumps and approved wood burners.

The scheme offers to meet 33% of the cost (up to NZD 1300 including tax) of installing ceiling and under-floor insulation to all households living in houses built before 2000. Households with sufficient ceiling and under-floor insulation may also be eligible for clean heating device funding of up to NZD 500. Lower-income households (i.e. Community Services Card holders) are eligible for more funding—60% of the total cost of insulation and NZD 1200 toward a clean heating appliance (provided the home is insulated). Landlords with Community Services Card holding tenants can also get the 60% subsidy and up to NZD 500 for the clean heating device if the home is insulated.

The program also works on a co-funding basis with a range of partners: local government; Iwi (Maori); service providers; local public health providers; charitable trusts and energy retailers. Working with these partners, EECA will retrofit over 188 500 homes over the next four years. Between $12 and $15 million per annum in private sector third party funding raised under the programme will assist low income households.

Generally, third party funding is applied to low income households to cover the 40% of the costs of insulation not provided by the programme. Different funders provide different mechanisms and eligibility criteria for their funding. For example, some territorial local authorities provide funding via a targeted rate on a rateable property for all households, not

just low income households. Other funders provide direct contributions via Service Providers for low income households with health referrals from local doctor's offices, for example.

The program includes a two-year independent evaluation program that measures the effectiveness and efficiency of delivery and achievement of energy, health and economic outcomes. The longer-term goals for the Fund are: energy savings, health benefits, and stimulating the supply and demand side for energy efficiency upgrades.[17]

**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**

188 500 homes insulated; 80 000 homes with clean heating devices; NZD 256 million in energy savings; 9.89 PJ energy demand reduction; NZD 240 million in health benefits; 1500 full-time equivalent jobs in construction and related industries.

**a) Name**

Solar Water Heating Programme

**b) Purpose**

To increase the uptake of solar water heating products

**c) Applicable sectors**

Residential, commercial and industry

**d) Outline**

The Solar Water Heating Initiative is designed to contribute to industry development by promoting and providing incentives to encourage the uptake of solar water heating systems. The overall aim of the programme is sustained future growth of the industry without government support.

**e) Financial resources and budget allocation**

NZD 15.5 million over 3 years starting in 2006

**f) Expected results**

2600 new solar hot water heater installations supported by mid-2009; 0.13 PJ of additional solar thermal energy a year; NZD 21.5 million in energy savings; 0.06 Mt of $CO_2$ avoided a year.

**a) Name**

Energy Intensive Business Grants

**b) Purpose**

To encourage energy intensive businesses to adopt energy efficient technologies

**c) Applicable sectors**

Industry

**d) Outline**

[17] EECA (2010b).

Energy Intensive Business Grants provide financial assistance to businesses with high energy use to fund energy efficiency projects. Funding is available for projects using technologies that have already been proven to increase energy efficiency but are not yet common place in New Zealand. In this sense, the program is designed to overcome investment risks in areas of emerging technologies.

**e) Financial resources and budget allocation**

NZD 1.04 million in grant funding for fiscal year 2008-09

**f) Expected results**

For the combined business programs Energy Intensive Business and Emprove (see 2.4.4), expect to achieve energy savings of 3 PJ a year; NZD 60 million in energy savings a year; and 350 000 tonnes of $CO_2$ avoided a year by 2012. It is also anticipated that increased competitiveness will create more employment opportunities.

### 2.4.4. Other Incentives

**a) Name**

Emprove

**b) Purpose**

To create more energy efficient and competitive businesses using more renewable energy and emitting less $CO_2$

**c) Applicable sectors**

Industry

**d) Outline**

Provides advice through energy audit grants on energy management best practices to large energy users and small to medium-sized enterprises in order for them to cut energy costs and reduce GHG emissions.

**e) Financial resources and budget allocation**

NZD 1.18 million for fiscal year 2008-09

**f) Expected results**

For the combined business programs, Energy Intensive Business and Emprove (see 2.4.3), expect to achieve energy savings of 3 PJ a year; NZD 60 million in energy savings a year; and 350 000 tonnes of $CO_2$ avoided a year by 2012. It is also anticipated that increased competitiveness will create more employment opportunities.

**a) Name**

Efficient Lighting

**b) Purpose**

To encourage uptake of efficient lighting technologies

**c) Applicable sectors**

Residential, Commercial

**d) Outline**

EECA provides a range of subidies aimed at increasing the uptake of efficient lighting across the resdential and business sectors. The programme supports the RightLight information and

capability building programme. The Rightlight Programme is a subset of the efficient lighting programme

**e) Financial resources and budget allocation**

$3m in fiscal year 2008/09

**f) Expected results**

1.6 PJ energy savings pa by 2012;

**a) Name**

Commercial audit and works program

**b) Purpose**

To provide information and incentives to enable businesses to make informed investment decisions on energy efficiency investments

**c) Applicable sectors**

Commercial

**d) Outline**

EECA has contracted several service providers to work with large commercial businesses to conduct energy and operational audits to identify measures that will generate electricity savings and to oversee the implementation of the recommended measures.

For approved projects, the Commission funds the cost of the audit and contributes a portion of the technology and implementation costs where the value of measures planned for implementation meet the Commission's investment criteria.

For each approved project, the service provider guarantees a set level (and minimum period) of electricity savings. If the guaranteed savings are not achieved, the service provider is required to repay a pro-rata proportion of the Commission's financial contribution based on the extent of the shortfall in electricity savings.

**e) Financial resources and budget allocation**

$3m in fiscal year 2008/09

**f) Expected results**

0.4PJ pa energy savings by 2012

**a) Name**

Motor Bounties Scheme

**b) Purpose**

Remove lower-efficiency three-phase motors with MEPS compliant motors

**c) Applicable sectors**

Industry

**d) Outline**

Bounty payments for the removal of lower efficiency three-phase motors that are replaced with MEPS compliant motors

**e) Financial resources and budget allocation**

$0.5m in fiscal year 2008/09

**f) Expected results**

0.1 PJ energy savings by 2012

**a) Name**

Compressed air system (CAS) accreditation audits and assessments

**b) Purpose**

Assist the development of specialist CAS auditing skills and fund audits on larger sites in return for commitments to act on agreed cost-effective recommendations

**c) Applicable sectors**

Industry

**d) Outline**

EECA facilitates the development of a CAS Auditor Accreditation Scheme. This involves accredited auditors having their competency subjected to an independent assessment. A prerequisite to having a competency assessment is for the auditor to have satisfactorily completed a training course.

The Electricity Commission also funds in-depth CAS audits of larger industrial sites, in return to a commitment to action from the CAS user. On a case-by-case basis, the Commission may then also contribute to funding of CAS plant investments that implement identified cost-effective energy efficiency investments.

**e) Financial resources and budget allocation**

$0.5m in fiscal year 2008/09

**f) Expected results**

0.4 PJ energy savings in 2012

**a) Name**

Vehicle fleet auditing for businesses programme

**b) Purpose**

To improve the vehicle efficiency of the commercial vehicle fleet

**c) Applicable sectors**

Commercial

**d) Outline**

This program provides audits for businesses with fleets of more than 100 vehicles. Businesses are eligible for a government funded grant of up to 50% of the audit (up to a maximum of NZD 10 000). Monitoring and case study information is collected by EECA.

**e) Financial resources and budget allocations**

No information available

**f) Expected results**

No information available

**a) Name**

Biodiesel Grant Scheme

**b) Purpose**

The grant will assist the production and adoption of environmentally responsible fuels which reduce greenhouse gas emissions and provide a similar advantage for biodiesel to that currently available to bioethanol.

**c) Applicable sectors**

Biodiesel producers in New Zealand

**d) Outline**

Under the scheme, a grant of up to 42.5 cents per litre for biodiesel or biodiesel content of a biodiesel blend will be available to biodiesel producers. The grant will be payable monthly in arrears to producers whose product sales amount to, or are in excess of 10 000 litres, B100 content (100% biodiesel) per month.

**e) Financial resources and budget allocation**

NZD 9 million in 2009/10; NZD 12 million in 2010/11; NZD 15 million in 2011/12

**f) Expected results**

No information available

**a) Name**

Improve energy sustainability in local government and communities

**b) Purpose**

To encourage and assist regional councils to develop regional energy strategies; and deliver operational and policy advice on energy efficiency, conservation and renewable energy

**c) Applicable sectors**

Government

**d) Outline**

The program was established in fiscal year 2008-09. It provides funding and technical assistance to local government bodies to improve energy efficiency and conservation in their communities with a focus on households.

**e) Financial resources and budget allocation**

NZD 170 000 a year

**f) Expected results**

Reduced barriers to sustainable energy in households

## 2.5. Energy Pricing

New Zealand's energy sector is guided by free market principles. As a government agency, the Electricity Commission regulates the operation of the electricity industry and markets to ensure electricity is produced and delivered to all consumers in a fair, reliable and environmentally sustainable manner.

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 because of weather conditions (for example 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 behaviour.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with other Government Organisations

MED and EECA work closely with the Ministry of Health, Ministry of Social Development, Ministry for the Environment, Ministry of Transport, Ministry of Agriculture and Forestry, the Department of Building and Housing, Housing New Zealand and Statistics New Zealand. EECA also works closely with local government and District Health Boards.

### 2.6.2. Cooperation with Non-Government Organisations

In general, non-government organisations (NGOs) and community energy groups in New Zealand have good knowledge and awareness of energy efficiency improvement programs implemented by the central government under the NZEECS. NGOs have established partnerships with central agencies to realise the goals of the NZEECS in certain areas. 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 the energy expenditures, while NGOs are focused on the alleviation of fuel poverty and improving health outcomes among lower-income families. Through EECA, NGOs/community and energy groups are implementing the Warm Up New Zealand: Heat Smart and Clean Heat Programmes and are able to use local networks to assist in reaching more participants.

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

The New Zealand government cooperates with other economies and New Zealand agencies on energy efficiency, including:

- The Australian Department of Environment, Water, Heritage and the Arts (DEWHA) and Australian State Regulators through the E3 committee to set joint standards and regulatory requirements for appliances and equipment
- APEC 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 Organisation (CSIRO, Australia)
- Regulators' Forum
- WTO TBT notification.

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

Through the Warm Up New Zealand: Heat Smart programme, EECA has contractual agreements with private service providers to safely install insulation and clean heating measures into homes.

## REFERENCES

DBH (2006) *Compliance Document for New Zealand Building Code Clause H1 Energy Efficiency – Third Edition*, Department of Building and Housing, Wellington, www.dbh.govt.nz/UserFiles/File/Publications/Building/Compliance-documents/clause-H1.pdf.

EECA (2009) *Legislation*, Energy Efficiency and Conservation Authority, Wellington, www.eeca.govt.nz/about-eeca/eecas-role/legislation.

—(2010a) *Vehicle fuel economy labels*, Energy Efficiency and Conservation Authority, Wellington, www.eeca.govt.nz/standards-and-ratings/vehicle-fuel-economy-labels.

—(2010b) *Warm Up New Zealand: Heat Smart*, Energy Efficiency and Conservation Authority, Wellington, www.eeca.govt.nz/node/3107.

New Zealand Government (2007) *New Zealand Energy Efficiency and Conservation Strategy: Make it happen*, Wellington, www.eeca.govt.nz/sites/all/files/nzeecs-07.pdf

# PERU

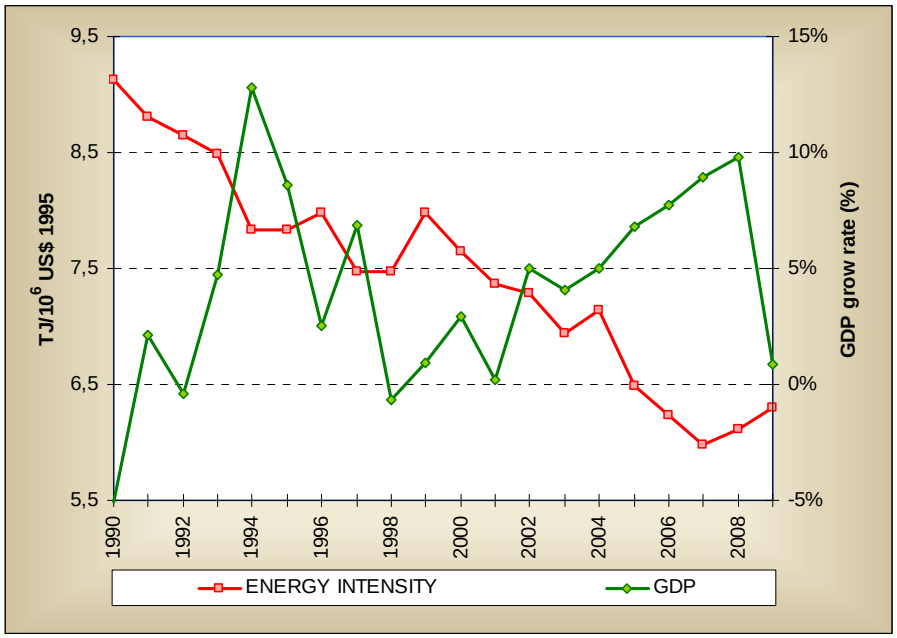
## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

#### a) Key indicator

The energy intensity is the indicator which gives the idea of energy efficiency performance. The energy intensity and the Gross Domestic Product (GDP) grow rate of Peru is shown in Figure 1.

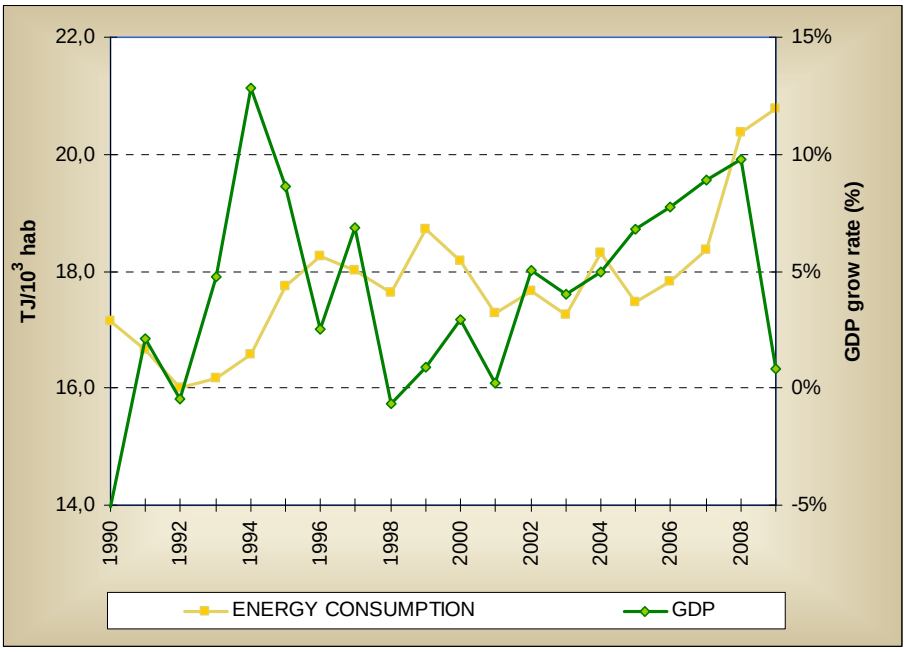
**Figure 1. Peruvian Energy Intensity and GDP**




**Source: Energy Balance of Peru 2009/Ministry of Energy and Mines/Central Reserves Bank of Peru**

In the period 1990 – 2009, the energy intensity decreased from 9.13 TJ/$10^6$ (at US$ 1995) to 6.30 TJ/$10^6$ (at US$ 1995), but the tendency appears to be changing in 2008 and 2009 because the International Financial Crisis affected the economy and the energy demand. In the short-term, the Peruvian Government will work in projects such as appliances and industrial equipment labelling, lighting improvement, installing solar water heaters for electric water heaters replacement and so on in order to increase the energy efficiency. The other component of the Energy Intensity is the GDP, and it grew around 6% until 2008. For the same period, the energy consumption per capita is shown in Figure 2.

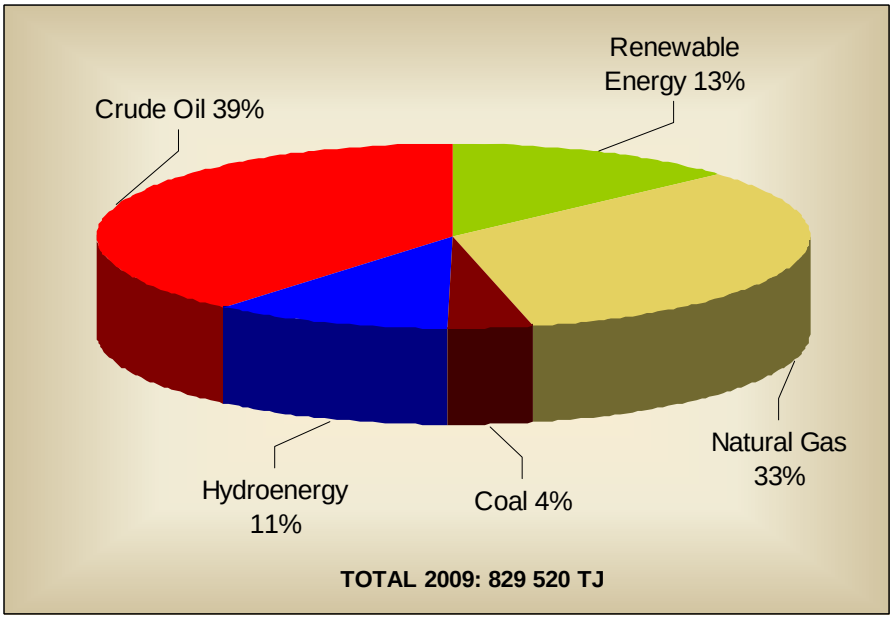
**Figure 2. Peruvian Energy Per Capita Consumption**




**Source: Energy Balance of Peru 2009/Ministry of Energy and Mines/Central Reserves Bank of Peru**

The energy per capita consumption increased from 17 TJ/Thousand people to 21 TJ/Thousand people. It is important to highlight that in 2009 despite the fact that grow rate of GDP decreased the energy consumption per capita grew. In order to satisfy the energy demand, the energy matrix of primary energy had behaviour as is shown in Figure 3.

**Figure 3. Energy Matrix of Peru in 2009**




**Source: Energy Balance of Peru 2009/Ministry of Energy and Mines**

In 2009, natural gas represented 33% of the energy gross internal supply of primary energy. In the short-term, renewable energy share will increase because there are some renewable energy projects which will be implemented as a result of the first action to produce electricity with solar energy, wind energy and small hydropower plants. The challenge for the government is to mitigate the hydrocarbons consumption mainly by liquids, and a result is that crude oil share might decrease in the long-term. The hydro energy is an abundant source in the economy and it might increase the share in the long-term. The result of the National Energy Plan will be the energy matrix for 2040.

**b) Goals**

Develop the energy efficiency and promote the use of renewable energy.

**c) Base year**

2009

**d) Goal year**

2040

**Description**

The Peruvian Government through the Ministry of Energy and Mines (MINEM) will develop the National Energy Plan taking the base of the Energy Policy released on 24 November 2010. According to the Law of Promotion for the Efficiency Use of Energy (Law No. 27345), the current document related to Energy Efficiency is the Referential Plan of Efficient use of the Energy 2009-2018 which will be updated with the results from the National Energy Plan.

The Vice-Ministry of Energy in coordination with the professionals of the General Directorates developed the Energy Policy published in the document "POLITICA ENERGETICA DE ESTADO PERU 2010-2040" (Peruvian State Energy Policy 2010-2040). This document will be the base of the National Energy Plan.

The nine Energy Policy Objectives are described below:

1. To count with a diversified energy matrix, with emphasis on renewable energy and energy efficiency.
2. To count with a competitive energy supply.
3. To have total access to the energy supply.
4. To count with the major efficiency in the productive chain and use of the energy.
5. To get self-sufficiency in the energy production.
6. To develop an energy sector with minimum environmental impact and low carbon emissions in the framework of sustainable development.
7. To develop a natural gas industry, its use in households, transportation, commerce, industry and efficient power generation.
8. To strengthen the institutionalism of the energy sector.
9. To integrate the Peruvian energy sector with energy markets in South American region fulfilling the long-term vision.

Each objective has been detailed to fulfill the vision. The instruments, activities and actions will be based on the energy policy and will be part of the National Energy Plan which might be made before 2012.

## 1.2. Sectoral Energy Efficiency Improvement Goals

**a) Sector**

As mentioned before, the Referential Plan for the Efficient Use of Energy 2009-2018 is in force till the National Energy Plan is complete. The referential plan contemplates goals in four sectors, where the energy efficiency improvements are to be approached from the energy demand point of view. The sectors to be considered are:

- Residential
- Industry (productive and service)
- Public
- Transportation

**b) Goals**

The Peruvian government has established the goal of 15% energy savings among the residential, industry (productive and services), public and transportation sector. To achieve this goal, all action plans will be implemented in each sector as proposed in the referential plan.

**c) Base Year**

2005

**d) Goal year**

2018

The reduction of energy demand implementing energy efficiency programs in each sector from 2009 to 2018 is shown in Table 1.

**Table 1. Reduction of energy demand by sectors**

| Sector | Total (PJ) |
|---|---|
| Residential | 143.63 |
| Industry (Manufacturing & Services) | 147.14 |
| Public | 0.91 |
| Transportation | 80.95 |
| TOTAL | 372.64 |

**Source: Referential Plan for the Efficient Use of the Energy 2009-2018, Ministry of Energy and Mines (NINEM), Peru.**

## 1.3. Action Plans for Promoting Energy Efficiency

### 1.3.1 Action Plans or Strategies for Promoting Energy Efficiency

**a) Name**

The current instrument in energy efficiency matter for the Peruvian Energy Sector is the Referential Plan for the Efficient Use of Energy 2009-2018 approved in October 2009 by The Ministry of Energy and Mines.

**b) Objectives**

To promote and disseminate the features and benefits of energy efficiency at all levels through visual media, print media, and so on.

**c) Applicable sectors**

The Referential Plan for the Efficient Use of Energy in Peru contemplates goals in four sectors, and energy efficiency improvements were taken from the energy demand point of view. The sectors are:

- Residential
- Industry (manufacturing and services)
- Public
- Transport.

**d) Outline**

The Peruvian government has actively pursued energy efficiency since the 1980s and 1990s, through the creation of the Energy and Environment Centre (CENERGIA) in 1986 and Energy Conservation Program (PAE) in 1994. The Government Decree regulating the Law for the Promotion of Efficient Use of Energy, which requires MINEM to formulate an energy efficiency policy (as part of the economy's energy policy), was established in 2000. As a result of this policy, the government has elaborated the Referential Plan for the Efficient Use of Energy 2009–2018, which is the current instrument to achieve the energy efficiency goals through the action plans proposed in each sector. From the Referential Plan, different action plans in four sectors were contemplated, which are described as follows:

*Residential sector:* There are several proposals in order to achieve the energy saving goals in the sector; however, only four projects have been taken into account which could have high impact within the sector:

1) Modernisation of lighting
2) Improved energy consumption habits of people
3) Replacement of electric water heaters with solar water heater systems
4) Replacement of traditional wood stoves with improved wood stoves.

*Industry sector (productive and service sector):* According to the Efficient Use of Energy and Energy Diagnosis Guidelines of 2008, equipment with high energy demand includes motors, heaters and lighting equipment. For this reason, the action plans are focused on these. Four major impact projects are considered:

1) Replacement of conventional motors with efficient electric motors
2) Optimisation and modernisation of high-pressure heaters
3) Modernisation and improvement of lighting
4) Implementation of cogeneration projects.

*Public sector:* According to the Efficient Use of Energy and Energy Diagnosis Guidelines of 2008, higher electricity demand comes from lighting and computers, as well as air conditioners in buildings. One of the principal projects here is the Efficient Lighting in the Public Sector.

It is worth to mention that building sector was one of the most dynamic sectors in the last years, on which cause there is a coordinated work among the Ministry of Energy and Mines and the Ministry of Housing.

The Referential Plan for the Efficient Use of Energy includes some issues regarding this sector: Efficient building, energy efficiency labelling, efficient house appliances, among others.

*Transport sector:* In Peru, most of the energy consumption in transport sector is related to road transport (80%), which is the sub-sector where energy efficiency improvements should be developed. Two of the most important projects that have been quantified in the Referential Plan are Efficient Driver Project and One Day without a Car Project.

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

There is currently no budget allocation for new action plans. However, the Peruvian Government is working to establish a financing mechanism for the energy efficiency market. In case of the programs in industry (production and service sectors), the mechanisms are:

- Promotion of financing mechanisms for medium- and large-size enterprises by means of commercial banks
- Implementation of a trust fund for the promotion of the efficient use of energy (Fideicomiso para la Promoción del Uso Eficiente de Energía).
- Financing programs from International Technical Cooperation for medium- and small-size enterprises.

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

In the framework of Law No. 27345 (Ley de Promoción del Uso Eficiente de la Energía) of 8 September 2000, and its Supreme Decree No. 053-2007-EM of 2007, the Peruvian Government designated Energy Consumption Indicators as a Ministerial Resolution, which was published as RM No. 038-2009-MEM/DM on 21 January 2009. The purpose of the Energy Consumption Indicators is the development of a fundamental tool to achieve the economy's goals on energy efficiency.

**Activities for monitoring and reporting**

On 1 January 2009, the Peruvian Government published the Ministerial Resolution (or Supreme Decree) No. 038-2009-MEM/DM, which approves the Energy Consumption Indicators and monitoring methodology for key economic sectors.

**Departments/agencies for monitoring and reporting**

Currently, the General Directorate of Energy Efficiency of the Ministry of Energy and Mines (MINEM) is responsible for the energy efficiency and renewable energy policies and monitoring activities.

**Outputs of monitoring**

The Supreme Decree on Energy Consumption Indicators and its Monitoring Methodology will establish disaggregated indicators for each sector with the purpose of developing Energy Action Plans encouraged by the Ministry of Energy and Mines (MINEM) in the coming years.

Several energy indicators have been developed for residential, industry and commercial sectors, as well as the public and transport sectors. Also, global indicators have been identified to be followed.

**Outcomes of monitoring**

The Supreme Decree was approved recently, as well as the management application.

**Financial resources and budget allocation for monitoring**

Will be developed with the National Government Budget

**Description**

The goal is to become acquainted through sectoral indicators with the necessary considerations to establish directives or guidelines in the Referential Plan of the Efficient Use of Energy.

**g) Expected results**

To achieve the goals outlined in Section 1.2

**h) Future tasks**

The current Referential Plan will provide the goals and will be regularly revised and updated according to recent available data.

## 1.4. Institutional Structure

### 1.4.1 Central Institutional Structure

**a) Name of organisation**

The Ministry of Energy and Mines changed its organization with DS N° 026-2010-EM on 28th may 2010, the Energy Vice Ministry added the Energy Efficiency Directorate; Figure 4 shows the new structure.

**Figure 4. Organization of the Vice-Ministry of Energy, Peru**


**b) Status of organisation**

Government

**c) Roles and responsibilities**

The General Directorate of Energy Efficiency is in charge of:

- Propose the Energy Policy.
- Propose the Energy Efficiency Policy.
- Promote the culture of rational and efficient use of the energy.
- Design and propose energy efficiency programs.
- Incentive the energy efficiency and renewable energy market.
- Others indicated in DS N° 026-2010-EM.

**d) Covered sectors**

All economic sectors

**e) Established date**

Starting point 2010

### f) Number of staff members

In the General Directorate of Energy Efficiency, there are three areas related to the following issues: Energy Planning and Policy; Energy Efficiency and Renewable Energy and Promotion, Training and International Cooperation.

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

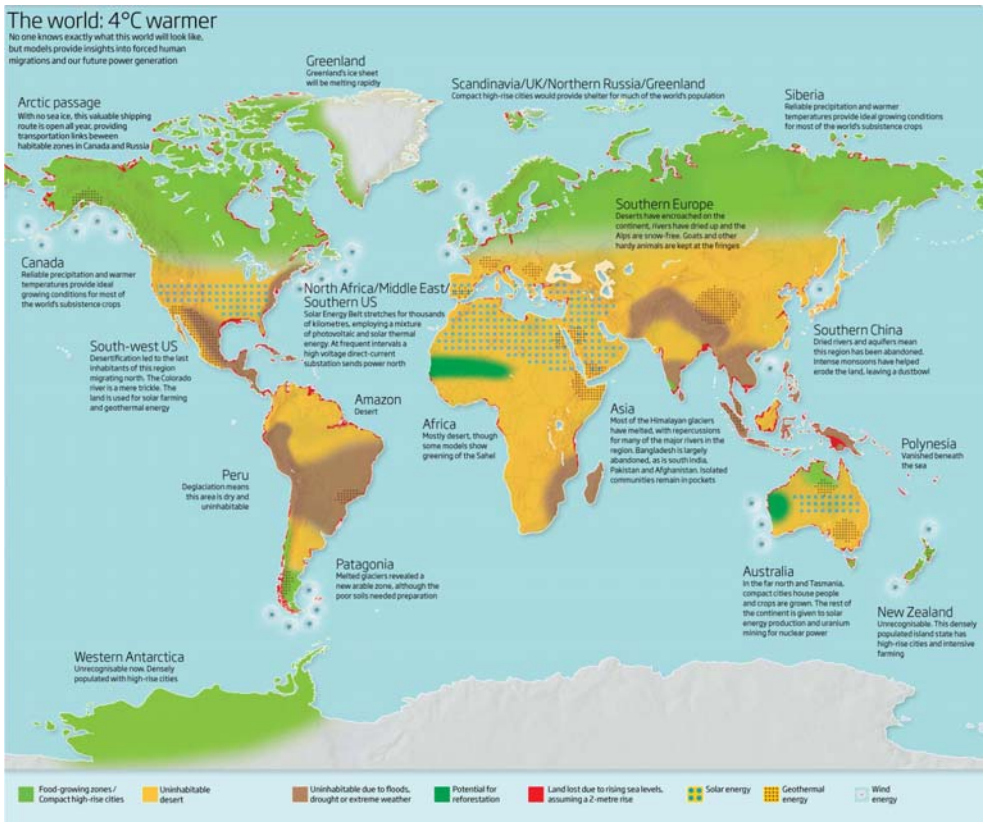
### a) Information collection and dissemination

The General Directorate of Energy Efficiency is also in charge of coordinate, supervise and consolidate statistic information of the energy sector, as well as, elaborate and keep the data base updated in coordination of the others General Directorates of the Vice-Ministry of Energy. In this matter, the General Directorate of Energy Efficiency is working to implement a data base of energy efficiency and renewable energy.

### b) Awareness-raising

Peru is vulnerable to climate change; as shown in the Figure 5.

**Figure 5. Climate change vulnerability**




The Peruvian Government is conscious of climate change and the effects in the economy, that is why, the public institutions such as Ministry of Energy and Mines, Ministry of Agriculture, Ministry of Environment and others are working together, they meet private companies and international organizations in this matter.

The national energy policy is based on energy efficiency and renewable energy, the Ministry of Energy and Mines has signed an inter-institutional agreement with the Ministry of Education to implement in the curricula of primary and secondary students topics such as sustainable development, efficient and responsible use of the renewable and non-renewable energy, electric security and environment protection. This agreement also ratified the

consideration in the civic calendar of the schools "The National Energy Saving Day", every year on 21st October both institutions will work together to promote the participation of educative institution in order to incentive the energy efficiency culture to pupils, teachers, parents and the whole community.

**c) Capacity-building**

The professionals of this directorate periodically participate in training programs in Peru and abroad.

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

#### 1.6.1. Specific Policies on Energy Efficiency RD&D

The Peruvian government does not have a specific program on research, development and demonstration (RD&D), the National Energy Plan might implement it according to the Law of Promotion of the Energy Efficiency (Law No. 27345) statements and its Regulations.

#### 1.6.2. Programs on Energy Efficiency RD&D

Same as above.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

**a) Name**

Promotion Law of Efficient Use of Energy (Law No. 27345), released on 8 September 2000.

**b) Purpose**

To national involvement of the energy efficiency promotion to guarantee the energy supply, protect the final consumer, encourage the competitiveness of the national economy and mitigate negative environmental impacts from energy consumption.

**c) Applicable sectors**

All economic sectors

**d) Outline**

The national authority related to Energy Efficiency in Peru is the Ministry of Energy and Mines. The Law No. 27345 gave attribution to:

- Promote the establishment of a culture directed to employ the efficient use of the energy resources in order to propel the sustainable development of the country looking for equilibrium between environment conservation, social and economic development.
- Promote the creation of Energy Service Companies (ESCOs).
- Coordinate with the rest of sector and public and private entities to develop energy efficiency policy.
- Others.

According to the Law No. 27345 all the equipment sold in Peru have to include energy consumption information (promotion of eco-labelling), under responsibility of producers and importers.

Currently the General Directorate of Energy Efficiency is responsible for Energy Efficiency and all matters indicated in the Law No. 27345.

**e) Financial resources and budget allocation**

The Law No. 27345 does not mention any kind of financial resource; it has to be included in the regulations.

**f) Expected results**

Regulate the Law No. 27345 to promote the efficient use of the energy. The energy efficiency contribute to make sure the energy supply, improve the national competitiveness, mitigate environmental impacts, protect the energy consumer and become conscious of the Efficient Use of the Energy.

## 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**

The objective of these regulatory measures is to promote the energy efficiency to make sure the energy supply in the long-term, improve the national competitiveness in all sectors, mitigate the environmental impacts for productions and consumption of energy, to protect the energy users and make conscious towards 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 Involve the whole economic sectors.

**d) Outline**

Develop the culture of efficient use of energy.

The ministry has to organize activities to promote a culture of efficient use of the energy, in coordination with public and private institutions.

The actions are developed in al education levels, including teachers' formation.

The Ministry organizes activities to create consciousness in the different segments of the population in the regions about the energy efficiency.

Every 21st October is the National Saving Energy Day.

The Ministry of Energy and Mines has to coordinate with universities of the economy the dictation of pre and post-graduate courses related to energy efficiency.

The Ministry of Energy and Mines promote develop of programs about scientific and technologic research applied to Energy Efficiency.

The energy efficiency has to be applied in four main sectors:

*Household sector:* Programs to improve habits towards efficient consumption and efficient equipment use. Release publicity; organize informative and demonstrative campaigns related to energy efficiency getting information conducting surveys and other mechanisms.

*Productive Sector and Services*: Promote the creation of energy efficiency market. Form energy service companies ESCOs. Elaborate energy efficiency indicators. Establish energy efficiency limits by productive activity 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). In regions where there is natural gas for vehicles; public vehicles have to shift fuel from gasoline to natural gas. Develop energy indicators in the sector to evaluate the best practices of the energy efficiency uses.

*Transportation sector*: Incentive best practices and capacitating programs for energy efficient use in vehicles. Promote training and updating in driving, engines and fuel use to taxi, public transport and truck drivers. Improve traffic management.

The Ministry of Energy and Mines has to develop the Energy Efficiency Referential Plan in coordination with the regional governments.

**e) Financial resources and budget allocation**

According to the Law No. 27345, the article 11th of the title VI mention that the Ministry of Energy and Mines coordinates with finance national and international entities to participate in the developing of energy efficiency projects.

Furthermore, the Law allows the ministry to find donations and international cooperation on energy efficiency and renewable energy issues.

**f) Expected results**

Energy Efficiency culture improvement. Get sufficient energy supply to attend the whole country with local resources.

### 2.2.2. Promotion of the electricity production with renewable energy

**a. Name**

Legislative promotion of electricity generation with renewable energy - Legislative Decree No. 1002.

**b. Purpose**

The objective of this Legislative decree is to promote the energy renewable resources to generate electricity in order to improve the health quality of the population and protect the environment.

**c. Applicable sectors**

All Energy Sectors.

**d. Outline**

Declare as national interest the participation of renewable energy in the electricity generation matrix.

The ministry establishes every five years the share (percentage) for the electricity generated from renewable resources. The percentage will be 5% each year the first five years. Renewable resources must be considered biomass, wind, solar, geothermal and tidal energy. In this category hydro energy is considered for power plants less than 20 MW of capacity.

The electricity from renewable energy has priority in the daily electric dispatch made by COES (Operator of the Electric System), it is also considered zero variable cost.

**e. Financial resources and budget allocation**

To sell total or partially the electricity production, the owners have to put the energy in the short term market with its price in that market, complemented with a prima in case of the marginal cost result minor than the tariff determined by OSINERGMIN(regulator of the system).

The tariff and the prime are determined in the way to guarantee 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 Ministry of Energy and Mines and the regional governments will encourage research projects.

The Ministry of Energy and Mines will develop the Referential Plan of Renewable Energy to get the optimum percentage of electricity got from renewable energy, improving the human health and protect the environment.

### 2.2.3. Minimum Energy Performance Standards and Labelling

The Law for the Promotion of the Efficient Use of Energy (Law No. 27345 of 2000) requires mandatory energy efficiency labelling of energy consuming equipment and appliances. This requirement has been confirmed by Supreme Decree No. 053-2007-EM of 23 October 2007 regulating Law No. 27345/2000. The Ministry of Energy of Mines (MINEM) has the goal to develop and implement energy efficiency standards and labelling for a wider range of end-use appliances and to develop and implement a comprehensive market transformation strategy, based on mandatory energy efficiency labelling, minimum energy performance standards (MEPS), and the development of testing infrastructure and procedures and consumer awareness. The proposed project will build on the achievements so far and provide support in developing and implementing all those measures that are necessary to overcome the institutional, technical and awareness-related barriers that prevents the implementation of this strategy, in particular:

1) Increase the awareness and strengthen technical and managerial capacities of government and other key public and private agents
2) Carry out a market study in order to establish a comprehensive and detailed data base of energy end-uses and end-use technologies
3) Develop a market transformation strategy for the introduction and dissemination of energy efficiency standards and labelling
4) Design and implement market transformation instruments (additional technical and energy efficiency labelling standards, MEPS)
5) Foster the development of the required infrastructure and procedures for product testing and certification, in particular test laboratories
6) Develop and implement an enabling legal and regulatory framework, in particular government regulations for mandatory energy efficiency labelling 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 Labelling Committee and the Regional Energy Efficiency S&L Information System will foster exchange of experience and coordination of economy-wide programs with other economies in the region.

### 2.2.4. Voluntary Measures

### 2.2.5. Energy Efficiency Labelling

**a) Name**

Guideline for Labelling

**b) Level**

Central

**c) Purpose**

To gather information on energy efficiency of households and their minimum performance standards with the goal of promote the culture on energy efficient consumption

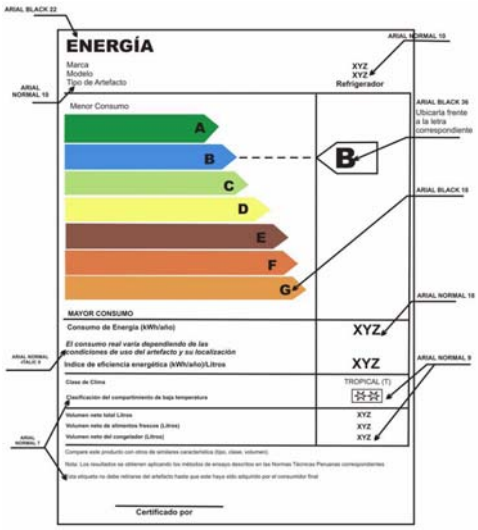
**d) Applicable sectors**

All economic sectors.

**e) Outline**

The development of test procedures and energy efficiency labelling standards in Peru begun in 1996 by the Technical Committee of Standardization for Rational and Efficient Use of Energy (CTNUREEE) and its respective subcommittees, with the participation of relevant public and private agents. So far, 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 labelling standards are in place for refrigerators and freezers, household lamps and electric motors, in addition to minimum efficiency performance standards for CFLs.

**Figure 6. Energy efficiency label for appliances.**




It is a voluntary measure, and it came into effect in January 2009.

### 2.2.6. 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.

**c) Purpose**

To induce the public sector to reduce its energy demand through energy efficiency campaigns and promotes the use of more efficient equipment.

**d) Applicable sectors**

All economic sectors.

**e) Outline**

It is a mandatory measure, which was published in June 2008.

**f) Financial resources and budget allocation**

Funding comes from the Ministry of Energy and Mines.

**g) Expected results**

In the coming years, this activity should be implemented as it is part of the Law on Promotion of Energy Efficiency and its Regulations, which were approved in 2007.

#### 2.2.7. Technical Norms (Standards) on Energy Efficiency

**a) Name**

Technical Norms (Standards) on Energy Efficiency (Essays, Limits, and Labels).

**b) Level**

Central.

**c) Purpose**

To provide the 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 47 voluntary norms (standards), which have been approved and published from 2000 to the present.

**f) Financial resources and budget allocation**

Funding comes from the Ministry of Energy and Mines.

**g) Expected results**

No information available.

### 2.3. Financial Measures Taken by the Government

#### 2.3.1. Tax Scheme

No information available.

#### 2.3.2. Low-Interest Loans

The Development Financial Corporation (COFIDE) is implementing the “Bio-business Program” with a 65 illion Euros fund coming from the German Kreditanstalt für Wiederaufbau (KfW). This Program aims to foster energy efficiency and renewable energy projects by giving low-interest loans to project promoters and developers. All sectors are included. The loans will be given through Peruvian commercial banks. The planning to start such program is on March, 2011.

#### 2.3.3. Subsidies and Budgetary Measures

No information available.

#### 2.3.4. Other Incentives

No Information available.

### 2.4. Energy Pricing

Pricing is electricity market based in form of marginal cost.

### 2.5. Other Efforts for Energy Efficiency Improvements

#### 2.5.1 Cooperation with Non-Government Organisations

There is no financial support for NGOs.

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

Peru has cooperation through bilateral schemes with international organisations such as:

- Japan International Cooperation Agency (JICA)
- German Technical Cooperation (GTZ)
- United Nations Development Program (UNDP)
- Inter-American Development Bank (IADB)
- The Global Environment Facility Trust Fund (GEF) of the UNDP.
- United States Agency for International Development (USAID)

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

- The General Directorate of Energy Efficiency is promoting the project "Peruvian sustainable universities to slow down climate change". This project aims to foster energy efficiency projects and the use of renewable energy in university campuses, by means of the application of the ESCO methodology and other relevant methodologies.

  Universities must sign a long-term Climate Neutrality Commitment before they can take advantage of the benefits.

  Fourteen universities have already signed the Commitment.

- The Ministry of Housing is elaborating the "Standard for Bioclimatic Building with Energy Efficiency". The Ministry of Energy and Mines and other relevant stakeholders participate in this effort.

  The aim of the new standard is to increase comfort, to save energy, and to mitigate GHG emissions by designing according to local climate and using local construction materials.

  The Peruvian Bioclimatic Map foresees nine bioclimatic regions and is already developed.

## REFERENCES

El Peruano (2010), *Aprueban la Política Energética Nacional 2010 - 2040*, Decreto Supremo N° 064-2010-EM, Diario Oficial (Official Gazette), November 24, 2010, Lima Perú. www.elperuano.com.pe

El Peruano (2010), *Modifican Reglamento de Organización y Funciones del Ministerio de Energía y Minas*, Decreto Supremo N° 026-2010-EM, Diario Oficial (Official Gazette), November 24, 2010, Lima Perú. www.elperuano.com.pe

MINEM (2009), *Plan Referencial del Uso Eficiente de la Energía 2009 – 2018*, Ministerio de Energía y Minas, October 26, 2009, Lima, Perú, www.minem.gob.pe

MINEM (2009), Sistema Interactivo del Uso Eficiente de la Energía, Ministerio de Energía y Minas, Lima, Perú, www.siee.minem.gob.pe

El Peruano (2000), *Ley de Promoción del Uso Eficiente de la Energía N° 27345*, Diario Oficial (Official Gazette), September 8, 2000, Lima, Perú, www.elperuano.com.pe

El Peruano (2007), *Reglamento de la Ley de Promoción del Uso Eficiente de la Energía*, Decreto Supremo N° 053-2007-EM, Diario Oficial (Official Gazette), October 23, 2007, Lima, Perú, www.elperuano.com.pe

El Peruano (2008), *Dictan medidas para el Ahorro de Energía en el Sector Público*, Decreto Supremo N° 034-2008-EM, Diario Oficial (Official Gazette), June 19, 2008, Lima Perú. www.elperuano.com.pe

El Peruano (2009), *Aprueban Indicadores de Consumo Energético y la Metodología de Monitoreo de los mismos*, Resolución Ministerial N° 038-2009-MEM/DM, Diario Oficial (Official Gazette), January 21, 2009, Lima Peru. www.elperuano.com.pe

El Peruano (2008), *Decreto Legislativo de promoción de la inversión para la generación de electricidad con el uso de energías renovables*, Decreto Legislativo N° 1002, Diario Oficial (Official Gazette), May 01, 2008, Lima, Perú, www.elperuano.com.pe

El Peruano (2009), *Reglamento de la generación de electricidad con el uso de energías renovables*, Decreto Supremo N° 050-2008-EM, Diario Oficial (Official Gazette), October 01, 2008, Lima, Perú, www.elperuano.com.pe

GEF (2008), The GEF Trust Fund, Project Identification Form (PIF), April 2008, www.si3ea.gov.co/Portals/0/URE/Peru.pdf

GEF – UNDP – UPME, *Proyecto CSL – Andino*, Unidad de Planeación Minero-Energética, Bogotá, Colombia, www.si3ea.gov.co/Inicio/CSLAndino/tabid/86/Default.aspx

.

# PHILIPPINES

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

The Philippine Government launched The National Energy Efficiency and Conservation Program (NEECP) in August 2004. It plans to further strengthen the implementation of energy efficiency and conservation programs through the promotion of saving and efficient utilisation of energy in the economy in the period 2005-14. The Government's objective is to make energy conservation a way of life for every Filipino through its theme dubbed as '***EC*** Way of Life'.

Since then, to effectively promote the NEECP, the DOE in cooperation with the private sector has continuously pursued the strong implementation of existing energy conservation programs to rationalise energy demand consumption. The NEECP is a comprehensive plan to institute measures for improving energy efficiency and conservation in all sectors of the economy by 2014, particularly for petroleum products and electricity in the Philippines.

The overall goals of the program are to:

- Curb the impact of oil price volatility on the economy and reduce carbon dioxide emissions to protect the environment
- Improve utilisation by all users through energy efficiency and conservation programs, which is expected to achieve an estimated potential cumulative energy savings of 9.08 million barrels of fuel oil equivalent (boe) at the end of the planning period in 2014.

These goals where further highlighted in the 2008 Philippine Energy Summit which has been considered and incorporated as part of the DOE's plans and programs for 2009 to 2030. The Summit likewise emphasized the relevance of human factor in the success and widespread implementation of energy efficiency and conservation programs.

### 1.2. Sectoral Energy Efficiency Improvement Goals

The Philippines has no sectoral quantitative goals in its NEECP. However, under the 2009-30 Philippine Energy Plan (PEP), the government's energy efficiency and conservation program was to set a sectoral energy efficiency goal from the previous program based on the planning goal. Accordingly, a target reduction of 10% of final energy demand has been set for the commercial, residential, industrial, transport and agriculture sectors.

### 1.3. Action Plans for Promoting Energy Efficiency

The Philippine National Energy Efficiency and Conservation Program is a medium-term comprehensive program of work for promoting energy efficiency in the Philippines. According to the NEECP framework, there are nine components focusing on the entire area of energy efficiency with specific actions to achieve goals.

**a) Objectives**

The specific objectives of NEECP are:

- To reduce the impact of the increase in prices of petroleum products and electricity through the implementation of energy efficiency and conservation measures
- To promote cost avoidance/savings for fuel and electricity without sacrificing productivity
- To help protect the environment

- To generate cumulative energy saving for the planning period 2007–14 by 9.08 million boe, which is to a deferred megawatt capacity of 210.56 MW and greenhouse gas (GHG) emissions of 2 917.07 giga-grams (hereafter Gg) of $CO_2$ at the end of planning year.

**b) Applicable sectors**

The NEECP is being implemented in the period 2007–2014. It contains a comprehensive set of measures that cover six sectors: government (government energy management, education and information), industry (including power), residential, commercial, agriculture, and transport.

**c) Outline**

The NEECP consists of nine components across six sectors including[18]:

**Component 1:** *Social Mobilization, Information, Education and Communication Campaign*

**Component 2:** *Energy Efficiency Standards and Labelling Program*

**Component 3:** *Government Energy Management Program (GEMP)*

**Component 4:** *Energy Management Services/Energy Audits*

**Component 5:** *Voluntary Agreement Program*

**Component 6:** *Recognition Award Program*

**Component 7:** *Fuel Economy Run Program* (currently part of the IEC program; however, necessary to establish/generate significant data for a vehicle labelling program in the future)

**Component 8:** *Locally Funded Projects that promote Energy Efficiency Conservation* include:

- Fuel Conservation and Efficiency in Road Transport (FCERT)
- Power Conservation and Demand Management (Power Patrol)
- Philippine Energy Efficiency Project (PEEP—a USD 31 million ADB loan by the Philippine Government to promote energy efficiency conservation)

**Component 9:** *Foreign Assisted/Technical Assistance*. This includes Philippine Industrial Energy Efficiency Project for the Philippines (a UNIDO-assisted project with the objective of showing optimisation system models in industrial manufacturing facilities and to establish Philippine Energy Management Standard in view of ISO 5001)**.**

Major programs that have been implemented as of 2008 are as follows:

**Social Mobilization and IEC Campaign**

The main focus of the IEC campaign is to promote the efficient use and conservation of electricity and fuel in all energy-consuming sectors. The campaign is in compliance with E.O. 123 ‘Institutionalising the committee on power conservation and efficiency in road transport’ (Road Transport Patrol). Among the activities conducted under the IEC campaign are seminar-workshops for target participants in commercial, residential, industrial and government buildings; fuel economy runs for road transport vehicles; and the use of television, radio and print media ads to reach wider target sectors.

About 25 seminar-workshops on energy conservation were held across the economy in 2007 with an additional 28 in 2008 with participants from the sectors of government, business and transport, as well as academia, especially elementary and high school students and teachers.

[18]NEECP, answers of the Philippine Government from questionnaires for energy efficiency compendium, 2009.

Energy efficiency and conservation dissemination through television channels and radio stations has reached a wider consumer base in the residential and transport sectors.

**Voluntary program**

Activities under this program include the promotion of the car-less day, carpooling and anti-idling campaigns. The aim is to promote fuel conservation and reduce pollution and traffic congestion in the economy in partnership with various transport groups, local government units, schools and shopping malls as well as with private individuals. A voluntary agreement has been arranged between the DOE and the industrial establishments under the so-called Partnership for Energy Responsive Companies/Ecozones.

**Energy Efficiency Standards and Labelling Program**

As part of its continuing efforts to promote the welfare of consumers, the DOE has been closely cooperating with various organisations including through an active alliance with DTI, Philippine Appliances Industry Association and the Philippine Lighting Industry Association for the effective implementation of the government's energy efficiency standard and labelling for selected household appliances and lighting products. Significant benefits have been gained through this program such as the improved quality of locally-manufactured products, making them more competitive in the local market. At the same time, it discourages the manufacturing and the importation of inefficient household appliances and lighting products sold in the market. Through the program, the country was able to save 13.03 MMBFOE (1.88 MTOE) for the period 2007 to 2008 which is equivalent to US$ 1.05 billion in savings.

The DOE aims to expand the coverage of the program within the planning period to include fluorescent lamps, luminaries, household electric fans, industrial fans and blowers, television sets and electric motors. Consumer education will also be undertaken as a complementary activity for the effective implementation of the program.

This program is also expected to generate the biggest contribution of energy savings from 0.97 MTOE in 2010 to reach 1.17 MTOE in 2014.

Apart from the above-mentioned programs, the Philippine Government is carrying out the following measures:

- Pursuing the passage of the Energy Conservation Bill into law
- Pursuing the inclusion of standardised technical specification requirements in the procurement process of energy efficiency lighting systems and other electrical equipment and devices in government offices
- Developing a benchmark in commercial and government buildings including in the manufacturing industry sector
- Filling in the gap in the implementation of utility-based demand-side management (DSM), market-based applications under the Demand Reduction Program will instead be promoted. At the same time, the existing policy framework for utility-driven DSM will be reviewed, and a new set of recommendations will be submitted to concerned stakeholders for consultation to provide new policy directions
- Evaluation of the impact of IEC programs in the household sector through contracted survey services under the auspices of the National Statistics Office (NSO)
- Strengthening of product testing and research through the enhanced testing capability of the DOE lighting and appliance testing laboratory Inventory of legitimate and accredited testing laboratories to encourage the private sector to set up independent and competent testing laboratories
- Promotion and establishment of accreditation of ESCOs
- Intensified promotion of heat rate improvement in power plants
- Establishment of energy labels for all new vehicles regarding the fuel mileage rating

- Expanding promotion of the Energy Efficiency and Conservation Program and Energy Consumption Monitoring in large seaborne vehicles, such as passenger and cargo ships, power generation plants and power distribution utilities.

The above measures will also help the government to review the NEECP, determine appropriate levels of funding for various initiatives, allow for increased competition and accountability among implementing partners, and determine appropriate roles for private sector participation.

**Government Energy Management Program (GEMP)**

The GEMP aims to integrate energy efficiency concepts into the operation of government agencies to realise the reduction target of 10% in electricity and fuel consumption in compliance with the presidential directive under A.O.126. The major activities under this program include conducting monitoring and energy audit spot checks in all government buildings and the carrying out seminars on energy efficiency and conservation for government employees.

In 2007 and 2008, the DOE was able to conduct spot checks in about 300 government buildings across the economy.

**System Loss Reduction Program**

Under the umbrella of the Energy Management Program, the System Loss Reduction program enables private utilities to reduce their system losses through redesigns of transmission lines and improvement of substation equipment such as installation of capacitors.

**Recognition Program**

In recognition of the private sector's effort to promote and implement energy conservation programs, the Don Emilio Abello Energy Efficiency Awards are presented to private companies that make significant improvements in their energy consumption patterns. On the other hand, the Government Energy Management Program Award is given to government agencies that exceed the mandatory 10% reduction in energy consumption. In addition, the ASEAN Energy Management Award for Major buildings and industries was launched in 2000 under the program area on energy efficiency and conservation of the ASEAN Plan of Action (2000–09). Objectively, this is a recognition program aimed to provide international prominence and recognition to buildings and entities. For this award, San Miguel Polo Brewery and Republic Cement Corporation gained first and second runner up recognition at the award night on 24 August 2007 in Singapore.

**Energy Auditing**

This technical service is offered by the DOE to manufacturing plants, commercial buildings and other energy-intensive facilities to evaluate the energy utilisation efficiencies of equipment, processes and operation of the companies, and appropriate energy efficiency and conservation measures are recommended.

In 2006, the DOE conducted energy audits at 16 industrial and commercial companies across the economy. This activity is continuously implemented in partnership with accredited energy service companies (ESCOs). In order to enhance the energy management advisory services in the economy, the Energy Service Company Association of the Philippines was organised in 2004. This association intends to (a) organise the firms engaged in the energy service industry to provide a forum for the effective exchange of information about industry practices and introduce new technologies for the industry; and (b) promote energy efficiency and demand reduction technologies, thereby creating tangible economic value.

**Philippine Efficient lighting Market Transformation Project (PELMATP)**

Since the project's inception in 2005, the UNDP-GEFF-funded PELMTP has been aggressively addressing the barriers to the widespread use of energy-efficient lighting systems

(EELS) in the economy. The project aims to achieve an aggregate energy savings of 29 000 MWh and a reduction of about 4600 Gg of $CO_2$.

There are five core components in the achievement of these objectives, namely EEL policy, Standard and Guidelines Enhancement Program, EEL Application Consumer Awareness Improvement Program, EEL Initiatives Financing Assistance Program, and EEL System Waste Management Program.

**d) Financial resources and budget allocation**

The energy sector continues to undertake an aggressive campaign to promote energy efficiency and conservation. The DOE has lined up several activities which will require PHP 48.69 billion in capital investments for the period 2007–14. From this amount, PHP 43.77 billion will be sourced from private investors and the remaining PHP 4.92 billion will come from the government.

Activities on energy labelling and energy efficiency standards will constitute the biggest share at PHP 19.72 billion, followed by the energy management programs of PHP 16.10 billion.

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

- Monitoring of activities through monthly and quarterly accomplishment reports
- Action plan measured through percentage use of annual budget fund
- Other activities monitored and measured through the submission of a Quarterly Energy Consumption Report and Annual Energy Conservation Program reports of private companies (commercial, government buildings, and industrial sector).

Surveys, statistics compilation, end-use information, reporting and trend analysis are all being undertaken, and databases are being developed to assist in program evaluation and policy formation. The Department of Energy-Energy Utilization Management Bureau (Energy Efficiency and Conservation Division) (DOE EUMB-EECD) has the duty of energy efficiency monitoring and reporting. The following are some examples of government-initiated activities aimed at energy efficiency monitoring and reporting:

- Under DOE Circular 93-03-05, companies consuming 1 million litres of oil equivalent are required to submit quarterly energy consumption reports. In addition, companies consuming 2 million litres of oil equivalent or more annually are required to submit an annual energy conservation program to the DOE
- Quarterly Energy Consumption Reports submitted by establishments (commercial, industrial and transport) are entered in a National Energy Consumption database for monitoring and data evaluation processing
- Under the Government Energy Management Program (GEMP), government buildings are required to submit a Monthly Electricity and Fuel Consumption Report as per Presidential Directives (Administrative Orders 110, 126)
- Fuel Mileage Rating Data are being generated under the 'Fuel Economy Run' for a future Vehicle Labelling Program.

**f) Expected results**

- Meet the set major final output for the year
- Meet the target of 400 MW deferred capacity under the Philippine Energy Efficiency Project for the CFL Distribution project component by 2010
- Post a savings of more than PHP 1.6 billion (USD 32 million), as set forth in 2008 under the recognition award program, by the end of 2008.

**g) Future tasks**

- Establish energy benchmarks in the manufacturing and building sectors

- Promote and establish an accreditation system for energy auditors and energy managers
- Intensify promotion of heat rate improvement in power plants
- Establish an energy label for all new vehicles (relative to fuel mileage rating only)
- Expand the promotion of energy efficiency and conservation program as well as energy
- Consumption monitoring in large seaborne vessels (passenger ships, cargo/tanker ships)
- Power generation plants, and power distribution utilities
- Expand reportorial requirements for the industrial, commercial and transport sectors to
- Include establishments consuming more than 500 000 litres of oil equivalent annually.
- Promote green building concepts and technology and the appropriate policy framework
- Formulation, development and submission to the Philippine Congress of an appropriate
- Philippine energy conservation policy
- Modernise the energy consumption database monitoring system to
- Monitor the energy consumption and annual energy conservation programs of private
- Companies (industrial, commercial, government buildings and transport sectors).

### 1.4. Institutional Structure

**a) Name of organisation**

The Energy Efficiency & Conservation Division (EECD) under the Department of Energy-Energy Utilization Management Bureau (DOE EUMB) has the roles and responsibilities to formulate policies, plans and programs related to energy efficiency and conservation, and it ensures effective implementation thereof in the government, industrial, commercial, residential, transport and electric power sectors. As such, EECD plays the role of focal coordinator for EE&C and is authorised to administer the implementation of the Philippine Energy Efficiency and Conservation Program (NEECP). In addition, DOE has two regional offices, the DOE-Vizayas Field Office and the DOE-Mindanao Field Office. These two offices also implement energy efficiency and conservation programs based on the plans and programs of the EUMB-EECD.

**b) Status of organisations**

All agencies report implementation of energy efficiency programs to the DOE.

**c) Roles and responsibilities**

Varies across agencies

**d) Covered sectors**

All sectors of the economy

**e) Established date**

1980

**f) Number of staff members**

Currently 18

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

**a) Information collection and dissemination**

General information about NEECP is readily available to Philippine energy consumers. For example, the Standards and Labeling Program of the Department of Energy can be easily accessed at the official website of the DOE. For labels of selected appliances such as refrigerators and freezers, CFL lamps and linear fluorescent lamps, a yellow label tag and specification of the unit inscribed on the box designate that it passed government minimum energy labelling requirements.

**b) Awareness-raising**

The purpose of the dissemination program in Component 2 is to increase public awareness of EE&C and support for popularising energy-efficient appliances in the domestic retail market. In recent years, the EE&C promotion and dissemination program has been conducted frequently in the public media.

The conduct of energy efficiency and conservation seminars in the commercial, residential and industrial sectors contributed significantly to the dissemination of proven energy efficient technologies available in the market, including service companies and financial institutions that support energy efficiency. Awareness-raising campaign programs are centred on the following areas: (a) fuel conservation and efficiency in road transport; (b) power conservation and demand management in the commercial, residential and industrial sectors; (c) energy efficient technology promotion in all sectors; and (d) tips for saving energy in all sectors.

**c) Capacity-building**

A range of training courses, workshops, publishing technical documents for energy efficiency knowledge and assessment addressing all nine components have been developed and are being implemented under the NEECP. These include training courses on energy auditing, capacity-building for EE&C units, and so on. Personnel of EUMB-EECD are being activated through attendance in local as well as overseas training programs provided by foreign institutions. The areas of capacity development are Energy Auditing Techniques, Energy Management, Energy Conservation Opportunities, Co-Generation, and so on.

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

The Philippines has no specific policy on research and development in energy efficiency and conservation yet. Under this item, the DOE's programs on energy research, development and demonstration are limited to the Philippine Energy Efficiency Project, funded under a loan agreement between the Philippine government and the Asian Development Bank. This project is an energy efficiency demonstration (efficient lighting system) including the establishment of a lamp waste management facility and promotion of Energy Service Companies (ESCOs).

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

- 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)
- Guidelines on Energy Conserving Designs of Buildings (2007) (note: this guideline is a reference document of the National Building Code.).

**a) Applicable sectors**

All of above-mentioned legal documents issued by the government apply to government and commercial buildings, households, industrial facilities, and transport facilities.

**b) Financial resources and budget allocation**

Budget allocation for EO 123 and 472 has been deferred by the Department of Budget and Management for 2010, while for 2009 there was a budget of PHP 20 million (USD 400 000). The other policies being implemented were funded under the Regular Budget fund for Personnel Services (PS) and Maintenance and Other Operating Expenses (MOOE).

**c) Expected results**

All of the policies indicated above are meant for IEC awareness campaigns and energy consumption monitoring. Accomplishment reports and reporting compliance by the concerned sectors under these policies are expected regularly.

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards and Labelling

**a) Name**

- Mandatory Energy Efficiency Labelling 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, and so on.
- Guidelines on Energy Conserving Designs of Buildings (this guideline has been a referral code of the National Building Code).

**b) Applicable sectors**

Residential, commercial, public buildings and local government units

**c) Outline**

The purpose is to establish compliance with mandatory labelling 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 in roadways.

**d) Financial resources and budget allocation**

No information available

**e) Expected results**

- Compliance by home appliance manufacturers and importers of CFL and linear fluorescent lighting
- Compliance by the building designers and architects
- Compliance by the local government units in rehabilitating inefficient roadway lighting especially in parks and streets.

## 2.3. Voluntary Measures

Under this program, measures include promotion of the car-less day and carpooling. The aim is to promote fuel conservation and reduce pollution and traffic congestion in the economy, and a voluntary agreement is arranged between the DOE and the industrial establishment under the so-called Partnership for Energy Responsive Companies.

## 2.4. Financial Measures Taken by the Government

### 2.4.1. Tax Scheme

Currently, no tax incentives are given for any energy efficiency improvements. Tax incentives are provided as in the past, for example, on co-generation technology. The Department of Trade and Industry-Board of Investment (DTI-BOI) provides incentives specified under the Investment Priority Plan (IPP). For 2010, the DOE negotiates with the BOI to include energy efficiency incentives for imported energy efficient goods and technologies.

### 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.

### 2.4.3. Subsidies and Budgetary Measures

The PDOE does not provide any financial subsidies or other budgetary measures to any private or other government entities for efficiency improvements or projects.

### 2.4.4. Other Incentives

The non-incorporation of tax incentives into the BOI-IPP also does not provide any incentive scheme for import duties on energy efficiency products. Energy Audits by the PDOE for Walk-Through Audits are free of charge; however, detailed audits have applicable charges and fees. Generally, there are no incentives given by the government in terms of energy efficiency improvements and importation of energy efficiency products. Recognising the company for reducing its energy consumption (energy consumption performance improvement) through application of appropriate energy conservation measures, programs and projects implemented are recognised under the Don Emilio Abello Energy Efficiency Award as mentioned previously. Financial requirements of this program are shared by the members of the Technical Working Group, which is composed of the oil companies, other government energy agencies, private energy organisations and other stakeholders in the energy sector. The amount to implement this program ranges from PHP 300 000–350 000 (USD 6000–7000). An expected result in average energy saving of not less than PHP 1 billion (USD 20 million) is estimated.

## 2.5. Energy Pricing

Generally, energy pricing is market-based (oil pricing is deregulated under the Philippine Oil Deregulation Law, for example). However, the pricing mechanism for electricity tariffs in the Philippines is controlled by the government (Energy Regulatory Commission—ERC).

In the transport sector, the almost daily increases in the price of transport fuel (gasoline and diesel) require vehicle owners, fleet operators and other business sectors to open up their options for the application of energy conservation measures—carpooling, stopping of long engine idling, regular maintenance, and trip-scheduling, among others. Residential, commercial and industrial sectors opted for the energy efficient lighting system, such as compact fluorescent lamps and slim-type fluorescent lamps. The introduction of the Yellow Label Tag for refrigerators and freezers and air conditioners also helps in the promotion of the government’s energy efficiency and conservation program.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organisations

Cooperation with non-governmental organisations is limited to capacity-building through seminars and workshops on energy efficiency and conservation.

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

ASEAN Regional Cooperation efforts focus on the ASEAN-Promotion of Energy Efficiency and Conservation (ASEAN-PROMEEC) cooperation initiative. They include the ASEAN Award for Energy Management for major Buildings and Industries, The ASEAN Award for Best Competition in Buildings, ASEAN Energy Manager Accreditation System (AEMAS), and ASEAN Labelling Program.

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

The Philippines is a member of the Association of Southeast Asian Nations (ASEAN) and is involved in various working groups, including the Energy Efficiency and Renewable Energy Network. Apart from that, the Philippines is designated as a lead economy for the working group on biofuels for transport and other uses in the EAS-Energy Cooperation Task Force (ECTF).

## REFERENCES

DOE (2008), Department of Energy, Republic of the Philippines, *Philippine Energy Plan 2007–2014*.

DOE (2009), *Energy Efficiency & Conservation Plans and Programs*, available at www.doe.gov.ph/EE/EE&C%20Plans%20and%20Programs.htm.

.

# 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 2008–09, 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).[19] Furthermore, in order to boost energy conservation, the strategy envisioned the USD 244–259 billion total budget for the period 2009–30, constituting about 10% of the overall ES2030 budget during the same period.[20]

[19] ES2030, Appendix 2 "Indexes of energy security: Indexes of energy efficiency".
[20] 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".

## 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 312.81million tonnes fuel equivalent (hereafter "tfe") total savings of energy resources in the entire Russian fuel and energy complex during 2011-2020.[21]

*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.[22]

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.[23]

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[24].

*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

[21] "Federal Program "Energy Conservation and Improvement of Efficient Efficiency for the period until 2020", (in Russian only), p.18.
[22] Ibid, p. 20 and p. 26.
[23] PEEREA report, p. 36.
[24] FP, p.21.

tfe.[25] 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.[26]

*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.[27]

## 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.

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

[25] FP, p. 23.
[26] Ibid, p. 25.
[27] Ibid, p. 22.

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[28] (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 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**

[28] FP, p. 6.

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).[29] 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**

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

[29] Ibid, p. 19.

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 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:

- 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;
- Facilitation of improvement of effectiveness of the state energy efficiency policy;
- Creation of the single platform for interaction of all market participants;
- 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 (ISEDC), 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.)[30]

[30] 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

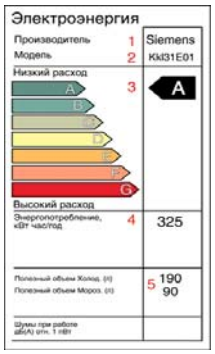
**c) Applicable sectors**

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%).




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.[31]

[31] 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 “Concerning some measures for improving the energy and ecological efficiency of the Russian economy” (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 programs’ energy 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 Russia’s 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 – 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 – KEMCO;
2) Korea Association for Photonics Industry Development –KAPID;
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 – 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).

## REFERENCES

"Energy Strategy of the Russian Federation up to the year of 2030" (in Russian), adopted on 13 November 2009, by the Government Decree No.1715-p.

"Federal Program "Energy Conservation and Improvement of Efficient Efficiency for the period until 2020", (in Russian), www.mnr.gov.ru.

Federal Law No. 261-F3 *"On Energy Conservation and Increase of Energy Efficiency"* (23 November 2009), (in Russian), www.energosovet.ru/npb1189.html.

IEA Energy Efficiency: Policies and Measures database for the Russian economy.

The Ministry of Energy of the Russian Federation, Official Website, http://minenergo.gov.ru/activity/energoeffektivnost/index.php.

"Progress with Implementing Energy Efficiency Policies in the G8: Energy Efficiency Progress Report–Russia", IEA Report, 2009.

Presidential Decree N. 889 "Concerning some measures for improving the energy and ecological efficiency of the Russian economy", 4 June 2008, (in Russian), www.energosovet.ru/dok/ensovmed.htm.

"Russian Federation: Regular Review of Energy Efficiency Policies," the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA), 2007.

"State Policy Guidelines for the Power Industry Energy Efficiency Improvement" (Government of the Russian Federation Resolution No. #1-r), (in English and Russian), www.energosovet.ru/dok/pprfes_2.htm.

# SINGAPORE

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In its Sustainable Singapore Blueprint (2009), Singapore has set a target of achieving a 35% energy intensity improvement by 2030. Energy intensity is defined as total energy consumed per dollar of GDP. This is a voluntary and unilaterally implemented goal, which would result in a reduction in Singapore's energy consumption from the business-as-usual level[32].

### 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**

Due to Singapore's constraints as a small economy without the natural endowments to utilise renewable energy resources like wind and hydro power, energy efficiency is Singapore's key strategy to mitigate greenhouse gas emissions. Energy efficiency also helps to improve Singapore's economic competitiveness, energy security, and environmental sustainability.

**b) Applicable sectors**

All sectors of the economy, namely power generation, industry, transport, buildings, and households[33]

**c) Outlines**

- Power generation

The liberalisation of Singapore's energy market since 2000 has promoted competition in the electricity and gas markets by encouraging investments in efficient power generation. As such, the use of natural gas for generating electricity has increased rapidly from 28 % in 2001 to 81% in 2009, while fuel oil which was the dominant fuel source for power generation till 2001 at 68%, accounted for 15% in 2009.

Singapore is also promoting greater use of co-generation and tri-generation by integrating the deployment of these technologies into ongoing and future industrial planning.

- Power Grid System

EMA has embarked on the Intelligent Energy System (IES) or 'smart grid' pilot project, which would be an important step towards a smarter power grid. The IES will provide consumers with more information, choice and control over their electricity usage, thereby improving energy efficiency for Singapore as a whole

- Industry
  - Energy Efficiency National Partnership (EENP)

    The EENP is a voluntary programme that seeks to encourage and help companies put in place energy efficiency and productivity improvement projects at the organisational level to reduce energy wastage. The EENP targets companies that are large energy consumers, consuming more than 15GWh per year, as well as companies that are interested in improving their energy efficiency and implementing energy management practices. The core elements of the EENP include i) the energy

[32] Ministry of National Development (2009).
[33] Ministry of National Development (2009); Energy Market Authority (2007).

management system for companies, ii) learning network to learn and share efficient technologies & iii) national recognition scheme to recognise energy management practices implemented by EENP Partners.

- The Energy Efficiency Improvement Assistance Scheme (EASe)

  EASe provides up to 50% funding for companies to carry out detailed energy assessments of buildings and industrial facilities. It is administered by the National Environment Agency (NEA).

- Grant for Energy Efficient Technologies (GREET)

  GREET provides up to 50% funding, capped at SGD2 000 000 per project, to encourage owners and operators of industrial facilities to invest in energy efficient equipment or technologies. It is administered by the NEA.

- The Investment Allowance (IA) Scheme

  Administered by the Economic Development Board (EDB), the IA scheme encourages companies to invest in energy efficient equipment. The IA Scheme provides a capital allowance on qualifying equipment costs that allows a deduction against chargeable income. The IA can be awarded for capital expenditures that result in more efficient energy use.

- The Design for Efficiency (DfE) Scheme

  The DfE Scheme provides up to 80% funding or SGD 600 000, whichever is lower, for large consumers of energy to conduct design workshops to design more energy efficient facilities. It is administered by the NEA.

- Accelerated Depreciation Allowance Scheme

  The Accelerated Depreciation Allowance Scheme allows capital expenditure on qualifying energy efficiency or energy saving equipment to be written off in one year instead of three. It is administered by the NEA.

- Innovation for Environmental Sustainability (IES) Fund

  The IES Fund provides seed funding for companies to undertake innovative environmental projects, including energy efficiency projects that could help to meet the government's goal of environmental sustainability. It is administered by the NEA.

- Transport

  Promoting public transport through a series of measures, including investments in new MRT lines and upgrading of existing facilities, central bus planning, bus priority schemes, tightening quality of service standards, and enhancing commuter information.

  - Managing car ownership and usage by reducing vehicle growth rate through the Vehicle Quota System (VQS), refining the Electronic Road Pricing (ERP) system, improving Off-Peak Car and Park & Ride schemes, and further developing Intelligent Transport System (ITS) solutions
  - Green Vehicle Rebate to encourage the use of hybrid, CNG and electric vehicles
  - Implemented mandatory Fuel Economy Labelling Scheme Euro IV emissions standard for new diesel vehicles registered from 1 October 2006 Euro IV compliance is applicable to green buses, taxis and commercial vehicles
  - Test-bedding new technologies such as the Diesel Particulate Filter (DPF), diesel-hybrid buses, electric cars

- Developed a Green Framework for Rapid Transit System (RTS). The Green Mark provides a systematic and structured approach in evaluating and rating the environmental performance of RTS for existing and future lines.
- Encouraging cycling and walking with investments in infrastructure.

- Buildings

  Since the introduction of the Ministry of National Development (MND) Research Fund for the Built Environment in December 2006, agencies such as the Building and Construction Authority (BCA) and the NEA have encouraged the development and construction of energy efficient buildings.

  - EASe for Buildings

    EASe scheme is available to buildings owners and operators.

  - Energy Smart Label

    The Energy Smart Building Labelling Programme, developed by the Energy Sustainability Unit (ESU) of the National University of Singapore (NUS) and the NEA, aims to promote energy efficiency and conservation in the buildings sector by according recognition to energy efficient office and hotel buildings, as well as retail malls. Buildings that are in the top 25 percentile in terms of energy efficiency of the total building cohort are awarded with a certificate and an Energy Smart Label. In addition to its energy performance, the building's indoor environmental conditions such as air quality, thermal comfort, ventilation and lighting level are taken into consideration when evaluating a building for the award.

  - Building Control Regulations

    BCA has established the Code for Environmental Sustainability of Buildings. This Code sets out the minimum environmental sustainability standard for buildings and the administrative requirements. This Code has largely adopted the BCA Green Mark's criteria as the compliance method in assessing the environmental performance of a building.

    The following codes and standards under the Code for Environmental Sustainability of Buildings have relevance:

    1. Code on Envelope Thermal Performance for Buildings
    2. SS530-Code of Practice for Energy Efficiency Standard for Building Services and Equipment
    3. SS553-Code of Practice for Air-Conditioning and Mechanical Ventilation in Buildings
    4. SSCP38- Code of Practice for Artificial Lighting in Buildings
    5. SS531-1-Code of Practice for Lighting of Work Places - Indoor

    The Code on Envelope Thermal Performance for Buildings covers:

    1. Envelope Thermal Transfer Value (ETTV) for air-conditioned non-residential buildings
    2. Roof Thermal Transfer Value (RTTV) for air-conditioned non-residential buildings (with skylight)
    3. Residential Envelope Transmittance Value (RETV) for residential buildings

4. Roof insulation for air-conditioned non-residential buildings (without skylight) and residential buildings

- Green Mark Buildings

  The BCA Green Mark Scheme is a green building rating system launched by the BCA in 2005 to evaluate a building based on its environmental impact performance. From 2008, all new and existing buildings with gross floor area (GFA) above 2000 $m^2$ that are undergoing major retrofitting works must meet the Green Mark Certified standard.

  BCA has also gone beyond individual buildings to inspire and promote environmental sustainability in parks, districts, rapid transit systems and supporting infrastructure.

- BCA Green Mark Incentive Scheme

  The Green Mark Incentive Scheme was launched in 2006 to encourage building developers to achieve higher Green Mark ratings. New and retrofitted buildings with a GFA above 5000 $m^2$ that have achieved ratings of Green Mark Gold and above will be awarded monetary incentives. To further encourage the private sector to develop buildings that attain higher tier Green Mark ratings (i.e. Green Mark Platinum or Green Mark Gold$^{PLUS}$), the Green Mark Gross Floor Area Incentive scheme in 2009 was initiated. To accelerate the pace of energy efficiency improvement in our buildings, BCA introduced a $100 million Green Mark Incentive Scheme for Existing buildings (GMIS-EB) in 2009 to encourage building owners to upgrade their existing buildings to be more energy efficient and environmentally friendly.

- Public Sector taking the lead

  The public sector is taking the lead in moving toward environmental sustainability for its buildings. It aims to demonstrate the associated environmental and economic benefits and set an example for the private sector. New public sector buildings and existing public sector buildings undergoing major retrofitting works with air-conditioned area more than 5,000$m^2$ would need to attain Green Mark Platinum rating, and existing public sector buildings with air-conditioned area more than 10,000$m^2$ to attain Green Mark Gold$^{PLUS}$ rating by 2020.

- Households

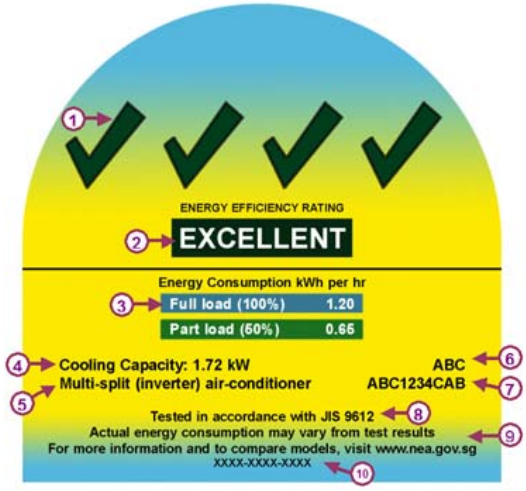
  - Mandatory Energy Labelling Scheme

    All household refrigerators, air conditioners and clothes dryers that are sold in Singapore must be energy labelled[34]. Singapore is also evaluating the introduction of minimum energy performance standards (MEPS) for energy-intensive household appliances.

    Singapore's Energy Label design and certain aspects of the Energy Labelling Scheme are presented below[35]:

    'Registered suppliers supplying registrable goods must affix the Energy Label on the units that they supply in Singapore. The Energy Label shall be affixed only after the National Environment Agency (NEA) has issued the Certificate of Registration (COR) for the model. Retailers are only allowed to display models that have the label affixed on them.'

[34] National Climate Change Committee (2009).
[35] National Environment Agency (2009).




Specifications

Dimensions: 9cm (width) x 9cm (height)
Arc: 9cm (diameter)
Font: Arial, bold, black

## Table 1. Features of the rating system

| Feature | Air conditioners | Refrigerators | Clothes Dryers |
|---|---|---|---|
| (1) Ticks | The number of Ticks shall conform to the Tick Rating system. | | |
| (2) **Energy Efficiency Rating** | The model's relative energy efficiency rating is also expressed in words:<br>Green Ticks → Energy Efficiency Rating<br>0 → Low<br>1 → Fair<br>2 → Good<br>3 → Very Good<br>4 → Excellent | | |
| (3) **Energy Consumption** | Effective power input x 1h expressed in kWh per hour and rounded to two decimal places.<br>For inverter type air conditioners, the energy consumed at part-load cooling capacity shall also be displayed on the label. | Energy consumption over 24 hours x 365 days expressed in kWh. | Energy consumption per wash expressed in kWh and rounded to two decimal places. |
| (4) **Capacity** | Full-load cooling capacity expressed in kW and rounded to two decimal places. | Measured total storage volume expressed in litres (L) in whole digits. | Rated capacity expressed in kilograms ( Kilogram Kg) and rounded to one decimal places. |
| (5) **Type** | Type of air conditioners:<br>(a) Casement<br>(b) Window<br>(c) Single Split (non-inverter / inverter)<br>(d) Multi-split Sys (non-inverter/inverter) | Type of refrigerators:<br>• Refrigerator<br>• Refrigerator-freezer | Type of clothes dryers:<br>(a) Air-vented<br>(b) Condenser |
| (6) **Brand Name** | Brand of air conditioner | Brand of refrigerator | Brand of clothes dryer |
| (7) **Model Number** | The model number found on the air conditioner nameplate.<br>For multi-split type air conditioners, only the model number of the outdoor unit shall be displayed. | The model number found on the refrigerator's nameplate. | The model number found on the clothes dryer's nameplate . |
| (8) **Test Standards** | The test standard used as specified here (app.nea.gov.sg/cms/htdocs/article.asp?pid=2843#standards). | | |
| (9) **Disclaimer** | The following disclaimer applies to all appliances:<br>'Actual energy consumption may vary from test results.' | | |
| (10) **Registration Number** | A unique number found on the registered model's COR, which is issued by NEA upon successful registration of the model. | | |

- Reducing Standby Power Consumption

  NEA will step up efforts to inform and encourage households to completely switch off appliances that are not in use.

- Residential Envelope Transmittance Value (RETV) standard

  From 2008 onwards, residential buildings with GFA of 2000 $m^2$ must comply with BCA's Residential Envelope Transmittance Value (RETV) standard.

- Electricity Vending System (EVS)

  The Energy Market Authority (EMA) has developed a prototype EVS as a platform to allow small consumers such as households to choose their electricity retailers. The EVS allows for time-of-use pricing to encourage consumers to shift their load from the more expensive peak periods to the less expensive off-peak periods. The EVS also allows for demand response features whereby consumers can monitor their "live" electricity consumption. The availability of such information empowers consumers to make conscious decisions to track and potentially reduce their electricity usage. The project involving about 400 households has been completed. Building on the results of this project, EMA has embarked on the IES pilot project, where 4,500 consumers including households and businesses will participate (see above for details of the IES pilot).

**d) Financial resources and budget allocation**

- The Sustainable Energy Fund—SGD 50 million
- The EASe scheme—SGD 10 million
- The Green Mark Incentive Scheme—SGD 20 million.
- The Smart Energy

Other funding in relation to R&D is stated in point 1.6.

**e) Method for monitoring and measuring the effect of the measures**

Programs have inherent methods for monitoring and measuring the effect of measures; other methods include monitoring through surveys.

**f) Expected results**

Information not available

**g) Future task**

Extend implementation of energy policy measures and programs

### 1.4. Institutional Structure

As a statutory board under the MEWR, NEA is the key agency for climate change and energy efficiency. The EMA has expanded its traditional role as a regulator for electricity and gas markets to take on a bigger role as an energy planner, promoter and developer on an economy-wide basis. In addition the Energy Studies Institute (ESI) has been set up at the National University of Singapore (NUS) to promote and develop policy-oriented research in economics, environmental and international relations aspects of energy, as well as contribute to energy dialogue and collaboration in the region.

**a) Name of organisation**

Energy Efficiency Programme Office (E2PO)

Energy efficiency matters in Singapore are lead by the Energy Efficiency Programme Office ($E^2PO$), formed in 2007.

**b) Status of organisation**

Multi-Agency Committee co-Chaired by EMA and NEA

The $E^2PO$ is a multi-agency committee co-chaired by the Energy Market Authority (EMA) and the National Environmental Agency (NEA).

$E^2PO$ is comprises the i) EMA for power generation, ii) Singapore Economic Development Board (EDB) for industry; iii) Land Transport Authority (LTA) for transport, iv) NEA and Housing Development Board (HDB) for households, v) Building Construction Authority (BCA) for buildings, vi) Infocomm Authority of Singapore (IDA) for ICT, and vii) Agency for Science, Technology and Research (A*STAR) for R&D.

**c) Role and responsibility**

- Promoting adoption of energy efficient technologies and measures by addressing the market barriers to energy efficiency
- Building capacity to drive and sustain energy efficiency efforts and to develop the local knowledge base and expertise
- Rising awareness to reach out to the public and businesses as to simulate energy efficient behaviour and practices
- Supporting research and development to enhance Singapore's capability in energy efficient technologies.

**d) Covered sectors**

Power generation, industry, transport, buildings, information/communications, and households

**e) Number of staff members**

Not applicable

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

**a) Information collection and dissemination programme**

Regarding the $E^2PO$, ministries and agencies collect information concerning the development of energy programs; relevant agencies disseminate information about programs.

**b) Awareness-raising program, (e.g., consumer campaign)**

A public campaign—10% Energy Challenge—was launched in April 2008 and aims to educate households on ways they can reduce energy consumption at home.

- Outreach Programmes

  To raise public awareness on the importance and benefits of green buildings, BCA has put in place a strong outreach programmes that includes public online portal, roving green building exhibitions and new social media, Facebook. BCA has also partnered the Green Mark Champion, CDL, to hold a BCA-CDL Green Sparks Competition 2010 which brings about fresh ideas and innovation among our youths on retrofitting existing buildings.

  More recently, the 2nd Singapore Green Building Week held in September 2010 which involves three major events – the inaugural SGBC Green Building Conference, WorldGBC International Congress and the Build Eco Xpo Asia forms a crucial part of BCA's public outreach activities to raise awareness on the need to provide a sustainable future for Singapore.

**c) Capacity-building (human resource development) programme (training)**

- Singapore Certified Energy Manager (SCEM) Programme

The Singapore Certified Energy Manager (SCEM) Programme, developed by the Energy Sustainability Unit of the National University of Singapore (NUS) under the sponsorship of the Economic Development Board's Locally-based Enterprise Advancement Program (LEAP), offers a formal training and certification system in the area of energy management. In support of the SCEM programme is the SCEM Training Grant, a co-funding scheme administered by NEA to develop local expertise and capability in professional energy management. The scheme is targeted at engineers who manage manufacturing facilities and buildings and provide energy services or engineering consulting services.

- ESCO Accreditation Scheme

  The NUS ESU administers an Energy Service Companies (ESCOs) Accreditation Scheme. The objective is to enhance the professionalism and quality of energy services offered.

- Green Mark Specialist Certification Programmes

  BCA has focused training programmes aimed at equipping professionals with new skills, to deepen their professional skills and expertise in the area of environmental sustainability. These include the Certification courses for Green Mark Managers (GMM), Green Mark Facilities Managers and Green Mark Professionals (GMP).

- Courses/Programmes on Sustainable Design and Operations

  As part of BCA Academy's continuous effort to facilitate the development of a pool of `green' specialists highly skilled in sustainable design and development leadership capabilities, the Academy tied up with the University of Nottingham to roll out a Master of Science in Sustainable Building Design programme in 2009. The two-year part-time is the first of its kind in Singapore, focusing on developing cross-disciplinary professional skills as well as analysis and decision-making skills.

  The BCA Academy has also partnered with the University College London (UCL) to launch the Master of Science degree in Facility and Environment Management earlier this year. This two-year part-time MSc programme will equip the building professionals with the skills, knowledge and tools to operate, maintain, manage and improve the performance of green buildings over their economic lifespan.

  Apart from postgraduate degrees, BCA has signed a tripartite agreement with UniSIM and Singapore Polytechnic to jointly offer the Bachelor of Science in Facility and Events Management Programme. This is a four-year part-time honours degree programme launched in 2010 targeted to train working adults in the facilities and events management field who wish to upgrade from diploma to degree level.

  To help industry leaders and managers to keep abreast with the trends, innovation and technology development globally in other countries, the Academy has also forged partnerships with various well-known institutions to offer short intensive executive development programmes. One example is the 6-day Carnegie Mellon University-BCA Executive Development Programme on Leadership in Environmental Sustainability; it has received good response since its launch in April 2009. Conducted at the Carnegie Mellon University annually, this programme aims to accelerate the development of executives in green stewardship roles that will steer Singapore's built environment towards the next level of environmental sustainability. About 40 executives had been trained for the two intakes.

  In addition, the Academy has collaborated with the Stuttgart University of Applied Sciences in Germany for the HFT Stuttgart-BCA Executive Development Programme on Innovations in Sustainable Design and Technology in 2010. This programme is designed to provide a strategic platform for leading building professionals in the area of green building design and technology.

- Seminars and conferences

  In addition to the formal training provided under the SCEM programme, the $E^2PO$ organises numerous seminars and conferences to bring together stakeholders and experts in the field of energy efficiency to share knowledge and expertise in effective energy management.

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

To harness multi-disciplinary research and development capabilities, Singapore has launched a SGD 1 billion 'National Innovation Challenge' as a major new R&D thrust for the next 5 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 to help Singapore improve energy efficiency, reduce carbon emissions and increase energy options.

In addition, as part of the inaugural Smart Energy Challenge (SEC) [36], launched in November 2009, EMA awarded Singapore-based companies a total of up to $10 million to fund & support the development of new energy technologies and solutions including improving energy efficiency.

The Ministry of National Development (MND) Research Fund for the Built Environment to encourage and support applied research and development, includes energy efficiency. The $50 million MND Research Fund for the Built Environment to support R&D efforts in green building technologies and energy efficiency was launched in January 2007.

The Innovation for Environmental Sustainability (IES) projects include:

- Seed funding for industry-led projects, including energy efficiency projects that could contribute to the long-term environmental sustainability of Singapore; responsible agency: NEA; financial resources: SGD 20 million
- R&D, including that for energy efficiency that will raise the quality of life and make Singapore a distinctive global city; responsible agency: BCA; financial resources: SGD 50 million
- Basic and applied research projects which pursue innovative and novel ideas in the clean energy space, including energy efficiency. Responsible agency: EDB; financial resources: SGD 50 million
- Technical trials on new sustainable transport initiatives, including the setup of vehicle emission test laboratory, diesel particulate filter, diesel-hybrid bus, and electric vehicle charging infrastructure. Responsible agency: LTA; financial resources: SGD 17 million.

The Singapore Initiative in New Energy Technologies (SINERGY) Centre set up by the Agency for Science, Technology and Research (A*STAR) conducts research, development and demonstration of new and innovative energy technologies, and supports the development of these technologies from research to successful introduction in the marketplace.

The Energy Research Institute (ERI@N) recently set up at Nanyang Technological University (NTU) will act as a think tank for scientists to assemble and exchange ideas across scientific disciplines. Up to six research centres will be set up under the Institute, including the Centre for Sustainable Energy Research, which focuses on the study of fuel cells and wind and tidal energy, aimed at improving energy efficiency besides other energy-related issues.

[36] Under the $25 million Energy Research Development Fund (ERDF) which provides financial support for implementation of new and innovative energy solutions that are close to deployment and have the potential to provide impactful and tangible results.

# 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1. Government Laws, Decrees, Acts

Energy efficiency is governed through a number of regulatory measures (see section 2.2).

## 2.2. Regulatory Measures

EPMA:

- Environmental Protection and Management Act (EMPA)
- Mandatory energy labelling of household air conditioners and refrigerators in January 2008 (see section 1.3 for details)
- Mandatory fuel economy labelling for passenger and light goods vehicles in April 2009 (see section 1.3 for details)
- Mandatory energy labelling of household clothes dryers in April 2009.

LTA:

- Vehicle Quota System (VQS) (see section 1.3 for details)
- Off-Peak Car scheme
- Electronic Road Pricing (ERP).

BCA:

- Building Control Act
- Building Control (Environmental Sustainability) Regulations 2008
- Code for Environmental Sustainability of Buildings 2nd Edition
- Code on Envelope Thermal Performance for Buildings
- BCA Green Mark Scheme – New Buildings [mandatory ]

## 2.3. Voluntary Measures

These include buildings under the BCA Green Mark Scheme, public sector energy audits, and other measures (see section 1.3 for details). Also including labels such as the Green Label Scheme (SEC), Singapore carbon Label (SEC), Green Product-Appliances Label (SGBC), Green Office Label (SEC).

## 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

Information not available

### 2.4.3. Subsidies and Budgetary Measures

Energy Efficiency Improvement Assistance Scheme (EASe); Grant for Energy Efficient Technologies; Design for Efficiency (DfE) Scheme; Green Vehicle Rebate; Innovation for Environmental Sustainability (IES) Fund; and Green Vehicle Rebate (see section 1.3 for details)

## 2.5. Energy Pricing

Energy prices in Singapore are determined by the price of energy at the regional and global market. Fuels are subject to excise duties and goods and services tax (GST). Taxes and duties make up about 30% of retail fuel price at the pump.

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Governmental Organisations (NGOs)

- Sustainable Energy Association of Singapore (SEAS) for the Singapore Certified Energy Manager Programme
- Singapore Environmental Council (SEC) for the 10% Energy Challenge
- NEA is a member of the Renewable Energy and Energy Efficiency Partnership (REEEP)

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

Singapore is a member of regional cooperation and forums on energy such as the Energy Efficiency Sub-sector Network of ASEAN, APEC, and EAS Energy Cooperation Task Force.

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

Cooperation with the International Energy Agency (IEA), Asian Development Bank (ADB) and United Nations Environment Programme (UNEP) – Sustainable Building and Climate Initiative (SBCI) have been initiated to facilitate the transfer of EE technologies and policies, share and exchange information in EE, including other aspects of sustainable development.

## REFERENCES

Energy Market Authority (2010), *Statement of Opportunities for the Singapore energy industry 2010*.
http://www.ema.gov.sg/media/files/publications/soo/EMA_SOO_2010_web-2.pdf

Energy Market Authority, *Funding Schemes*
http://www.ema.gov.sg/page/125/id:84/

Ministry of National Development (2009), *Sustainable Singapore Blueprint*, www.mnd.gov.sg/.

National Climate Change Committee (2009), *Singapore Energy Labelling Scheme*, www.nccc.gov.sg/.

National Environment Agency (2009), *the Energy Label*, http://app.nea.gov.sg/.

Building and Construction Authority (2009), *2nd Green Building Masterplan*,
http://www.bca.gov.sg/GreenMark/others/gbmp2.pdf/

Building and Construction Authority (2010), BCA Green Mark Scheme Version 4,
http://www.bca.gov.sg/greenmark/green_mark_criteria.html/

Building and Construction Authority (2010), Building Control Act,
http://www.bca.gov.sg/BuildingControlAct/building_control_act_objectives.html/

Building and Construction Authority (2008), Building Control (Environmental Sustainability) Regulations 2008,
http://www.bca.gov.sg/BuildingControlAct/building_control_env_sus_regulations.htm/

Building and Construction Authority (2010), MND Research Fund for the Built Environment,
http://www.bca.gov.sg/ResearchInnovation/mndrf.html/

Building and Construction Authority (2010), Collaboration UNEP-SBCI,
http://www.bcaa.edu.sg/unep-sbcicollaboration.aspx/

Code for Environmental Sustainability of Buildings 2nd Edition (2010),
http://www.bca.gov.sg/EnvSusLegislation/others/Env_Sus_Code2010.pdf/

Code on Envelope Thermal Performance for Buildings,
http://www.bca.gov.sg/PerformanceBased/others/RETV.pdf/

# CHINESE TAIPEI

## 1. GOALS FOR EFFICIENCY IMPROVEMENT[37]

### 1.1. Overall Energy Efficiency Improvement Goals

**a) Goals**

Reduce energy intensity 20% by 2015 and 50% by 2025

**b) Base year**

2005

**c) Goal year**

2015 and 2025

### 1.2. Sectoral Energy Efficiency Improvement Goals

**a) Industry**

Reduce $CO_2$ intensity by 30% in 2025 in the industry sector

**b) Transportation**

Raise standard fuel efficiency for private vehicles (measured in terms of passenger kilometres per litre) incrementally to 25% by 2015

**c) Residential and commercial**

Improve device energy efficiency by 10%–70% in 2011(this standard is expected to be revised further before 2015, and traditional lighting equipment will be replaced with 20%–90% more efficient equipment in residential and commercial sectors)

**d) Government**

Reduce energy use by 7% in 2015

**e) Base year**

2008

**f) Goal year**

2025 (for industry), 2015 (for transport and government), 2011 and 2015 (for residential and commercial)

### 1.3. Action Plans for Promoting Energy Efficiency

**a) Name**

Energy Conservation and GHG Emission Reduction Action Plan

**b) Objectives**

Reduce $CO_2$ emissions by applying cleaner energy and energy conservation measures

**c) Applicable sectors**

Residential, commercial, industry, transport, and government

**d) Outline**

A number of measures have been introduced to achieve the energy efficiency goals.

- Raise power generation efficiency

[37] BOE (2008A).

- Replace coal-fired power plants with high-efficiency generating units (efficiency raised 7.5% by 2025) and gas-fired power plants (efficiency raised by 11%)
- Improve power dispatch and transmission facilities (reducing line loss 0.5% by 2015)
- Raise vehicle energy efficiency standard[38]
- Raising private vehicles' standard fuel efficiency incrementally 25% by 2015
- LED electricity saving lighting
- Traffic signal lamps completely replaced with LED lamps by 2012
- Building (exit, fire alarm signal, etc.) and landscape lighting completely replaced with LED lamps by 2025
- Promote the uptake of energy efficient appliances
- Voluntary energy saving partnership agreement
- Energy auditing of major energy consumers.

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.

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

- Measure the sales of energy efficiency appliance monthly
- Monitor the progress of energy efficiency standard revision quarterly
- Monitor the result of voluntary energy saving agreement quarterly.

**g) Expected results**

Reduced $CO_2$ emissions through more efficient energy use

**h) Future tasks**

No information available

### 1.4. Institutional Structure

**a) Name of organisation**

Bureau of Energy, Ministry of Economic Affairs

**b) Status of organisation**

No information available

**c) Roles and responsibilities**

- Draw up drafts of policy and law
- Plan and predict the energy demand and supply
- Examine and approve energy development, distribution and sale
- Monitor the energy price
- Build an energy database
- Energy saving promotion and dissemination; energy technology R&D.

**d) Covered sectors**

All sectors of the economy are covered.

[38] BOE (2008B).

**e) Established date**

No information available

**f) Number of staff**

No information available

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

**a) Information collection and dissemination**

Media dissemination programs will evaluate the potential audience reached. In the meantime, an economy-wide telephone survey is conducted to assess public awareness.

**b) Awareness-raising**

There are two awareness-raising programs. One is the Research and Promotion of the Energy Conservation Labelling and Energy-Efficiency Labels systems; the other is 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 Bureau of Energy, Ministry of Economic Affairs; the project is applicable to industry (excluding agriculture), transport, residential, commercial, and government sectors.

The aim of the project is to develop and advance Chinese Taipei's research and development capabilities and intellectual property in many energy technologies, including LED lighting, photo voltaic, hydrogen power, air-conditioning, refrigeration, electric motors, energy information and communication technology. The Government allocates an annual budget of about USD 33 million to this project and 59% of this budget is used for energy-related research and design.

The Chinese Taipei Government has allocated USD 1.36 million to establish the Energy Conservation Labeling and Energy-Efficiency Labels system for the transport, residential, commercial and government sectors since December 2001. This system is expected to result in annual energy savings of up to 45 000 kilolitres of oil equivalent, and energy efficiency increases of 30% for air-conditioners, 45% for refrigerators, 36% for hot-warm water drinking fountains, and 15% for automobiles.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, 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 industry, transport and commercial sectors.

**d) Outline**

- Energy utilisation facilities or equipment that are designated by the central competent authority, manufactured by local manufacturers or imported by merchants for domestic use, are to 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 are to conform to the permit standards of energy consumption established by the competent central authority.

**e) Financial resources and budget allocation**

Governmental fund

**f) Expected results**

Energy efficiency improvement of 2% every year for the next eight years; improve appliance energy efficiency 10%–70% by 2015

### 2.2. Regulatory Measures

**a) Name**

Minimum Energy Performance Standard (MEPS) for appliances and lighting; fuel efficiency standards for automobiles

**b) Purpose**

Improve the energy efficiency of appliances, lighting devices, and vehicles

**c) Applicable sectors**

Industry (including agriculture), transport, residential, commercial, energy, government

**d) Outline**

The MEPS and efficiency standards for the following products will be raised:

- Private vehicles by 2015
- Compact fluorescent lamps from 2009
- Room air-conditioners and refrigerators from 2011
- Dehumidifiers from 2012.

### 2.3. Voluntary Measures

**a) Name**

Energy Labelling 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**

Industry (including agriculture), transport, residential, commercial, energy, government, etc.

**d) Outline**

No information available

**e) Financial resources and budget allocation**

No information available

**f)　Expected results**

Raising energy efficiency of appliances from 10% to 70% (conservation labelling as follows)



## 2.4.　Financial Measures Taken by the Government

### 2.4.1.　Tax Scheme

No information available

### 2.4.2.　Low-Interest Loans

No information available

### 2.4.3.　Subsidies and Budgetary Measures

No information available

### 2.4.4.　Other Incentives

The FREE Energy Audit started 15 years ago, to assist 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 China Petroleum Corporation, was abolished in September 2000 after FPCC's petroleum products were released to the market. Following significant fluctuation in international petroleum prices in the second half of 2005, MOEA authorised 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 neighbouring economies in Asia.

The pricing mechanism for electricity is controlled by the government rather than based on the generation cost. The proposal for electricity price adjustment is 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 price in June and July 2008, and petroleum and electricity consumption significantly declined in the following months. Higher energy prices may also provide the incentive for equipment replacement. However, the effect is not easy to assess due to higher sales price of higher-efficiency products.

## 2.6.　Other Efforts for Energy Efficiency Improvement

### 2.6.1.　Cooperation with Non-Government Organisations

The Government cooperates with non-government organisations 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 Labelling and Appliance Standards Program (CLASP) based in California, USA to promote energy-efficient products by developing and updating the standards and labelling program.

## REFERENCES

BOE (2008A) *Framework of Taiwan's Sustainable Energy Policy*, Bureau of Energy of Ministry of Economic Affairs, Taipei, www.moeaec.gov.tw/English/files/Framework%20of%20Taiwan's%20Sustainable%20Energy%20Policy.pdf.

BOE (2008B) *Regulations on Fuel Economy Standard and Inspection and Administration of Motor*, Bureau of Energy of Ministry of Economic Affairs, Taipei, http://law.moj.gov.tw/Eng/Fnews/FnewsContent.asp?msgid=3122&msgType=en&keyword=Fuel+Economy+Standards+and+Regulations+on+Vehicle+Inspection+and+Administration.

# THAILAND

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

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

### 1.2. Sectoral Energy Efficiency Improvement Goals

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

#### 1.2.1. Industrial Sector

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

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

#### 1.2.2. Transport Sector

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

#### 1.2.3. Residential

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

### 1.2.4. Other Sectors

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

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

## 1.3. Action Plans for Promoting Energy Efficiency

Thailand has the following strategic approach for promoting energy efficiency.

**a) Objectives**

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

**b) Applicable Sectors**

All sectors, especially industry, transport and household

**c) Outline**

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

In the industrial sector, key measures include: speeding up EE improvement—revolving funds/tax incentives/investment promotion measures via BOI; promotion of Energy Services Company (ESCO) business; supportive measures for SMEs, by sending experts to visit SME facilities and assist in energy auditing/giving advice on efficient energy management; and provision of grants for equipment replacement by 9 standard (energy-efficient) equipment. In addition, the Department of Industrial Works (DIW), Ministry of Industry, has been operating the "Energy Savings for Small and Medium-Sized Enterprises (SMEs)" program during the past three years with around 20% energy savings in the forms of electricity and heat which is translated into the GHG emission reductions of around 100 tonnes $CO_2$-e per enterprise, annually. Since there are approximately 60 000 SMEs in Thailand, 10 000 SMEs with the highest energy consumption could be targeted which would reduce around 1M tonnes $CO_2$-e per year. As the next step, there could be several possible modalities to scale-up and build on DIW's program, including engaging ESCOs to promote investment in SME energy efficiency projects, with financing through financial intermediary banks and with DIW providing technical support. Further discussion is needed to design the most suitable modality for the proposed concept.

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

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

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

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

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

**d) Financial resources and budget allocation**

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

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

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

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

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

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

**f) Expected results**

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

**g) Future tasks**

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

## 1.4. Institutional Structure

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

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

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

**a) Name of organisation**

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

**b) Status of organisation**

EPPO—policymaker; DEDE—regulator/implementer

**c) Roles and responsibilities**

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

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

**d) Covered sectors**

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

**e) Established date**

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

**f) Number of staff members**

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

Regional Institutional Structure

**a) Name**

Regional Energy Offices 1-12 under the Ministry of Energy

**b) Status of organisation**

Regulator/implementer/information service

**c) Roles and responsibilities**

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

**d) Covered sectors**

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

**e) Established date**

October 2008

**f) Number of staff members**

225 government officials, and 404 employees

**g) Future tasks**

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

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

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

#### a) Information collection and dissemination

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

#### b) Awareness-raising

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

#### c) Capacity-building

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

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

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

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

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

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

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

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

**a) Name**

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

**b) Purpose**

To enforce energy conservation, particularly in designated factories and buildings

**c) Applicable sectors**

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

**d) Outline**

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

**e) Financial resources and budget allocation**

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

**f) Expected results**

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

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards and Labelling

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

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

### 2.2.2. Building Energy Codes

**a) Name**

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

**b) Purpose**

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

**c) Applicable sectors**

Industry and commercial, including government buildings

**d) Outline**

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

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

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

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

**e) Financial resources and budget allocation**

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

**f) Expected results**

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

### 2.3. Voluntary Measures

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

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

### 2.4. Financial Measures Taken by the Government

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

#### 2.4.1. Tax Scheme

**a) Name**

Tax incentives (monitored by DEDE)

**b) Purpose**

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

**c) Applicable sectors**

Various sectors

**d) Outline**

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

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

**e) Financial resources and budget allocation**

ENCON Fund

**f) Expected results**

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

### 2.4.2. Low-Interest Loans

**a) Name**

Revolving funds or soft loans (monitored by DEDE)

**b) Purpose**

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

**c) Applicable sectors**

Buildings and factories

**d) Outline**

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

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

**e) Financial resources and budget allocation**

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

**f) Expected results**

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

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

**a) Name**

Household Energy Credits

**b) Purpose**

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

**c) Applicable sectors**

Residential (households)

**d) Outline**

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

**e) Financial resources and budget allocation**

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

**f) Expected results**

Approximate annual energy saving of 50 ktoe by 2011

### 2.4.3. Subsidies and Budgetary Measure

**a) Name**

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

**b) Purpose**

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

**c) Applicable sectors**

Private industrial and commercial sectors

**d) Outline**

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

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

**Table 1: Subsidy rates**

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

**e) Financial resources and budgetary allocation**

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

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

**f) Expected results**

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

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

### 2.4.4. Other Incentives

In 2008, the Thai Government introduced a new initiative, the ESCO Venture Capital (monitored by DEDE). The ESCO Fund has been established as a source of venture capital for the investors to jointly invest between public and private operators in energy efficiency and renewable energy projects through various channels—venture capital, equity investment, equipment leasing, carbon market, technical assistance and credit guarantee facility. The Fund was launched in October 2008, with an initial capital of THB 500 million (about USD 14.7 million) targeted for potential investors; and as a pilot venture capital initiative to address the issue of lack of equity capital for small developers. The Fund provides equity capital up to 50% of total equity; and in the case of very small projects, provides its support through equipment leasing. The Fund has outsourced the identification and appraisal of projects to two entities, playing the role as Fund Managers (THB 250 million each for ECFT and E for E[39]). As of August 2010, the Fund has approved as many as 33 projects, with total co-investment of around THB 328 million from the ESCO Fund, including, for instance, solar firms, biomass power plants, gasification projects and lighting devices.

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

[39] Energy Conservation Foundation of Thailand and Energy for Environment Foundation.

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

## 2.5. Energy Pricing

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

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

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

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

## 2.6. Other Efforts for Energy Efficiency Improvements

### 2.6.1. Cooperation with Non-Government Organisations

*Stand-alone PEA Renewable Energy and Energy Efficiency Project*

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

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

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

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

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

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

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

## REFERENCES

DEDE (2008), Annual Report 2007, Department of Alternative Energy Development and Efficiency, Thailand. www.dede.go.th/.

EGAT (2008), Annual Report 2007, Electricity Generating Authority of Thailand, www.egat.co.th/en/.

EPPO (2008), Annual Report 2007, Energy Policy and Planning Office, Thailand, www.eppo.go.th/.

MoEN (2008), Annual Report 2007, Ministry of Energy, Thailand, www.energy.go.th/.

# 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 Technology 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 close to 2009 consumption by 2025. BTP programs that are helping to reduce US energy demand include Building America, Net-Zero Energy Commercial Building Integration, Energy Smart Schools, Energy Smart Hospitals, Energy Star, Energy Codes, and Equipment Standards and Analysis.

a) Residential

The BTP's goal is to develop cost-effective zero energy homes by 2020. 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 70%.

b) Commercial Buildings

For commercial buildings, DOE's goal is to achieve net-zero energy new buildings by 2025. In support of this goal, DOE is developing integrated whole-building strategies to enable commercial buildings to be designed, constructed, and operated to use up to 50% less energy by 2015 and 70% less energy by 2025 relative to the relevant commercial building energy standard, ASHRAE Standard 90.1-2004. The balance of the buildings' energy requirements (30% or more) will be met by renewable energy sources. 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 reduce this contribution, the DOE establishes voluntary agreements with industrial partners to reduce energy intensity (annual energy consumption per unit of physical output) 2.5% per year over a period of 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**

The numbers below represent the funding made available for EERE's energy efficiency programs through the American Recovery and Reinvestment Act of 2009:

- 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 Energy Efficiency Action Network

**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

**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 Industrial Technologies Program

**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 (EPAct) 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. 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.

**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. For 2011, the EERE requested USD 100 million to invest in the Industrial Technology Program.

**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[40]

### 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,

[40] 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 *Industrial Technologies Program* reduces the energy intensity of the US industrial sector through a coordinated program of research and development and deployment activities. The Program collaborates with industry (e.g., energy-intensive industries such as forest and paper products, steel, aluminium, metal casting, and chemicals) on R&D to improve the energy efficiency and productivity of industrial processes.

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, transport, power, and public sectors

**d) Established date**

Department of Energy Organization Act (1974)

**e) Number of staff members**

Approximately 430 (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.[41]

*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) 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) as a consumer-friendly portal to detailed energy saving information from various Federal agencies.

**b) Awareness-raising**

*Powerful $avings Campaign*: In May 2004, DOE and the Alliance to Save Energy teamed up on a Powerful $avings campaign to help consumers reduce their energy bills and the economy reduce its energy use through smart energy practices and energy-efficiency. Powerful $avings 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 $avers 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.

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.[42]

*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.[43]

## 1.6 Research and Development in Energy Efficiency and Conservation

### 1.6.1 Research and Development on Building System Components

The goal of this program is to develop a range of technologies to reduce energy use in buildings and eventually make possible the construction of zero-energy buildings. The 2009 budget allocation for the Building Program was USD 140 million, of which about 28% was devoted to R&D. The Recovery Act provided USD 346 million for the Building Technologies Program. The budget request for FY 2011 is USD 231 million.

Research on the building envelope focuses on systems that determine or control the flow of heat, air, moisture, and light in and out of a building; and on materials that can affect energy use. Goals include market-viable, highly insulating windows with R5 insulation performance, advanced systems capable of net-zero energy use by 2025, and eventual reduction in average thermal load of 30% for existing residential buildings and 66% for new buildings.

Research on building equipment focuses on means to significantly improve the efficiency of heating, cooling, ventilating, thermal distribution, lighting, home appliances, and on-site energy use. This area also includes advanced refrigerants and cycles, solid-state lighting, smart sensors and controls, microturbines, and heat recovery. A research goal is to develop solid-state lighting equipment which provides 123 lumens per watt. In FY2011, USD 92.7 million was allocated for research in emerging technologies.

Development of analysis and design tools targets such areas as performance simulation software and design tools for building technology professionals. Home performance programs for builders and home buyers/owners have also been supported. The USD 5.5 million allocated for design tools will be used for improving EnergyPlus.

R&D on solid-state lighting aims to demonstrate energy-efficient, high-quality, long-lasting lighting technologies by 2025 that can illuminate buildings with half as much electricity as in 2005. More about DOE's comprehensive SSL program is available at www.netl.doe.gov/ssl/.

### 1.6.2 Industrial Sector Energy Efficiency Research and Development

The overall goal of the Industrial Technologies Program is to contribute to a 20% reduction in the energy intensity (energy per unit of industrial output, as compared to 2002) of energy-

[42]DOE (2009) and EPA and DOE (n.d. - a).
[43]DOE and EPA (n.d. - b).

intensive industries by 2020. The FY2011 budget request is that USD 100 million be invested in the Industrial Technology Program, with the intent of reducing energy usage in the U.S. industrial sector through partnerships under the Save Energy Now initiative and investment in research and development of crosscutting technologies.

Under the Industrial Technology Program, USD 12.6 million was dedicated to the RD&D of advanced technologies such as high efficiency pulping and innovative paper drying; energy efficient iron- and steel-making and recovery of valuable components from steel industry wastes; efficient aluminum melting and forming; and alternative energy efficient chemical processes, oxidant reactions, hybrid distillations and micro reactors. A budget of USD 25 million was allocated for the RD&D of industrial reaction and separation, high-temperature processing, waste energy minimization and recovery, and sustainable manufacturing. USD 28.9 million was awarded to R&D towards advanced prime movers, key components and integrated systems for clean, efficient and fuel-flexible CHP systems, and replacement of natural gas and oil use.

Research on *energy conversion and utilisation* focuses on a diverse range of advanced and integrated systems. These include advanced combustion technologies, gasification technologies, high-efficiency burners and boilers, thermoelectric technologies to produce electricity using industrial waste heat streams, co-firing with low-GHG fuels, advanced waste heat recovery heat exchangers, and heat integrated furnace designs. Integrated approaches include combined-cycle power generation, and cogeneration of power and process heat or cooling. Combined heat and power systems have the goal of saving $5.3x10^{15}$ Btu of energy and eliminating 848 million metric tons of annual $CO_2$ emissions by 2030.

Research on specific, *energy-intensive and high-$CO_2$-emitting industrial processes* focuses on identifying and removing process inefficiencies, lowering energy requirements for heat and power, and reducing $CO_2$ emissions. One process under development is a means to produce high-quality iron without the use of metallurgical coke, which is a significant source of $CO_2$ emissions in steelmaking. Other research concerns processes that may improve product yield, including oxidation catalysis, advanced processes, and alternative processes that take a completely different route to the same end product, such as use of non-carbon inert anodes in aluminium production.

Research on *resource recovery and utilisation* focuses on separating, capturing, and reprocessing materials for feedstock. Recovery technologies include materials designed for recyclability, advanced separations, new and improved process chemistries, and sensors and controls. Reuse technologies include recycling, closed-loop process and plant designs, catalysts for conversion to suitable feedstock, and post-consumer processing. Research in this area aims to improve recycling and recovery efficiencies. For example, in the chemicals industry the goal is to improve recyclability of materials by as much as 30%. Research also aims at new and improved processes to use wastes or by-products; improve separations to capture and recycle materials, by-products, solvents, and process water; and identify new markets for recovered materials, including ash and other residuals such as scrubber sludges.

### 1.6.3 Research and Development in Transport Sector Energy Efficiency

The overall goal of the Vehicle Technologies Program is to develop and deploy vehicle technologies that will reduce petroleum consumption by increasing efficiency or switching to alternative fuels. The focus of the program is on fuel flexible plug-in hybrid vehicles through greatly enhanced battery research activities and utility partnerships. The 2010 budget allocation for the program was USD 311 million, of which approximately $42 million was requested to broaden research and development. For FY2011 the budget request is approximately $325, an increase of 4% compared to FY2010.

Research on *light vehicles*, organised primarily in support of the FreedomCAR and Fuel Partnership, focuses on materials; power electronics; hybrid vehicles operating on gasoline, diesel, or alternative fuels; high-efficiency, low-emission advanced combustion engines,

enabled by improved fuels; and high-volume, cost-effective production of lightweight materials. Beginning in Fiscal 2007, the Department of Energy is increasing the funding for advanced batteries, power electronics, and systems analyses specifically needed to accelerate the introduction of "plug-in" hybrid vehicles.

The vehicle technologies research programs have a number of specific goals:

1) Improve hybrid electric vehicle component efficiency (up to 50% improvement in fuel economy)
2) Improve plug-in hybrid electric vehicle components (up to 300% improvement in fuel economy)
3) Improve combustion engines and fuel characteristics (up to 40% improvement in fuel economy and displacement of oil by non-petroleum fuels)
4) Reduce the weight of vehicles (up to 30% improvement in fuel economy)
5) Reduce the production cost of a high energy and high power battery to $300/kWh by 2014
6) Improve passenger vehicle engine efficiency 25%-40% and commercial vehicle engine efficiency at least 20% by 2014 while meeting emission standards by 2014
7) Electric propulsion systems with a 15-year life capable of delivering at least 55 kW for 18 seconds and 30 kW continuous at a system cost of USD 12/kW peak
8) Internal combustion engine powertrain systems costing USD 30/kW, having peak brake engine efficiency of 45%, and that meet or exceed emissions standards
9) Electric drivetrain energy storage with a 15-year life at 300 Wh with discharge power of 25 kW for 18 seconds and USD 20/kW
10) Material and manufacturing technologies for high-volume production vehicles, which enable/support the simultaneous attainment of 50% reduction in the weight of vehicle structure and subsystems, affordability, and increased used of recyclable/renewable materials
11) Internal combustion engine powertrain systems, operating on hydrogen with a cost target of USD45/kW by 2010 and USD30/kW in 2015, having a peak brake engine efficiency of 45%, and that meet or exceed emissions standards.

Research areas for *heavy vehicles*, organised primarily under the 21st Century Truck Partnership, include lightweight materials, aerodynamic drag, tire rolling resistance, electrification of ancillary equipment, advanced high-efficiency combustion propulsion systems (including energy-efficient emissions reduction), fuel options (both petroleum- and non-petroleum based), hybrid technologies for urban driving applications, and onboard power units for auxiliary power needs.

The research objectives are to:

1) Reduce energy consumption in long haul operations
2) Increase efficiency and reduce emissions during stop-and-go operations
3) Develop more efficient and less-polluting energy sources to meet truck stationary power requirements (i.e., anti-idling).

By 2010, the goals include a laboratory demonstration of an emissions-compliant engine system that is commercially viable for Class 7-8 highway trucks, and an engine that improves the system efficiency to 53% by 2010 and to 55% by 2013, from the 2002 baseline of 40%. By 2012, the goals include advanced technology concepts that reduce the aerodynamic drag of a Class 8 tractor-trailer combination by 20%.

Research on aviation fuel efficiency includes engine and airframe design improvements. Aviation fuel efficiency goals include new technologies with the potential to reduce $CO_2$ emissions from future aircraft by 25% within 10 years and by 50% within 25 years.

### 1.6.4 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 (EPAct 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 residential appliances and certain commercial equipment. DOE has energy efficiency standards in place for most major types of energy-using appliances, including air conditioners, clothes washers and dryers, space and water heaters, kitchen ranges and ovens, refrigerators and freezers, and lighting. Section 135 of EPAct 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.

EISA also 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.

The Energy Security and Independence Act of 2007 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.

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). The US DOE manages the labelling for a variety of residential products, including appliances, compact fluorescent lamps (CFL), solid state lighting, windows, and residential water heaters. The EISA of 2007 states that starting in 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, for example, 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. 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. They are projected to save 1.8 billion barrels of oil over the life of the program, with a fuel economy gain averaging more than 5% per year and a reduction of approximately 900 million tonnes in greenhouse gas emissions.

On April 1, 2010, the U.S. Environmental Protection Agency and the National Highway Traffic Safety Administration issued regulations that will require cars and light trucks combined to get an average of 35.5 miles per gallon by 2016 (6.6 liters/100 km; 250 g CO2/mile), moving up a 2007 law that required the same efficiency by 2020. 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 over the life of the vehicles covered by the new requirements.

The Environmental Protection Agency and National Highway Traffic Safety Administration recently proposed the first fuel economy standard for heavy duty vehicles. The proposed rules are expected to reduce the fuel consumption of heavy duty vehicles by 10–20% between 2014 and 2018, depending on the type of vehicle. 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.[44]

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

[44] NHTSA (2010)

**f) Expected results**

Average fuel economy for new cars and light trucks will gradually increase to 35.5 miles per gallon by 2016. The new CAFE standard is expected to result in savings of 1.8 billion barrels of oil over the next five years.

## 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 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.

## 2.4. 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 are now available for home improvements "placed in service" from 1 January 2009 through 31 December 2010. Any qualified home improvements made in 2008 are not eligible for the tax credit. The maximum lifetime amount that a taxpayer may claim is USD 1500. It must be an existing home and principal residence to receive this tax credit. New construction and rentals do 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 are 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 – 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 –
  - USD 150 – models that use 30% less energy relative to federal standard
  - USD 200 – 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 is available for hybrid vehicles placed in service after 31 December 2005. Vehicles purchased after December 31, 2010 are not eligible for this credit. Plug-in hybrid-electric vehicles and all electric vehicles purchased in or after 2010 may be eligible for a federal tax credit of up to USD 7,500. The credit amount varies based on the capacity of the battery used to fuel the vehicle. Some diesel vehicles purchased or placed into service after December 31, 2005 may be eligible for a federal income tax credit of up to USD 3,400. The credit amount begins to phase out for a given manufacturer once it has 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 receive a USD 250-USD 3400 tax credit for certified vehicles. For the case of hybrid-electric vehicles, the tax credit for a given manufacturer is phased out after the first 60 000 certified vehicles are sold. For plug-in hybrid-electric vehicles, the tax credits are: PHEV10 (vehicles with a range of 10 miles): USD 2500, PHEV20 (20 miles): USD 4000, PHEV30: USD 5000, PHEV40: USD 5000. In this case the tax credit for a given manufacturer is to be phased out after 200 000 vehicles are 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 09 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

*DOE Loan Guarantee Program*

**a) Level**

Federal

**b) Purpose**

Accelerate the deployment of energy efficiency improvements, including efficient windows, lighting, and roofs

**c) Applicable sectors**

Commercial, industry, state and local government, agriculture, others

**d) Outline**

The loans, available to non-Federal entities, must be repaid by the lesser of 30 years or 90% of the projected useful life of the physical asset.

**e) Financial resources and budget allocation**

As extended under ARRA, up to USD 6 billion may be allocated through September 2011.

**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.

**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*

**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 stimulus bill made available approximately USD 5 billion for weatherisation efforts. The budget request for FY2011 is approximately USD 385 million.

**f) Expected results**

Some 6.2 million homes have been weatherised since the program began in 1974. Over 1.2 million more homes should be weatherised during 2009 and 2010 in view of the maximum expenditure per home of USD 5000.

*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.

**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 550 projects worth USD 3.6 billion have been awarded by 25 different Federal agencies and organizations as of March 2010. These projects saved an estimated USD 11 billion in energy costs, from which USD 9.6 billion goes to fund energy efficiency projects and the remaining USD 1.4 billion in savings reduces government spending.

**f) Expected results**

The current ESPC contract permits contractor payment of up to USD 5 billion. Contracts with 25 private companies were awarded.

*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**

More than 45 electric and gas utilities have provided project financing for energy and water efficiency upgrades at Federal facilities, investing more than USD 600 million through utility energy services contracts since 1995.

**f) Expected results**

The Edison Electric Institute has committed to encouraging USD 2 billion in private investment by 2010.

## 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.

## REFERENCES

DOE (2009). *Best Practices.* US Department of Energy, www1.eere.energy.gov/industry/bestpractices/.

EPA and DOE (n.d. - a). *Industrial Energy Management Information Center.* US Environmental Protection Agency and US Department of Energy, www.energystar.gov/index.cfm?c=industry. bus_industry_info_center.

DOE and EPA (n.d. - b). *Energy Star for Small Business.* US Environmental Protection Agency and US Department of Energy, www.energystar.gov/index.cfm?c=small_business.sb_index.

EIA (2009). *Households, Building, Industry & Vehicles.* US Energy Information Administration, www.eia.doe.gov/emeu/consumption/index.html.

NHTSA (National Highway Traffic Safety Administration) (2010). DOT, EPA Propose the Nation's First Greenhouse Gas and Fuel Efficiency Standards for Trucks and Buses http://www.nhtsa.gov/PR/DOT-189-10

OMB (2009). *Detailed information on the Industrial Technologies Program Assessment*. US Office of Management and Budget, www.whitehouse.gov/omb/expectmore/detail/10003402.2005.html.

# VIET NAM

## 1. GOALS FOR EFFICIENCY IMPROVEMENT

### 1.1. Overall Energy Efficiency Improvement Goals

In 2005, the Vietnamese Government (Ministry of Industry and Trade—MOIT) released the National Strategic Program on Energy Savings and Effective Use (Vietnam National Energy Efficiency Program, VNEEP) for the period 2006–2015, which was approved and enforced on 14 April 2006 by the Prime Minister (Decision No.79/2006/QD-TTG). The VNEEP calls for coordinated efforts for improving energy efficiency, reducing energy losses, and implementing extensive measures for conservation of energy.

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 Viet Nam. Phase 1 (2006–2010) aims to actively start up all components of the program, and Phase 2 (2011–2015) aims to expand each component, based on the lessons learned from Phase 1.

The overall objectives of the program are as follows:

- The program is a set of activities to encourage, promote, and disseminate energy efficiency and conservation (EE&C) in the public sphere; in science and technology research activities and in management measures needed to carry out synchronous activities on energy efficiency and conservation throughout society
- The program's energy savings goal is 3%-5% of total energy consumption (compared to the BAU case) in the period 2006–10; 5%–8% of the total energy consumption in the period 2011–15.

### 1.2. Sectoral Energy Efficiency Improvement Goals

Viet Nam currently has no sectoral quantitative targets.

### 1.3. Action Plans for Promoting Energy Efficiency

Vietnam National Energy Efficiency Program (VNEEP) is the comprehensive program of work to promote energy efficiency in Viet Nam. According to the VNEEP framework, there are six components focusing on the entire field of energy efficiency with specific actions, including 11 large projects for promoting energy efficiency.

#### a) Objectives

The VNEEP aims to reach a certain target of energy saving, which will result in lower investment requirements for the energy supply system and social economic benefits. At the same time, it will contribute to environmental protection and rational extraction of energy resources, moving towards social and economic sustainable development.

#### b) Applicable sectors

Phase one of the VNEEP was implemented in the period 2006–10. It contains a comprehensive set of measures that cover six sectors: government (institutions, education, and information), industry, equipment and appliances (for the residential and commercial sectors), buildings and transport. However, this phase focuses on the development and completion of the legal documents, education, information, and capacity building, such as the Energy Efficiency Law, Decree on Punishment and Reward for Energy Efficiency, organising training courses, workshops, dissemination to the community, etc. Phase 2 of the VNEEP will start from 2011 with a deeper and larger focus in each sector.

#### c) Outline

The VNEEP consists of six component packages with 11 projects (actions). The actions and

achievements to date are listed below[45]:

**Component 1: State Management on Energy Efficiency and Conservation**

Project 1: Complete the legislative framework on EE&C in industrial production, construction site management, domestic activities, and energy consumed equipment

***Achievements (2007-2008)***

- Completed the draft Law on Energy Conservation and Efficient Use
- Issued Joint Circular No. 142/2007/TTLT/BTC-BCT of 30 November 2007, guiding the management and use of non-business funds for the implementation of the target program on economical and efficient use of energy
- Directed and guided all localities to carry out the energy efficiency activities
- Set-up the EE&C Centres in Hanoi and Tien Giang to coordinate program activities in the whole economy
- Organised workshops, seminars, and training on energy efficiency laws, policies, institutional issues, and technology and solutions
- Developed VNEEP websites: www.tietkiemnangluong.com.vn
- Published the leaflets, handbooks, and technical guidelines on energy efficiency.

**Component 2: Education and Information Dissemination**

Project 2: Public awareness enhancement on EE&C

Project 3: Integrate EE&C in to the education system

Project 4: Develop pilot models for 'EE&C in the household' movement

***Achievements (2007-2008)***

- Broadcast EE&C news and released on television and radio
- Developed documentary films on energy efficient technologies
- Printed EE&C information on various newspapers and electronic media
- Organised contest on energy efficient buildings
- Provided guidelines to disseminate EE&C 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: Technical assistance to domestic producers on energy efficiency compliance

***Achievements (2007-2008)***

- Completed demonstration model for solar water heater and industrial biogas
- Carried out labelling program for three appliances, i.e., FTL T8-36W, T5-32W, and electronic ballasts
- Collaborated with 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 pilot EE&C information for households by Vietnam Woman Union in six provinces and cities
- Implemented two programs to support lighting manufacturers in the technology transition from incandescent lamps to compact fluorescent lamps.

[45] Decision 79 /2006/QD-TTg (2006); APEC EWG (2009).

**Component 4: EE&C in Industrial Enterprises**

Project 7: Develop EE&C management models in enterprises

Project 8: Support industrial enterprises in improving, upgrading, and optimising technology aiming at energy savings and efficiency

***Achievements (2007-2008)***

- Completed a survey in 2008 on the energy consumption of more than 500 large enterprises to identify the potential of energy savings and set the energy consumption rates in the industrial sectors that consume a lot of energy

**Component 5: EE&C in Buildings**

Project 9: Improving capacity in EE&C and conducting EE&C in building design and management

Project 10: Develop pilot models and disseminate EE&C management activities in building operation

***Achievements (2007-2008)***

- Implemented various dissemination activities led by the Ministry of Construction (MOC)

**Component 6: EE&C in Transportation**

Project 11: Make optimal use of transportation facilities and equipment, minimise the amount of fuel consumed, and reduce discharge of exhausted gases to environment

The major actions that have been taken by 2008 are as follows:

***Achievements (2007-2008)***

- Conducted research activities on the enhancement of public passenger transportation in cities, and creation of fuel consumption measurement equipment to serve the management and exploitation of diesel-powered ships for fuel-saving purposes

The VNEEP has provided a platform for implementing a variety of EE&C in all sectors. However, the first two years of VNEEP implementation have been focused mostly on education, capacity building, and study, and there is much more work to be done. With the introduction of several enabling efforts and capacity building, VNEEP now is a good position to review its objectives and targets, and develop an overall strategy and detailed implementation plan to achieve them. This will aid the government in determining appropriate levels of funding for various initiatives, allow for increased competition and accountability among implementing partners, and the appropriate roles of private sector participation and leverage.

**d) Financial resources and budget allocation**

In 2007, VND 30 billion (about USD 2 million) of the state budget was allocated for 28 projects registered under VNEEP. About a third of these funds were allocated to support two energy efficiency lighting manufacturers. In 2008, VND 36 billion (about USD 2.25 million) were allocated for 48 projects, many of which were initiated in 2007. Of this, about one third was used to set up an energy efficiency laboratory for air conditioners and refrigerators.

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

Surveys, statistic compilation, end-use information, reporting, and trend analysis are all being undertaken and databases are being developed to assist in program evaluation and policy formation. However, these activities are very limited because there has been no official agency until now that is responsible for energy data collection and analysis. Most of the past and ongoing energy data monitoring and evaluation were undertaken as part of individual projects or energy audits of customers. In addition, the capability of human resources and government budget shortages are also another impediment in this area.

Energy Efficiency and Conservation Office (EECO) at MOIT is the only agency that has a duty regarding energy efficiency monitoring and reporting so far.

**f) Expected results**

Reducing total final consumption by more than 5%-8% compared to the BAU case

**g) Future tasks**

Tasks include completing the Law of Energy Conservation and Efficient Use and related legal documents, establishing the official energy database to be included energy efficiency data, developing human resources, and so on.

### 1.4. Institutional Structure

**a) Name of organisation**

MOIT plays the role of focal coordinator on EE&C and is authorised to administer the implementation of the VNEEP. As part of this enforcement, the Energy Efficiency and Conservation Office within the Ministry of Industry and Trade was established on 7 April 2006 (Ministerial Decision No.919/QD-BCN). The main work of the Energy Efficiency and Conservation Office is to develop organisations and systems related to improving energy efficiency and conservation on government levels from the central government to local governments.

The National Steering Committee chaired by MOIT was established for inter-ministerial coordination in monitoring implementation of the VNEEP. Members of the Steering Committee include representatives from the Ministry of Construction, Ministry of Transport, Ministry of Education and Training, Ministry of Culture and Information (renamed the Ministry of Culture, Sports and Tourism in August 2007), Ministry of Science and Technology, Ministry of Planning and Investment, Ministry of Justice, Ministry of Finance, and the Union of Vietnam Associations of Science and Technology.

The National Steering Committee and Energy Efficiency and Conservation Office (EECO) were established in 2006 to manage the EE activities and VNEEP in Viet Nam. Since then, EECO has completed preparatory tasks including the formulation of the action plans and detailed programs needed to launch and implement the VNEEP successfully in cooperation with other governmental organisations. The EECO currently has a 15-member staff.

At the level of implementing agencies, the following main agencies have been carrying out energy efficiency programs or related energy efficiency programs:

- Institute of Energy (IE)
- Energy Efficiency Centres in some big cities such as Hanoi, Tiengiang, HCM City, Phu tho, Dongthap, Haiphong, Danang
- Vietnam Standards and Quality Centre (VSQC)—STAMEQ (MOCT)
- Electricity of Vietnam (EVN)
- Other agencies under different ministries.

**b) Status of organisation**

All agencies report implementation of EE programs to the EECO and MOIT.

**c) Roles and responsibilities**

Vary across agencies

**d) Covered sectors**

All sectors of the economy are covered

**e) Established date**

Since 2002 (only for EE&C centres)

**f) Number of staff**

25 staff members (only for EE&C centres)

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

**a) Information collection and dissemination**

General information on VNEEP is readily available to Vietnamese energy consumers. For example, the EE&C 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 EEC HCM Centre, EE Hanoi Centre, etc.

**b) Awareness-raising**

The purpose of the dissemination program in Component 2 is to increase the public awareness of the definition of EE&C and support the penetration of energy efficient appliances into the domestic retail market. In recent years, the EE&C promotion and dissemination program has been appearing frequently in the media.

Four projects were carried out in 2007 and six projects were implemented in 2008-2009. The projects are mainly focused on communication via public media, radio, television, newspapers, and other public relations activities.

Almost all projects in Component 2 have completed the proposed tasks, including Viet Nam television and radio, the contest for energy efficient buildings, and provision of EE&C information to the school education system at all levels.

**c) Capacity-building**

A range of training courses, workshops, publishing of technical documents for energy efficiency knowledge and assessment 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, capacity building for EE&C centres, and so on. Generally, most of these activities are scheduled to be completed in the first phase of the program. Training courses in construction and design of energy efficient buildings, enhancing capacity for facility management on energy efficiency of local industry department leaders and energy managers are also being developed under the VNEEP.
EECO outlines annual plans on implementation of energy efficiency program by 2010, in which there are several activities for the development of human resource to ensure that Viet Nam will have the skills and knowledge required to reach energy efficiency goals under VNEEP.

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

Viet Nam has no specific policy on research and development (R&D) in energy efficiency and conservation. However, there are a number of measures that encourage research and development in energy efficiency incorporated in the energy policy and other related legal framework documents. In this regard, the decision on "The National Energy Development Strategy of Vietnam for the period up to 2020 with outlook to 2050" pointed out in 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"[46]. The important role 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 improvement of energy efficiency in various sectors in Viet Nam. The decree also

[46] Decision 1855/QD-TTg (2007).

mandates various organisations in the government at central and local levels to put reasonable efforts into R&D for energy efficiency improvement. The contents of energy efficiency R&D in the decree are: development of suitable energy efficiency and conservation technologies in the industrial sector; promotion of those technologies developed from R&D efforts and improvement of energy efficiency in production activities of Vietnamese people especially in the rural and remote areas. The decree also calls the government to allocate a suitable budget for R&D work in energy efficiency improvements from the Science-Technology Research and Development Fund. Until now, Viet Nam's R&D is under the purview of the Ministry of Science and Technology (MOST). MOST is also responsible for setting up long- and medium-term R&D programs and budget allocations. In this regard, there are no any specific action plans or programs developed in accordance to the measures stipulated in the above documents on the R&D for energy efficiency improvements so far.

## 2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

### 2.1. Government Laws, Decrees, Acts

In 2003 a first Decree on Energy Efficiency and Conservation (Decree No.102/2003/ND-CP) was issued (see below). In addition, in July 2004 the Ministry of Industry issued a circular providing guidance for the implementation of energy conservation in the industry sector (Circular No. 01/2004/TT/BCN on Energy Efficiency and Conservation). Now this decree has been replaced by the Law on Energy Efficiency and Conservation which was passed by the 12th National Assembly in June 2010 and enforced since 01 January 2011.

In 2005 the MOIT released the National Strategic Program on Energy Savings and Effective Use (Vietnam Energy Efficiency Program—VNEEP)) for the period 2006-2015, which was approved and enforced on 14 April 2006 by the Prime Minister's Decision (Decision No.79/2006/QD-TTG). The VNEEP calls for coordinated efforts for improving energy efficiency, reducing energy losses, and implementing extensive measures for conservation of energy. In addition, in November 2006 MOIT issued a Guideline for Energy Efficiency Standard and Labelling in order to assist on the implementation of energy efficiency standards and labelling in appliances (Circular No.08/2006/TT/BCN).

Other related regulations are the Electricity Law approved and enforced in July 2005, comprising sections that specify electricity efficiency in the generation, transmission, distribution and use processes. This was followed by the "Electricity Saving Program for the period 2006–2010" approved by the Prime Minister in April 2006. Furthermore, the Building Code which aims to reduce energy losses and improve living conditions in buildings was issued in November 2005 (Energy Efficient Commercial Building Code No.40/2005/QD-BXD).

**a) Name**

Law on Energy Conservation and Energy Efficiency (50/2010/QH12)

**b) Purpose**

The decree aims to promote the energy conservation and energy efficiency for meeting 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 industry, construction (buildings), transport sectors and energy consuming equipments.

**d) Outline**

The Law regulates all designated energy consumers to be defined by the Government. It also confirmed that the government carries out the state management on energy efficiency and

conservation and the Ministry of Industry and Trade, as its duty to government, is responsible for implementing the state management on energy efficiency and conservation. Apart from that, other related ministries such as Ministry of Science and Technology, Ministry of Construction, Ministry of Transport and the General Statistics Office, People's Committees at provincial level etc. are responsible for coordinating with the Ministry of Industry and Trade (now called MOIT) in implementing the state management duty on energy efficiency and conservation in provinces and sectors.

**e) Financial resources and budget allocation**

The Law also indicated that the energy efficiency projects could be considered for financial support from National Target Programs on Energy Efficiency and Conservation. Financial resources and budget allocation will be identified clearly in the regulations and guidelines of this Law.

**f) Expected results**

No information available

## 2.2. Regulatory Measures

### 2.2.1. Minimum Energy Performance Standards and Labelling

Mandatory measures are expecting to be gradually applied after The Law of Energy Conservation and Effective Use is fully enforced. Viet Nam is now preparing the road map for implementation of energy efficiency standard and labelling programs for equipment and appliances in line with Phase 2 of VNEEP (2010–2015).

### 2.2.2. Building Energy Codes

**a) Name**

Vietnam Energy Efficiency Building Codes (No. 40/2005/QD-BXD)

**b) Purpose**

This code introduces minimal requirements that need compliance in design and construction to improve the energy efficiency of existing extensions and new buildings and to minimise loss of energy used in all types of buildings, and improve thermal comfort and visual conditions.

**c) Applicable sectors**

Residential, commercial, and public buildings

**d) Outline**

Energy efficiency provisions for buildings were first introduced in 2000 based on research results of the fourth component of the Demand Side Management—DSM—project with the cooperation of Vietnamese Ministries of Industry and Construction and an international consulting company, The Deringer Group (US). Regulations in this code are applied to the building envelope, systems of outdoor and indoor lighting, air conditioning and ventilation together with other power-consuming and energy-managing equipments. The provisions varied according to the size of the buildings—small buildings (gross floor area from 300 $m^2$ to 2499 $m^2$), medium-sized buildings (gross floor area from 2500 $m^2$ to 9999 $m^2$), and large buildings (minimum gross floor area of 10 000 $m^2$).

**e) Financial resources and budget allocation**

No information available

**f) Expected results**

No information available

### 2.3. Voluntary Measures

Labelling is currently voluntary for the following electrical products in Viet Nam:

- Refrigerators
- Fans
- Water heaters
- Lighting equipment: CFLs, TFLs, electronic ballast
- Air conditioners
- Three-phase electric motors.

### 2.4. Financial Measures Taken by the Government

In order to implement energy efficiency programs within the framework of the VNEEP, MOIT together with MOF (Ministry of Finance) issued Circular No. 142/2007/TTLT/BTC-BTC to guide the management and use of non-business funds for the implementation of the target program on economical 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 (equal to USD 5 million) of which VND 10 billion to support for two EE 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 available

#### 2.4.2. Low-Interest Loans

No information available

#### 2.4.3. Subsidies and Budgetary Measures

Apart from the VNEEP, there are a number of subsidies and budgetary measures for energy efficiency improvement programs at the central government levels. One example is provided below.

**a) Name**

The Pilot Commercial Energy Efficiency Program (CEEP)

**b) Purpose**

The Pilot Commercial Energy Efficiency Program aims to enhance capacity building in EE&C activities for agencies and provide financial support to enterprises.

**c) Applicable sectors**

Residential, commercial, and industrial sectors

**d) Outline**

For this project the Government of Vietnam has received a grant from the Global Environment Facility (GEF) through the International Bank for Reconstruction and Development (World Bank—WB). The implementation period of the Program is the four years from 2004–2009.

The pilot program has three components:

- Training of Project Agents in all aspects of energy-efficient commercial business services and customised technical assistance follow-up to support their development and completion of energy efficiency investment projects (Annex 5 summarises the training plan)

- Energy audit and efficiency investment grants (at decreasing levels over four years) to enable individual business efficiency investment transactions to overcome initial barriers to 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, together with program administration to ensure success of the overall project strategy.

**e) Financial resources and budget allocation**

This has been funded by the state budget, World Bank, and Global Environmental Facility.

**f) Expected results**

Upon implementation, the total electricity consumption will be reduced by 1540 GWh.

#### 2.4.4. Other Incentives

No information available

### 2.5. Energy Pricing

The pricing mechanism for some kinds of energy fuels (coal for power generation, several kinds of petroleum products) and electricity tariff in Viet Nam is controlled by the government.

### 2.6. Other Efforts for Energy Efficiency Improvements

#### 2.6.1. Cooperation with Non-Government Organisations

The Vietnamese Government cooperates with non-government organisations 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), Promotion of energy efficiency in Small and Medium Enterprises (PECSME Program—in cooperation with UNDP), and other programs and initiatives.

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

As there is a wide variety of donor activities, coordination of donor support in the future months and years will be crucial. In October 2008, the MOIT and the World Bank co-chaired an Energy Efficiency Donor Coordination Meeting, which included presentations of each donor on their programs and planned activities as well as a roundtable discussion on ideas for coordinating efforts and further sharing of information. The following summarises major donors and their activities in the field of energy efficiency in Viet Nam:

- 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—WB).

## REFERENCES

Decision 79/2006/QD-TTg (2006), *The VN National Energy Efficiency Program*.

APEC EWG (2009), *Peer Review on Energy Efficiency in Viet Nam*, (final report, 2009).

Decision 1855/QD-TTg (2007*), Approving the National Energy Development Strategy of Viet Nam for the Period up to 2020 with Outlook to 2050*.