COMPENDIUM OF ENERGY EFFICIENCY POLICIES OF APEC ECONOMIES

ASIA PACIFIC ENERGY RESEARCH CENTRE

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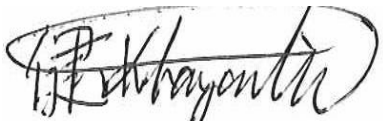
FOREWORD

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. In the Honolulu Declaration of November 2011, APEC Leaders agreed to revise this goal; it now aspires to reduce APEC's aggregate energy intensity by 45 percent from the 2005 level by 2035.

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.



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AUSTRALIA

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

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 released its response as part of the Clean Energy Future package in July 2011. The Report is available at: http://www.climatechange.gov.au/publications/energy-efficiency/report-prime-ministers-taskforce-energy-efficiency.aspx.

The Clean Energy Future package contains a number of elements, including a price on carbon from 1 July 2012 and initiatives to encourage energy efficiency in Australia (discussed below). Further details on the Clean Energy Future package are available at www.cleanenergyfuture.gov.au

1.2. Sectoral Energy Efficiency Improvement Goals

From 1 July 2012 the Australian Government will introduce a price on carbon in the Australian economy, which will contribute to energy efficiency incentives across a range of economic sectors. Further details on the carbon price are available at www.cleanenergyfuture.gov.au

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 2012-13)

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 http://www.energyrating.gov.au/resources/program-publications/?viewPublicationID=2204.

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. 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 and electricity generators using more than 0.5 petajoules (PJ) of energy in a year must identify and report on energy efficiency opportunities both publicly and to the government.
- RET commissions work on industrial energy intensity (undertaken by the Australian Bureau of Resource and Energy Economics — BREE). 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 Industry, Innovation, Science, Research and Tertiary Education (DIISRTE). 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 and Climate Change
- 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 has terminated and it is intended that two new councils will be formed to assume the roles and responsibilities of the MCE: the Standing Council on Energy and Resources (SCER); and, the Select Council on Climate Change (SCCC).

It is intended that if formed, the SCCC will generally assume responsibility for matters of energy efficiency. However, an exception may apply in the case where matters of energy efficiency have an impact or are related to the National Energy Market.

Recently formed, SCER is comprised of all federal, state and territory energy and resources ministers.

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 and will be available for use in early 2012. 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, was extended to electricity generators from 1 July 2011. Work is currently underway to expand EEO to include energy transmission and distribution networks as well as covering the design phase of major greenfield and expansion projects. Inclusion of transmission and distribution networks in EEO could see significant reductions in network losses, which would lower carbon pollution from electricity use and put downward pressure on energy prices. The Government is also considering a voluntary program for medium sized energy users. Such a voluntary scheme will allow the significant resources and information available under the existing program to be tailored to these energy users, a key element of which will be training, mentoring and help with program management.

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 July 2011 the Australian Government announced the Clean Energy Future package (CEF). CEF has four main elements: a carbon price, renewable energy, energy efficiency and action on the land (such as the storing of soil carbon, revegetation and forest conservation).

The carbon price scheme comes in two phases. The first phase will be a fixed-price period and the second phase, a market based emissions trading scheme. The fixed price period will last for 3 years and will commence on 1 July 2012 (subject to legislation passing through the federal parliament).

In addition to a price on carbon, there are a number of energy efficiency specific initiatives under CEF.

National Energy Savings Initiative

In its 2010 report, the Prime Minister's Task Group on Energy Efficiency recommended the introduction of a national Energy Savings Initiative (ESI). The Government has committed to develop a national ESI as part of the Clean Energy Future package.

The Australian Government is currently undertaking further work on the costs and benefits of a national scheme to replace existing State-based schemes which operate in South Australia, Victoria and New South Wales. This would reduce complexity and duplication and allow energy consumers in states without existing schemes to benefit. A national ESI would place obligations on energy retailers to help households, businesses and industry install energy efficient goods and technologies.

Subject to the findings of economic modelling and regulatory impact analysis, the Australian Government will make a final decision on whether to adopt a national ESI. A national ESI

would be conditional on the agreement of the Council of Australian Governments and the abolition of existing and planned state schemes.

Clean Energy Finance Corporation

A new $10 billion Clean Energy Finance Corporation is to be established that will be independent from the Australian Government and will invest in the commercialisation and deployment of renewable energy, low-pollution and energy efficiency technologies. It will also invest in manufacturing businesses that provide inputs for these sectors. Investments will be divided into two streams, a renewable energy stream and a clean energy stream, each with half of the allocated funding. This program does not include investment in carbon capture and storage (CCS) which is already catered for through a number of other programs such as the Global CCS Institute and the CCS Flagships program.

Clean Technology Program

The Clean Technology Program (CTP) is a $1.2 billion program to help directly improve the energy efficiency of manufacturing industries and support research and development in low-pollution technologies. Of that funding, $150 million will be targeted at the food processing industry, and $50 million for the metal forging and foundry industries.

The CTP will provide funding for the Clean Technology Innovation Program, a $200 million investment in further support for businesses for research and development in the areas of renewable energy, low-pollution technology and energy efficiency.

The CTP will also provide funding for the Clean Technology Investment Program, providing $800 million in grants to manufacturers to support investments in energy-efficiency capital equipment and low-pollution technologies, processes and products. Manufacturing businesses with facilities that use more than 300 megawatt hours of electricity or five terajoules of natural gas per year, or are covered by the carbon pricing mechanism, will be eligible to apply for grants under this program.

Steel Transformation Plan

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

Clean Energy Skills Program

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

Energy Efficiency Information Grants

The Energy Efficiency Information Grants program will provide $40 million in grants over four years to industry associations and non-government organisations which have established relationships with small businesses and community organisations to deliver information about

the implications of the Government's Clean Energy Future package and how to reduce energy costs.

Living Greener

The Living Greener initiative will provide a website and household advice line that gives householders information on living sustainably and will connect to all Commonwealth, state and territory energy efficiency and climate change programs. The website will include information on how households can improve energy efficiency to save dollars and cut carbon pollution.

Low Carbon Communities

The Government's Low Carbon Communities program will be expanded to provide funding through competitive grants to local councils and communities to improve energy efficiency in council and community-use buildings and facilities, and to assist low-income households. Funding for the program will be increased from $80 million to $330 million.

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 and natural gas networks. This mainly covers the mining, resource processing, manufacturing, transport and commercial sectors.

d) Outline

Participation in EEO is mandatory for corporations and electricity generators 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 300 participants on 6 December 2011) registered for the program account for around 60% of all energy end-use. Extension to electricity transmission and distribution networks will increase coverage to around 65% of total energy end 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. The *Clean Energy Future* package outlines further funding for the program out to 30 June 2017.

e) Expected results

Abatement and energy efficiency improvements from the program are significant. The latest program results show that in 2009-10, 207 companies reported that they had assessed 85% of their energy use. From these assessments they had identified energy efficiency opportunities with annual savings of 141.9 petajoules (PJ) or 9.8% of energy use assessed. From these identified opportunities, companies reported they will implement savings of 75.5 PJ, or 53% of the identified savings. This is worth more than AUD 650 million a year in net financial benefits, saving an estimated 6 million tonnes of CO_2 equivalent a year or 1% of Australia's total greenhouse gas emissions.

Another 30% of opportunities (43.0 PJ) are under further investigation and 17% (23.4 PJ) were not to be implemented at the reporting date. The report '*Continuing Opportunities – A Look at Results for the Energy Efficiency Opportunities Program 2006-2010'* is available on the Department's website at: http://www.ret.gov.au/energy/efficiency/eeo/pages/default.aspx.

Savings to be implemented represent an average net abatement saving of approximately AUD 117 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.

2.1.2. Hot Water Phase Out Program

a) Name

Phase out of greenhouse intensive (electric resistance) 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 has begun and is being implemented through the Building Code of Australia. Restrictions are now in place on the installation of greenhouse intensive water heaters in new detached, terrace, row and town houses. Stage 1 (2010) for existing homes is being implemented on a State by State basis in areas with access to reticulated gas. Queensland and South Australia have already commenced.

(ii) 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. The phase out is expected to extend across the country (except Tasmania) during 2012.

Research is currently being undertaken into the feasibility of extending the program to cover new apartments, flats and high rise buildings from 2013.

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, most sellers or lessors of office space of 2000 square metres or more are required to obtain and disclose a current Building Energy Efficiency Certificate (BEEC). 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

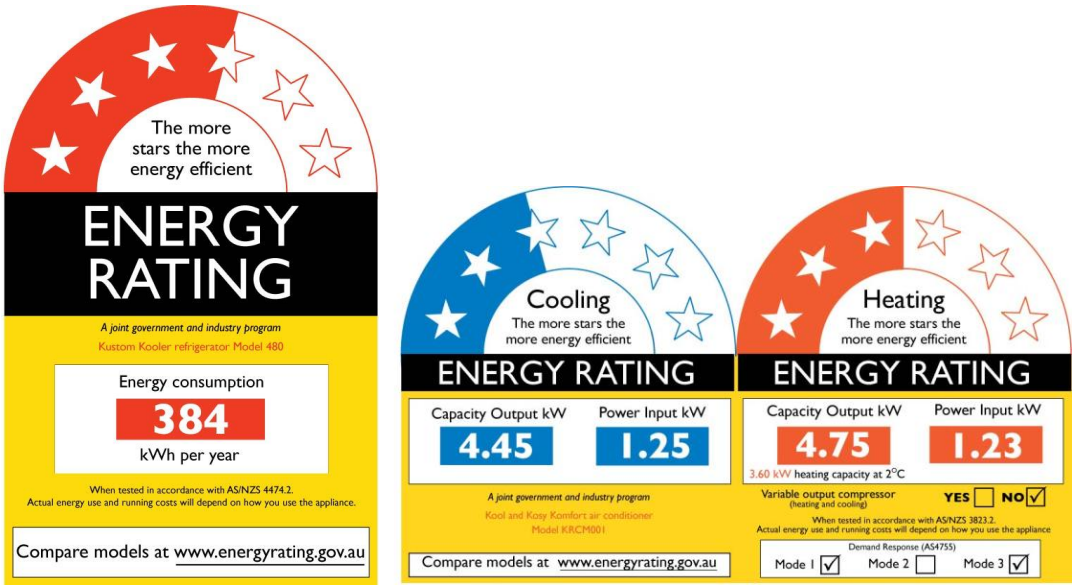
Mandatory MEPS and energy efficiency labelling are covered by the Equipment Energy Efficiency Program (E3), which is co-funded by the Australian Government, state and territory governments and the New Zealand Government. Products are included in the program based on whether the community would benefit 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.

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

- Refrigerators and freezers
- Mains pressure electric storage water heaters
- Small mains pressure electric storage water heaters (<80L) and low pressure and heat exchanger types
- Three-phase electric motors (0.73kW to <185kW)
- Single-phase air conditioners
- Three-phase air conditioners up to 65kW cooling capacity
- Distribution transformers
- Ballasts for linear fluorescent lamps. In addition to MEPS, ballasts 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
- Commercial refrigeration (self-contained and remote systems)
- Incandescent lamps
- Compact fluorescent lamps
- External power supplies
- Set top boxes
- Televisions
- Commercial building chillers
- Close control air conditioners
- Transformers and electronic step-down converters for ELV lamps.

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

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

No information available

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

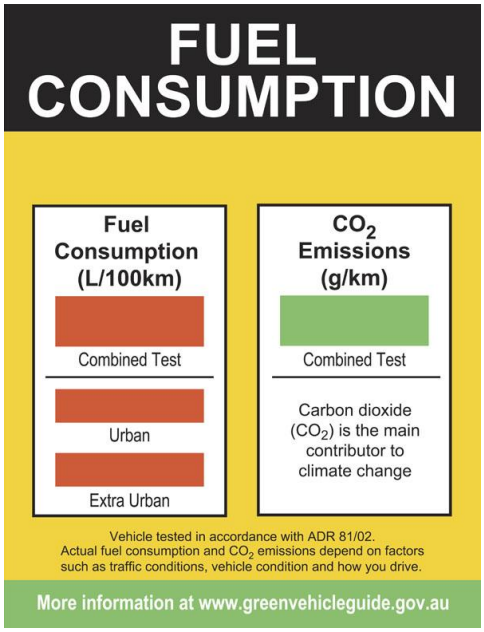
Mandated fuel consumption labelling to enable new car purchasers to compare vehicles on a common basis and incorporate vehicle fuel use in their decision making. More information can be found at http://www.greenvehicleguide.gov.au/GVGPublicUI/Information.aspx?type=FuelConsumptionLabel.

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 2012.

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, comprised of two main programs, the Community Energy Efficiency Program and the Low Income Energy Efficiency Program, provides AUD 330 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. It also supports low income households in trials of energy efficiency approaches and to find more sustainable ways ot manage their energy consumption.

c) Applicable sectors

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

d) Outline

The Australian Government is currently considering program design and anticipates that the program guidelines for both programs will be released in early 2012. However, broadly the programs will achieve the following:

- The $200 million Community Energy Efficiency Programw ill support energy efficiency upgrades to council and community-use buildings, facilities and lighting.
- The $100 million Low Income Energy Efficiency Program will support consortia of Community organisations, local councils and energy service companies to trial energy efficiency approaches in low income households.
- The $30 million Home Energy Saver Scheme will assist low income households find more sustainable ways to manage their energy consumption.

e) Expected results

The Government's objective is to support local councils, communities and households to reduce emissions and energy costs by stimulating investment in energy efficient upgrades to street lighting, community facilities, council buildings and low income households. 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 is the price on carbon that will come into effect from 1 July 2012.

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 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 December 2011, 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 Low Carbon Australia Limited. Formerly known as the Australian Carbon Trust, Low Carbon Australia (LCA) was established in 2010 as a Commonwealth-owned company, with an independent Board of Directors. LCA 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, LCA provides financial support and advice to promote investment in energy efficiency technologies and building retrofits.

LCA 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

Brunei Darussalam has set a nationwide target to reduce its energy intensity by 25 percent by 2030 with 2005 as base year. This figure serves as a direction for Brunei Darussalam to ensure that the measures and strategies set out for the energy sector strive the importance of growing improvement in efficiency.

Brunei Darussalam's energy intensity target is also aimed to contribute to the recently revised APEC target at the 19th APEC Economic Leaders Meeting to reduce the regional energy intensity by 45 percent by 2035.

1.2. Sectoral Energy Efficiency Improvement Goals

As to ensure that the target of 25 percent in national energy intensity reduction is met, Brunei Darussalam has identified a number of measures under the generation, residential, industrial, government and transportation sectors. The plan was to improve the energy efficiency performance of these five areas over the period between 2010 and 2030. For 2012, Brunei Darussalam's immediate plans for improvement of energy efficiency and conservation are detailed out below.

1.3. Action Plans for Promoting Energy Efficiency

1.3.1

~~a)~~ **Name**

Revision of electricity tariff structure

b) Objective

To encourage use of high efficient appliances, avoid waste and providing subsidies to the right group of people through the introduction of a progressive tariff.

c) Applicable sectors

Residential

d) Outline

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

e) Financial resources and budget allocation

The Government is also replacing all residential electricity meters from postpaid to prepaid meters so that consumers can plan their energy usage better. Analysis on the pattern of consumption shows that consumers with pre-paid meter used 13 percent less compared to usage prior to the introduction of the new tariff.

f) Method for monitoring and measuring effects of action plans

The total consumption of the residential centre is monitored by the Department of Electrical Services on a monthly basis.

g) Expected results

New progressive tariff structure – 1 January 2012

Replacement of meter -

h) Future tasks

1.3.2

a) **Name**
Improvement of power plant efficiency

b) Objective
Improvement of Power Plant Efficiency from current 23% to more than 45% through phasing out of simple cycle power plant and optimisation of its operation.

c) Applicable sectors
Power sector

d) Outline
- Maximize utilization of the Combined Cycle Power Plant (by 2012)
- All new power station shall have efficiency >45%
- Replacement of existing simple cycle power station to combine cycle (by 2015)
- Expansion of the existing co-generation plant (by 2014)

e) Financial resources and budget allocation
Government and Private Sector

f) Method for monitoring and measuring effects of action plans
The action plan on power plant will be implemented by the Department of Electrical Services and monitored by the Energy Department, Prime Minister's Office.

g) Expected results
2012; 2014; 2015

h) Future tasks
Extend improvement of power plant efficiency.

1.3.3

a) **Name**
Formulation of a national standard and labelling for air conditioning system and lighting

b) Objective
To ensure that choices of energy efficiency appliances are open to consumers through information of standard and labelling as to influence their purchasing decision.

c) Applicable sectors
Residential, Industrial and Government.

d) Outline
A consultant has been engaged to assist the Government in formulating the appropriate standard and labelling scheme for Brunei Darussalam to adopt for its air conditioning and lighting.

e) Financial resources and budget allocation
Supported by the Government.

f) Method for monitoring and measuring effects of action plans
The initiative will be regulated by the Energy Department, Prime Minister's Office

g) Expected results
Consultant will complete the study in October 2012 while the implementation is expected to be realised in December 2012.

h) Future tasks
Introduction of Policy and Regulation on the use of high efficient electrical appliances including tax incentive.

1.3.4

a) **Name**
Energy Management

b) Objective
The government to lead by example on the effectiveness the right energy management as a start for improvement in energy efficiency and conservation.

c) Applicable sectors
Government and Industrial

d) Outline

- A feasibility study followed by a pilot project for energy management in building will be conducted by a consultant over a period of 2 months. The result is hoped to increase the awareness on energy management.
- The Energy Department will facilitate energy audit exercises to five major government buildings in Brunei Darussalam. The aim is to reduce the consumption of the top five government-building consumers by 10 percent.
- To continue to work closely with PROMEEC as to build capacity in the area of energy management and audit.

e) Financial resources and budget allocation
Supported by the Government.

f) Method for monitoring and measuring effects of action plans
The initiative will be regulated by the Energy Department, Prime Minister's Office

g) Expected results
End of 2012

h) Future tasks
To extend audit exercise to building in other sectors.

1.3.5

a) **Name**
Introduction of energy efficient vehicles

b) Objective

The transportation sector accounts for nearly 50 percent of Brunei Darussalam's total energy consumption. Thus, there is a shift the fuel base of the sector to those more efficient.

c) Applicable sectors
Transportation

d) Outline
- To bring in a total of 100 hybrid and electric vehicles into the market.
- To replace main government cars to hybrid.
- To install a minimum of five (5) charging bays across the country.

e) Financial resources and budget allocation
No information.

f) Method for monitoring and measuring effects of action plans
The initiative will be implemented by the Energy Department, Prime Minister's Office and monitored twice a month.

g) Expected results
End of 2012

h) Future tasks
To increase the number of hybrid and electric vehicles available in the market.

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

The Energy Department holds annual energy awareness campaign, the "Energy Week" as to continuously increase public's awareness on the subject. The Energy Department also works closely with the educational stakeholder through "Energy Club" at schools to inculcate energy efficiency and conservation among students.

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.

1.5. 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 (Universiti Brunei Darussalam and Institut Teknologi Brunei). These projects aim to conduct energy audit on government buildings, building guidelines and fuel labelling scheme specific for the local conditions. The newly established "Brunei National Energy Research Institute (BNERI)" will take custodians of any energy projects when it is in full operation in April 2012.

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2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1. Government Laws, Decrees, Acts

a) Name
Energy White Paper – a policy paper to be launched in Q2, 2012 will entail detailed strategies on energy efficiency and conservation.

b) Purpose
A long-term policy directives to 2035.

c) Applicable sectors
Oil & Gas industries, Power and Transportation sectors.

d) Outline
Information will be available after the Energy White Paper is officially launched.

e) Financial resources and budget allocation
Supported by the Government.

2.2. Regulatory Measures

Policy and Regulations on EE&C will be formulated.

2.3. Voluntary Measures

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. (See section 1.3.1)

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 series of human capacity building program on energy efficiency and conservation for Brunei officials in the last few years which resulted in intensive training and knowledge transfer related to EEC in Japan.

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.

In July 2011 Canada's Energy Ministers agreed to a Collaborative Approach to Energy with a companion Action Plan. Work themes related to economic prosperity and responsible energy supply, efficient energy use, and knowledge and innovation, will all contribute to advancing common goals. Specific areas of interest include a more stringent model energy code for buildings, a next generation energy rating system for homes, project financing tools, transportation, product regulation, industrial energy management standards, and integrated community energy solutions. For more details, please see the following link: http://www.scics.gc.ca/english/conferences.asp?x=1&a=view&id=2611&y=&m=

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 and ecoENERGY Retrofit-Homes

b) Objectives

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

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

- Making the stock of housing, buildings, and energy-using products and products that affect energy use more efficient through regulation, codes and standards;
- Making energy performance more visible in all sectors through labelling and benchmarking, training and information sharing to affect behaviour change; and
- Making industrial, building, and vehicle operations more energy efficient.

A fourth pillar is addressed by the ecoENERGY Retrofit – Homes program, of making energy efficiency more affordable for Canadians.

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

c) Applicable sectors

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

d) Outline

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

There are five elements under the ecoENERGY Efficiency initiative:

- *ecoENERGY Efficiency for Vehicles* aims to reduce energy use and emissions from transportation in Canada. For example, the program offers fuel efficient driver training; provides energy information to vehicle consumers, such as the Fuel Consumption Guide; and, through the introduction of the SMARTWAY Transportation Partnership in Canada, encourages freight companies to make their operations as energy efficient as possible.
- *ecoENERGY Efficiency for Housing* encourages the construction and retrofit of low-rise residential housing, making the new and existing stock more energy-efficient. For example, funding will support and refine the EnerGuide Rating System as a standard measure of the energy performance of new and existing homes used in home energy labelling.
- *ecoENERGY Efficiency for Buildings* provides information and benchmarking tools to improve the building energy performance of new and existing buildings. For example, actions have led to the National Energy Code for Buildings, establishing an overall 25% improvement in energy efficiency over the previous code and indicating minimum requirements for energy efficiency in new buildings.
- *ecoENERGY Efficiency for Equipment Standards and Labelling* introduces or raises energy efficiency standards for a wide range of products, and promotes energy-efficient products through the ENERGY STAR program. The program enhances labelling and promotion programs that have historically led to the introduction of new and more stringent standards that are closely aligned with U.S. developments.
- *ecoENERGY Efficiency for Industry* aids the adoption of a national energy management standard, accelerates energy-saving investments in factories and supports the exchange of best-practices information within Canada's industrial sector. For example, it supports the early implementation of the new ISO 50001 Energy Management System standard, as well as the Canadian Industry Program for Energy Conservation, which offers networking opportunities for industry to share information, identify common needs and best practices, and improve energy efficiency in more than 25 industrial sectors.

In July 2011, the Government of Canada announced a one-year extension of $400 million to the ecoENERGY Retrofit – Homes program, to help homeowners make their homes more energy-efficient and reduce the burden of high energy costs.

These investments build on the success of the first suite of ecoENERGY Efficiency initiatives, which invested $960 million from 2007 to 2011 to deliver tangible improvements in energy efficiency in Canada.

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

e) Financial regulations and budget allocation

From fiscal year 2011/2012 to fiscal year 2015/2016, total allocations to the ecoENERGY Efficiency initiative and the ecoENERGY Retrofit – Homes program will be

CDN 595 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/parliament09-10/index.cfm).

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

g) Expected results

Improvement in energy efficiency in Canada.

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, equipment, and consumer products. Homeowners can also apply for grants and financial incentives for retrofits through the ecoENERGY Retrofit – Homes program, also managed by the OEE.

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

- Promotion of the international ENERGY STAR symbol in Canada. Products that display the ENERGY STAR symbol have been found to meet or exceed higher energy efficiency levels without compromising performance;
- Mandatory and/or voluntary EnerGuide labelling for products including appliances, buildings, houses, heating and cooling equipment, and vehicles. EnerGuide is a Government of Canada initiative that rates the energy consumption and efficiency of these products; and
- Publication of a Fuel Consumption Guide, which provides estimated fuel consumption ratings for passenger cars and light-duty pickup trucks, vans and special purpose vehicles sold in Canada.

Informing key decision-makers in 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.

The OEE also plays a regulatory role under the *Energy Efficiency Act* (see section 2.1.1, below). The Act gives the Government of Canada the authority to make and enforce standards for the performance of energy-using products, or products that affect energy use, that are imported to Canada or that are manufactured in Canada and shipped across provincial

or territorial borders. The first regulations came into effect February 3, 1995 and now cover 47 products. Several more products are expected to be covered by the second quarter of 2012.

c) Covered sectors

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

d) Established date

April 1998

e) Number of staff members

Approximately 280

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.

In July 2011, Canada's Energy Ministers agreed to the Collaboration Approach on Energy and an accompanying Action Plan, which includes work on energy efficiency in the areas of a more stringent model energy code for buildings, a next generation energy rating system for homes, project financing tools, transportation, product regulation, industrial energy management standards, and integrated community energy solutions. For more details, please see the following link:
http://www.scics.gc.ca/english/conferences.asp?x=1&a=view&id=2611&y=&m=

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 elements are incorporated in the ecoENERGY Efficiency initiative, including:

- ecoENERGY Efficiency for Equipment Standards and Labelling supports the energy labelling of a wide range of products:

  - 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 Efficiency for Vehicles provides Canadian motorists with helpful tips on buying, driving and maintaining their vehicles to reduce fuel consumption and greenhouse gas emissions. Freight companies are encouraged to make their operations as energy efficient as possible through the introduction of the SMARTWAY Transportation Partnership in Canada.
- ecoENERGY Efficiency for Buildings provides information and benchmarking tools to improve the energy performance of new and existing buildings.
- ecoENERGY Efficiency for Industry supports the implementation of the Canadian Industry Program for Energy Conservation, which offers opportunities for industry to share information, and identify common needs and best practices.
- ecoENERGY Efficiency for Housing includes the ENERGY STAR for New Homes initiative, which promotes energy efficiency guidelines that enable new homes to be more energy efficient than those built to minimum provincial building codes.

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

c) Capacity-building

The ecoENERGY Efficiency for Housing program includes a focus on providing home builders with the specific energy efficiency training required to certify an R-2000 home, information on ENERGY STAR for New Homes, and information on affixing 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 ecoENERGY Efficiency for Industry and ecoENERGY Efficiency for 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 Efficiency for Vehicles program offers fuel-efficient driver training through a series of initiatives. Auto$mart targets novice light-duty vehicle drivers and driving educators to promote fuel-efficient and safe driving practices. A number of driving schools throughout Canada are registered to deliver the 'Auto$mart' driver education program. FleetSmart introduces fleets to energy-efficient practices that can reduce fuel consumption and emissions, offering free practical advice on how energy-efficient vehicles and business

practices can reduce fleet operating costs, improve productivity and increase competitiveness. A major component of FleetSmart is the SmartDriver training program, which is targeted at drivers in the commercial and institutional fleet sector.

1.6. Research and Development in Energy Efficiency and Conservation

1.6.1. Policy: CanmetENERGY

a) Level

Economy-wide (federal)

b) Responsible department

CanmetENERGY, Natural Resources Canada

c) Applicable sectors

Buildings and communities, 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, acts as a window to federal financing, and works with partners to develop more energy efficient and cleaner technologies in areas such as buildings and communities, clean fossil fuels, bioenergy, renewables, industrial processes, oil sands, and transportation. 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 85.7 million for the 2010–11 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 Innovation Initiative

a) Level

Economy-wide (federal)

b) Responsible department

Natural Resources Canada's Office of Energy Research and Development (OERD) is the Government of Canada's coordinator of energy research and development activities. OERD is responsible for the ecoENERGY Innovation Initiative, which supports energy technology innovation.

c) Objectives and period

The ecoENERGY Innovation Initiative is a CDN 97 million investment over 2 years by the Government of Canada to support energy technology innovation to produce and use energy in a more clean and efficient way. Activities funded under the Initiative will be in five strategic priority areas:

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

d) Applicable sectors

Industry, transport, residential and commercial

e) Financial resources and budget allocation

CDN 97 million

f) Expected results

The ecoENERGY Innovation 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 CDN 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 CDN 466 million from the Fund. Up to CDN 146 million will also be invested over five years to support renewable, clean energy and smart grid demonstrations in all regions of the country. Energy efficiency projects relate to integrated community energy systems. The program has allocated all of its funding to existing projects and no further calls for proposals are planned at this time. For a 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 and products that affect energy use that are imported into Canada or shipped across provincial borders for the purpose of sale or lease.

c) Applicable sectors

All sectors of the economy

d) Outline

Canada's *Energy Efficiency Act* came into force in 1992, giving the Government of Canada the authority to make and enforce standards for the performance of energy-using products and products that affect energy use, 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 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 twelve 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. The regulations will continue to be updated on an ongoing basis.

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 has developed new regulations under CEPA to reduce greenhouse gas emissions from

light-duty vehicles. These regulations came into force for model year 2011 and are aligned with those of the United States. The Government of Canada is currently developing regulations under CEPA to reduce greenhouse gas emissions from heavy-duty vehicles, which would be implemented in model year 2012 in alignment with the United States.

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

All sectors of the economy

d) Outline

Regulations under the *Energy Efficiency Act* set minimum energy-performance levels for 47 energy-using products such as appliances, lighting, and heating and air-conditioning. It is expected that as of January 2013 products accounting for 80% of the energy used in homes and businesses will be regulated. An additional set of new regulations will implement further new and revised standards for 16 products. 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://oee.nrcan.gc.ca/regulations/11239.

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 label for lightbulbs is expected to be revised in 2014 to complement new standards, and a new label for televisions will be introduced.

Canada works with the US and Canadian stakeholders to implement performance and labelling requirements and the associated compliance activities.

e) Financial resources and budget allocation

Funding for this initiative is provided through the ecoENERGY Efficiency for Equipment Standards and Labelling element of the ecoENERGY Efficiency initiative (CDN 195 million over five years).

Expected results

Improvements in the performance of energy-using products in Canada

2.2.2. National Energy Codes for Houses and Buildings

a) Level

Economy-wide (federal)

b) Purpose

The National Building Code of Canada (NBC) is a model for provincial/territorial building codes and provides a minimum baseline for new building design. Growing concern over energy use in the housing/building sector has recently led to the development of additional requirements specifically aiming to promote energy efficient design and construction.

c) Applicable sectors

Commercial, industrial and residential

d) Outline

In Canada, building regulation is a provincial and territorial responsibility. The provinces and territories have recognised, however, 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 National Building Code of Canada (NBC) was originally established in 1941 to serve as a basis for provincial/territorial building codes and to provide a baseline for new building design. It should be noted that the NBC distinguishes between two distinct sub-sectors: i) larger buildings of all types and ii) houses and small buildings. Distinct requirements are provided for each of these sectors.

Growing concern over energy use through the 1990s led to the addition of energy requirements, with distinct paths followed for each of the above sectors. The larger building sector was first addressed in 1997 with publication of the Model National Energy Code for Buildings (MNECB). The MNECB complemented the existing NBC with a set of cost-effective minimum energy efficiency criteria for new building design. The MNECB was then updated in 2011 and is now referred to as the National Energy Code for Buildings (NECB 2011). For more information see http://www.nationalcodes.ca/eng/necb/index.shtml.

Code requirements for the housing and small buildings sector are being addressed through inclusion of minimum energy requirements directly into the relevant part of the NBC. The revised NBC is scheduled for release at the end of 2012.

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

e) Financial resources and budget allocation

Funding for this initiative is provided through the ecoENERGY Efficiency for Buildings and the ecoENERGY for Housing elements of the ecoENERGY Efficiency initiative (CDN 195 million over five years).

f) Expected results

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

2.2.3. Building Energy Benchmarking

a) Level
Economy-wide (federal)

b) Purpose

To develop and to promote participation in a national system for benchmarking of building energy consumption.

c) Applicable sector
Commercial

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

e) Financial resources and budget allocation
Funding for this initiative is provided through the ecoENERGY Efficiency for Buildings element of the ecoENERGY Efficiency initiative (CDN 195 million over five years).

f) Expected results
Greater awareness and understanding of energy use will promote further implementation of efficient technologies and practices in buildings.

2.2.4. Greenhouse Gas Emission Regulations

a) Level

Economy-wide (federal)

b) Purpose

To reduce greenhouse gas emissions and fuel consumption of motor vehicles

c) Applicable sectors

Transportation

d) Outline

In October 2010, the Government of Canada released the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations*, which are aligned with the United States and establish progressively tighter emissions standards for cars and light trucks over the 2011-16 model years. As a result of the regulations, it is projected that the average greenhouse gas emission performance of new vehicles for the 2016 model year will be about 25% lower than the vehicles that were sold in Canada in 2008.

The Government of Canada is currently developing regulations to limit greenhouse gas emissions from new on-road heavy-duty vehicles. Canada and the United States are taking a common North American approach and Canada intends to implement these regulations with the 2014 model year in alignment with the United States. The proposed regulations would seek to reduce emissions and improve the fuel efficiency of the whole range of new on-road heavy-duty vehicles from full-size pick-up trucks to tractor-trailers, and include a wide variety of vocational vehicles such as freight, delivery, service, cement, garbage and dump

trucks, as well as buses. The proposed regulations would also seek to promote advanced technology vehicles such as hybrid and electric vehicles.

e) Financial resources and budget allocation

Funding for these initiatives is provided through the Canada's Clean Air Agenda (Budget 2011 funding for the Clean Air Agenda is almost CDN 870 million over two years).

f) Expected results

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

2.3. Voluntary Measures

2.3.1. Canadian Industry Program for Energy Conservation (CIPEC)

a) Level

Economy-wide (federal)

b) Purpose

The Canadian Industry Program for Energy Conservation (CIPEC) 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, training, financial support and tools to improve energy efficiency. Current activities include:

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

Thousands of registered CIPEC Leader companies have voluntarily met and exceeded annual targets to reduce their energy intensity (that is, energy use per unit of output). Year over year trends in energy intensities per industrial sector are disseminated in the CIPEC Annual Report. See www.cipec.ca for more details.

e) Financial resources and budget allocation

Funding for this initiative is provided through the ecoENERGY Efficiency for Industry element of the ecoENERGY Efficiency initiative (CDN 195 million over five 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 and commercial

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). ecoENERGY Efficiency for Housing includes the ENERGY STAR for New Homes initiative, which promotes energy efficiency guidelines that enable new homes to be more energy efficient than those built to minimum provincial building codes. 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).

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

e) Financial resources and budget allocation

Funding for these initiatives is provided through the ecoENERGY Efficiency for Houses and ecoENERGY Efficiency for Buildings elements of the ecoENERGY Efficiency initiative (CDN 195 million over five years).

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 greenhouse gas 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 clean energy generation equipment. Class 43.2 includes the following categories of systems or equipment:

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

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

Class 43.2 was introduced in 2005 and is currently available for assets acquired on or after 23 February 2005 and before 2020. 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 of Class 43.1 continue to be eligible for Class 43.1.

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

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)

e) Expected results
Improved energy efficiency in the residential sector.

2.4.3. Subsidies and Budgetary Measures

ecoENERGY Retrofit – Homes

a) Level

Federal and sub-federal (provincial/territorial)

b) Purpose

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

c) Applicable sectors

Residential

d) Outline

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

e) Financial resources and budget allocation

CDN 400 million in addition to provincial/territorial funds

f) Expected results
Homeowners that participate in the ecoENERGY Retrofit – Homes program are expected to save an average of 20% on their energy bills.

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 at http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/policy_e/programs.cfm.

d) Expected results

Increase in energy efficiency and reduction in greenhouse gas emissions

2.5. Energy Pricing

Market-based

2.6. Other Efforts for Energy Efficiency Improvements

2.6.1. Cooperation with Non-Government Organisations

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

2.6.2. Cooperation through Bilateral, Regional and Multilateral Schemes

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

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

2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements

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

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

Partnerships are also 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.

CHILE

1. . GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

The Chilean Government has delivered a National Energy Strategy, which will be the navigation guidance for the next 20 years. This Strategy aims to achieve a cleaner, safer, and cheaper energy, and meets the energy requirements of our country. This strategy is based on a set of support, of which energy efficiency will be the first pillar of energy development.

1.2. Sectorial Energy Efficiency Improvement Goals

The National Energy Strategy has established a goal of 12% reduction in energy projection by 2020. Additionally the Ministry is elaborating an Action Plan by 2020 to reach the established goal

1.3. Action Plans for Promoting Energy Efficiency

The Energy Ministry is the institution responsible for developing public policies in energy efficiency, it centralizes the functions to develop, propose and evaluate actions in this area. The Energy Efficiency Division of the Ministry is responsible to define and promote: objectives and goals in energy efficiency, the regulatory framework that promotes energy efficiency, long-term strategy to follow.

Chile has a number of government institutions working to achieve increased energy efficiency, one of the most important is the Chilean Energy Efficiency Agency (Agencia Chilena de Eficiencia Energética - AChEE). The mission of AChEE is to promote, strengthen and consolidate the efficient use of energy by bringing together relevant stakeholders, national and international, and implementing public-private initiatives in energy sectors. AChEE is in charge of the implementation of the energy efficiency programs according to the policies developed by the ministry.

Other important actors are: Superintendencia de Electricidad y Combustibles (SEC)/Superintendency of Electricity and Fuels (SEC); Ministry of Housing; Ministry of Transport and Communications.

1.3.1 Energy Efficiency Monitoring and Reporting

The Division of Energy Efficiency and AChEE have established an area of Measurement and Verification. It seeks to implement methodologies to produce reports at both macro and project level.

At the macro level, energy statistics are prepared by the Prospective Division of the Ministry of Energy, while economic data (national accounts, production) are reported by both the Central Bank of Chile and by the National Institute of Statistics. In addition, we are participating in a project to build a base of energy efficiency indicators in Mercosur countries and partners.

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

An example of progress is the development of a "methodology for measuring and reporting energy efficiency for the Mining Board", whose objective is that large mining companies manage energy use and measure progress in achieving efficiency. The mining industry in Chile is recognized as a world leader in managing the efficient use of energy.

1.4. Institutional Structure

1.4.1 Central Institutional Structure

a) Name of organisation

Ministry of Energy - Energy Efficiency Division

b) Status of organisation

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

c) Roles and responsibilities

Develop long-term strategy for energy efficiency.

d) Covered sectors

Covered sectors are: industry and mining, transportation, residential, commercial, construction, government, education, research, development and innovation, etc.

e) Date of establishment

2010

f) Number of staff members

The Ministry of Energy has approximately 150 staff members. The Energy Efficiency Division has seven professionals.

g) Description of Energy Minister

The overall objective of the Ministry of Energy is to develop and coordinate plans, policies and standards for the proper functioning and development of the sector, ensure compliance and advise the Government on all matters relating to energy.

The energy sector includes all activities of study, exploration, generation, transmission, transportation, storage, distribution, consumption, efficient use, import and export, and anything else that relates to electricity, coal, gas, oil and oil products, nuclear energy, geothermal and solar and other energy sources.

1.4.2 Implementing Institution 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

Covered sectors are: 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 Energy Efficiency Chilean Agency (AChEE) is a private foundation, nonprofit organization whose mission is to promote, strengthen and consolidate the efficient use of energy by bringing together relevant stakeholders, national and international level, and implementing initiatives public private partnerships in various sectors of energy, contributing to the country's sustainable competitive. AChEE has a board comprising representatives of the Ministry of Energy, Ministry of Finance and the Confederation of Production and Trade

1.4.3 Regional or Local Institutional Structure

a) Name of organisation

Ministerial Regional Secretaries of Energy (SEREMIS)

b) Status of organisation

SEREMIS lead the implementation of energy efficiency strategies in different regions of the country.

c) Roles and responsibilities

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

d) Covered sectors

Covered sectors are: industry, mining, transportation, residential, commercial, construction, government, education, research, development and innovation, etc.

e) Starting date

2010

f) Number of staff members

There are six regional ministry representatives (SEREMI).

1.4.4 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: incandescent bulbs (2007), compact fluorescent lamps (2007), refrigerators (2008), refrigerator-freezer (2008), freezer (2008), standby in: microwaves (2010) – TVs (2011) – Set top Box (2011) – stereos (2012) – DVDs (2012) – Blu Ray (2012), electric motors to 10 hp (2011), air conditioner (2011).

Products covered are mostly for residential applications. The future coverage is aimed at residential to small commercial applications, like: sodium lamps, high and low pressure (2012), ballast for sodium lamps, high and low pressure, ballast for high pressure mercury lamps, and/or metal halides (2012), LED technology devices for lighting fixtures (2012).

Appliances that are in the process of defining labels and measurement and verification protocols are: washing machine (2012), gas water heater (2012), gas stove (2012), halogen lamp (2012).

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

Another initiative that is being developed is new car labeling, which will be in operation during 2012.

b) Awareness-raising

Chile has carried out, at least once per year, communication campaigns aimed at residential users, through television, billboards and newspapers. The last campaign is called "La Energía Importa" (Energy Matters), it has emphasis in energy efficiency and it has a national scope.

In 2011 the 2nd "Energy Efficiency Exposition" was held, a place to exchange experiences and learn more about this topic. The exposition in 2011 featured more than 150 participating companies and more than 8,000 visitors. In this edition, it had international speakers, like Amory Lovins (EE.UU), Darío Pérez (Spain), Bill Wylie (Canada), and others.

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.

In 2011, AChEE made three professional certifications: CRU: Certified Retscreen User; CMVP: Certified Measurement & Verification Professional program; CEM - Certified Energy Manager. Also the first certified "European Energy Manager" was dictated by the German-Chilean Chamber of Commerce and Industry.

1.5. Research and Development in Energy Efficiency and Conservation

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

- Study of Bases for the elaboration of an Action Plan for Energy Efficiency.

- Study of energy end uses in the residential sector.

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.

2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1. Government Laws, Decrees, Acts

In February of 2010 the Ministry of Energy was created, the highest organ of cooperation of the President in the functions of government and administration of the energy sector. The ministry centralises 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

See point 1.4.4 a)

2.2.2. Minimum Energy Performance Standards

Chile is developing a strategy to establish MEPS. The first milestone is to have the MEPS regulation in 2012.

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 began a process to establish a Minimum Thermal Standard for Residential Buildings. The first regulation that went into effect includes minimum transmittance and thermal resistance requirements. In January 2007 Building Envelope Regulation went into effect involving to the entire building envelope including roof, walls, ventilated floor and windows.

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 2006

f) Financial resources and budget allocation

No information available

g) Expected results

Support management in the energy efficiency (EE) in companies and mining operations in Chile to improve its energy management by developing cross-cutting projects on energy.

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.

i) Other voluntary measures

There are several other sectorial round tables such as the one established with the retail sector, where studies are underway to determine the characteristics of consumption and energy efficiency recommendations for its members.

2.4. Other Measures

a) Name

National Truck Replacement Program

b) Purpose

Replace of 350 trucks older than 20 years with new and efficient ones that fulfil the EURO III or EPA 98 standards.

c) Applicable sectors

Transport

d) Outline

This program was carried out in two stages, the first one in 2009, when 196 trucks were replaced, the second stage in 2011 with 154 trucks involved. In the latter the drivers were also trained in eco-driving.

e) Financial resources and budget allocation

The financial resource for this program was equivalent to USD 6 million.

f) Expected results

The savings of the first stage are estimated as 1.7 million litres of fuel and 4.000 t of CO_2 in ten years. The savings of the second stage are estimated as 2.3 million litres of fuel and 7.500 t of CO_2 in the same period.

2.5. Financial Measures Taken by the Government

2.5.1. Tax Scheme

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

2.5.2. Other Incentives

Information not available

2.6. 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). No energy efficiency is considered in the calculation of rates.

2.7. Other Efforts for Energy Efficiency Improvements

2.7.1. 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.

In 2011 there were two important inputs for energy policy in Chile: Report of the Advisory Committee for Electrical Development, and the Technical Committee Report of the parliament.

2.7.2. Cooperation through Bilateral, Regional and Multilateral Schemes

Chile participates in COPANT[1] for the harmonisation of energy efficiency standards, and participated in the design discussions of the ISO 50.001 standard.

Currently being developed to generate instances National mirror committee of ISO / TC 242 Energy Management, this allows the participation of national stakeholders in Chile.

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

2.7.3. Other Cooperation/Efforts for Energy Efficiency Improvements

2.7.3.1. Cooperation Agreements

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

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[1] Pan American Standards Commission – COPANT.

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 about 20% energy intensity reduction target, having achieved reductions of 2.74% in 2006, 5.04% in 2007, 5.20% in 2008 , 3.65% in 2009,and 4.02% in 2010, for a total reduction of 19.1% during the period of the 11th Five-year Plan .

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.

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HONG KONG, CHINA

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

Reduction of energy intensity by 45% by 2035 from 2005 levels

1.2. Sectoral Energy Efficiency Improvement Goals

Not applicable

1.3. Action Plans for Promoting Energy Efficiency

With the adoption of the Honolulu Declaration, the Hong Kong, China (HKC) Government continue to step up efforts in energy efficiency and conservation monitoring and reporting by means of an end-use energy database[2] ever since the Sydney Declaration. 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 more energy-efficient lighting products through various means, including public consultation on the restriction of sale of energy-inefficient 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.

[2]HKEEUD (2011).

d) Covered sectors

Public and private sectors

e) Established date

EEO of EMSD was established in 1994

f) Number of staff members

There are 58 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, outreach programme to schools , guider tours to Exhibition Centre and workshops to promote energy efficiency and conservation within various sectors. There are also websites and Energy Efficiency Newsletter 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 and conservation in particular regarding specific measures (e.g., Energy Efficiency Labelling Scheme, Buildings Energy Efficiency Funding Schemes, etc.) and 'Liberal Studies education kit' for New Senior Secondary Cirriculum to promote energy efficiency and conservation among the students.

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)
3) Buildings Energy Efficiency Ordinance (Chapter 610)

b) Purpose

1) To facilitate the choice of energy efficient appliances and raise public awareness on energy saving in electrical appliances
2) To regulate the design and construction of external walls and roofs of buildings in order to achieve an appropriate overall thermal transfer value such that the energy consumption of commercial buildings and hotels can be controlled.
3) To regulate the building services installations including lighting, electrical, air-conditioning and lift & escalator installations of the prescribed buildings to comply with the specified minimum energy efficiency standards and requirements

c) Applicable sectors

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

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 has also been fully implemented from 19 September 2011.
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.
3) The new Buildings Energy Efficiency Ordinance for mandatory implementation of the Building Energy Code (BEC) and energy audit, enacted in December 2010, will come into full operation on 21 September 2012. The core parts of the Ordinance are now within the grace period in order to allow various stakeholders and public having ample time to be adapted to and familiarized with the requirements of the new legislation. The Ordinance will require compliance with the BEC in design of new construction of the prescribed types of building and in major retrofitting works of the prescribed buildings for the 4 key types of building services installations (namely

lighting, air-conditioning, electrical and lift & escalator installations), as well as the implementation of energy audit in commercial buildings. For new buildings, it is estimated that the new legislation will result in energy saving of 2.8 billion kWh, or reduce carbon dioxide emission of 1.96 million tonnes, in the first decade. Further energy saving will be resulted from existing buildings by requiring compliance with the BEC when major retrofitting works and energy audit are carried out in these buildings.

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)[3].

b) Purpose

See 2.3. (d)

c) Applicable sectors

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 19 types of household appliances and office equipment. Eleven of these types are electrical appliances including refrigerators (voluntary scheme), washing machines (voluntary scheme), non-integrated type compact fluorescent lamps, dehumidifiers (voluntary scheme), electric clothes dryers, room coolers (voluntary scheme), electric storage water heaters, television sets, electric rice-cookers, electronic ballasts and LED lamps. 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 two phases of the Energy Efficiency (Labelling of Products) Ordinance on 9 November 2009 and 19 September 2011, the Voluntary Energy Efficiency Labelling Scheme for room coolers (voluntary scheme),household refrigeration appliances (voluntary

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

scheme), washing machines (voluntary scheme) and dehumidifiers (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 107. In December 2011, 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. A review was completed in September 2010 to streamline application procedures and requirements of the Scheme to facilitate participation. The Scheme was re-titled as 'Fresh Water Cooling Towers Scheme for Air Conditioning Systems' in November 2010 for simplicity.

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 December 2011, 3000 registration certificates were issued to 1312 building venues involving 3156 installations.

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)[4] 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

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

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

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.

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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)[5] 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)[6] 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".[7]

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[8].
- *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

[5] 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.
[6] Presidential Regulation No.5/2006 regarding National Energy Policy.
[7] Chapter 2, Article 2 – Presidential Decree (KEPRES) No. 43/1991 regarding Energy Conservation.
[8] Presidential Decree No. 2/2008 on Energy and Water Efficiency.

to encourage a greater role for private-sector ESCOs in the future.[9]

- *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.[10]

  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.[11]

[9]DJLPE (2009).
[10]CLASP (2008).
[11]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 4 billion IDR in FY2009, 20 billion IDR each of FY2010 and FY2011.

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

Continuing the energy conservation program such as: implementation and completion of energy conservation policy, conduct activities related to public awareness, training, energy conservation partnership program, preparing the certification of energy managers and energy auditors and enhance international cooperation.

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[12]. 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

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

implementing energy efficiency and conservation programs within their jurisdiction in the regions.

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.

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 2011, Indonesia issued set of implementing regulations, such as:

- Presidential Instruction No. 13 year 2011 on Energy and Water Saving
- Presidential Regulation No. 61 year 2011 on National Action Plan on GHGs Emission Reduction and Presidential Regulation No. 71 year 2011 on National GHGs Emission Inventories.
- Ministry of Energy and Mineral Resources Regulation No 6/2011 on Sign-tagging of save energy for CFL
- Director General of Renewable Energy and Energy Conservation Regulation No. 1287.K/06/DJE/2011 concerning Codes of Conduct on Swabalast Lamp.

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.

- 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.

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. The Indonesia government through the Ministry of Industry has provided funding for the industry sector in order to improve the efficiency of plants and the Ministry of Energy and Mineral Resources are proposing similar financing through the government budget to promote and accelerate energy efficiency achievement.

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 and diesel oil, which are most consumed in transport sectors are expected to be reduced this year. There is remaining government subsidy in gasoline RON 88 octane, automotive diesel oil for transport, some part of kerosene for households, LPG in the government kerosene-to-LPG conversion program for households; and electricity price for small households and small businesses.

In renewable development, just recently, the Government has issued the Ministry of Energy and Mineral Resources Regulation number 4 year of 2012 concerning Renewable Energy Based as Power Plant that mandated a Feed-in Tariff on Biomass, Biogas, and Municipal Solid Waste Based Power Plants. Based on the regulation, the PT. PLN Persero as the utility is obligated to buy the electricity from biomass, biogas and municipal solid waste based power plant up to 10 MW capacity with feed-in tariffs as follows:

- If interconnected to the medium voltage the feed-in tariff:

Biomass	Rp. 975/kWh[13] x F
Biogas (non municipal solid waste)	Rp. 975/kWh x F
Municipal Solid Waste (Zero Waste Technology)	Rp. 1050/kWh

[13] Rp 975/kWh around 10.7 cent US$/kWh

Municipal Solid Waste (Landfill Gas)	Rp. 850/kWh

- If interconnected to the low voltage the feed-in tariff:

Biomass	Rp. 1325/kWh x F
Biogas (non municipal solid waste)	Rp. 1325/kWh x F
Municipal Solid Waste (Zero Waste Technology)	Rp. 1398/kWh
Municipal Solid Waste (Landfill Gas)	Rp. 1198/kWh

Which F is incentives factor for:

- Java, Bali and Sumatera region F = 1
- Kalimantan, Sulawesi, NTB and NTT region F = 1.2
- Maluku and Papua region F = 1.3

In addition, the Ministry of Finance issued Regulation No. 130 year of 2011 concerning Tax Exemption or Reduction for Renewable Development.

In the electricity development, the Government just recently also issued the Government Regulation no. 14 year of 2012 concerning Electricity Business Activities. This regulation mandated among others the business regulation of electricity business for public use and own use, business license and electricity tariff.

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 reviewed 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/.

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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

Among 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 also has 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 18 categories of products are subject to the labelling as of March 2011. 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, five categories of products (air conditioners, TV sets, refrigerators, electric toilet seats and fluorescent lights) 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, when 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 40.0 billion(for fiscal 2011).

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 houses/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 7.0 billion (for fiscal2011).

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, in order to contribute to the reduction in greenhouse gas emissions. Budget allocation is JPY 10.2 billion (for fiscal 2011).

5) *Promotion of Energy Management System (BEMS & HEMS) Implementation:*

A subsidy is provided for the implementation of BEMS (Building Energy Management System) to small to medium size businesses, in order to promote activities to inhibit electric power demand by linking up with the implementation of Smart Meters. A subsidy is also provided for the implementation of HEMS (Home Energy Management System), which raises the effects of implementation for Smart Meters in households, in order to promote electric power savings and peak-cut electric power generation in the consumer sector, as aspects for electric power demand and supply measures. Budget allocation is JPY 30.0 billion (for the third revised budget of fiscal 2011)

6) *Promotion of Expenses Relating to Refurbishment of Building Structures for Conservation of Electric Power*

A subsidy is provided for expenses relating to the implementation of facilities (air conditioning and hot water supply equipment, lighting facilities etc.) in existing building structures that offer a certain level of electric power saving effects, in order to promote electric power savings in the consumer sector, as part of electric power demand and supply measures. Budget allocation is JPY 15.0 billion (for the third revised budget of fiscal 2011)

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 2006 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. 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:

- 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)

- Give priority 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
- Divide businesses into four categories, depending on how much energy they consume to encourage businesses to improve energy efficiency. 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 version).

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 across various sectors. For this purpose, KEMCO implements various projects aimed at rationalising energy use. KEMCO has twelve regional offices.

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 offices 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 1980.

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-efficient products is promoted by KEMCO through its website which provides energy efficiency and related cost saving information. A mandatory procurement guideline on purchasing energy efficiency products has been applied to public institutions.

b) Awareness-raising

Awareness campaigns have been undertaken with specific initiatives such as energy saving campaigns (Heating 2018 in winter, Energy Minus Love Plus in summer), National Energy Efficiency Awards, designation of November as Energy Saving Month, 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 Green Energy Show) and mobile exhibitions, and early education in elementary and middle school.

c) Capacity-building

Capacity building programs have been undertaken for various actors such as energy managers in the high energy-consuming industries or buildings above 2,000 toe per annum, boiler and pressure vessel operators, local government officials and energy auditors.

1.6. Research and Development in Energy Efficiency and Conservation

Technological innovations, adoption of new energy technologies and the diffusion of existing highly efficient energy technologies 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. Its main function is to support MKE in formulating energy technology policies. 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 is applied to all energy end use sectors

d) Outline

In the wake of the second oil shock in 1979, the Ministry of Energy and Resources 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 (http://elaw.klri.re.kr) by typing in “energy use rationalization act” at search menu.

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 have 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 30 items currently and 5 more items will be added within 2012. In case of a violation, a fine up to USD 16, 000 is levied on violators.

Detailed information is available at KEMCO website :

http:// 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 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 below displacement : 12.4 km/l, above 1600cc displacement: 9.6 km/l
2) From 2012 to 2015(gradually)—Fuel economy : above 17km/l, CO2 emission : under 140g/km

* A different standard is applied to imported vehicles.

More information can be found at KEMCO web site :
http://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 Framework 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 national and corporate competitiveness 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. 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 newly-built 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.

2.3.2. ESCO (Energy Saving Service Company)

a) Name

Energy Saving Service 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 209 in 2011. 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 under the Energy Use Rationalization Act in 1991. Energy service companies have been registered and operated since 1992.

The scope of projects to be implemented includes :

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.

Detailed information is available at the 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, 10% 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 2013.

Detailed information is available at the website :
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 of the loan. The rate of the loans is 2.0~2.25% per year, as of the fourth quarter of 2011.-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 to 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 through 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 cooperative activities such as IEA 4E, 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 implementation 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.

In cooperation with the IEA 4E, the Ministry of Knowledge Economy and KEMCO are participating in the main annex, Mapping & Benchmarking(M&B). The overall goal of the M&B Annex is to provide policy makers with a single source base of knowledge on product performance and associated policy tolls employed by economies across the world, enabling more informed policy making at the national and regional levels.

APEC 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 hosted the 38th APEC EGEE&C meeting in Seoul on November 2011.

The EGEE&C has maintained the Energy Standards Information System(ESIS) since 2002. ESIS provides the latest information about energy standards and regulations for appliances and equipment. The Ministry of Knowledge Economy and KEMCO funded $10,000 for this ESIS project in 2007 and continue to take an active role in this system.

IPEEC(International Partnership for Energy Efficiency Cooperation) is an international partnership for energy efficiency cooperation among G8(United States of America, United Kingdom, France, Germany, Italy, Canada, Japan, Russia) + 5(China, India, Brazil, Mexico, Korea) countries.

Under IPEEC, 8 international task programs are currently being carried out. Korea is participating in two task programs, SBN(Sustainable Buildings Network) and GSEP(Global Superior Energy Performance partnership).

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 finalising a National 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 middle 2012.

1.2. Sectoral energy efficiency improvement goals

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

1.3. Action plans for promoting energy efficiency

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

The Economic Transformation Programme (ETP) identified a few National Key Economic Areas (NKEA) in order to achieve a high income economy by 2020. An Entry Point Project (EPP) on energy efficiency was designed under the Oil, Gas and Energy (OGE) NKEA which is known as EPP9: Improving Energy Efficiency. EPP9 is also known as Sustainability Achieved via Energy Efficiency (SAVE) Program that focuses on 5 key initiatives as follows:

i) Government leading by example;

- To promote and implement efficient energy management system and practices in government buildings.

ii) SAVE Program [Rebate];

- The SAVE Program [Rebate] focuses on increasing sales of energy efficient appliances by increasing demand through giving rebates for 5-Star rated appliances.
- Rebates given for the purchase of efficient 5-Star rated refrigerator (100,000 units) and air-conditioner (65,000 units) for domestic users and replacement to energy efficient chillers (72,000 Refrigerant Tons) for private commercial building owners.

iii) Promotion of building insulation;

iv) Promotion of more economically viable cogenerations for industries; and

v) Efficiency transport from energy efficient vehicles

Objectives:

Energy efficiency measures will be intensified to harness energy savings potential and reduce Malaysia's carbon emissions and dependence on fossil fuels. Intrinsic barriers to energy efficiency that pose challenges in capturing this opportunity will also be addressed.

a) Applicable sectors:

Residential, Township, Industrial and Building

b) Outline:

i) Phasing out of incandescent light bulbs by 2014;

ii) Increase energy performance labelling from four to ten electrical appliances;

iii) Introduction of guidelines for green townships and rating scales based on carbon footprint baseline;

iv) Increasing the use of energy efficiency machineries and equipment such as high efficiency motors, pumps and variable speed drive controls;

v) Introduction of Minimum Energy Performance Standards for selected appliances;

vi) Revision of the Uniform Building By-Laws to incorporate the Malaysian Standard: Code of Practice on Energy Efficiency and Renewable Energy for Non-Residential Buildings (MS1525);

vii) Wider adoption of the Green Building Index (GBI); and

viii) Increasing the use of thermal insulation for roofs in air conditioned building.

c) Financial resources and budget allocation

The SAVE Program was created and administered federally by the Ministry of Energy, Green Technology and Water (MEGTW) and is funded by the Government in Economic Transformation Program (ETP) RM45million in total for the rebates and its promotional campaign activities throughout the country. The budget should cover the purchases of as many as 100,000 units of refrigerators, 65,000 units of air-conditioners and 72,000RT capacity of energy efficient chillers for eligible domestic consumers and private companies.

d) 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.

e) 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 *Energy Efficiency and Conservation Guidelines Part 2: Thermal 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 boilers, thermal oil heaters, industrial furnaces, absorption chillers, heat exchangers, cogenerationsystems, 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;

iv) 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

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

vi) Increasing the use of energy efficient machineries and equipment such as high efficiency motors, pumps and variable speed drive controls;

vii) Introduction of Minimum Energy Performance Standards for selected appliances to restrict the manufacture, import and sale of inefficient appliances to consumers.

viii) To accelerate the transformation of consumer appliances market to increase the share of Energy Efficient (EE) models and to phase out inefficient models from the local market so as to reduce the price premium for the EE products.

b) Building

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, were incorporated in the amendments to the Uniform Building By-Laws (UBBL). All non-residential buildings have to comply with the energy efficiency requirements of the UBBL that allows for integration of renewable energy systems and energy saving features in buildings;

ii) Minimum ten percent reduction of electricity use in selected government buildings. The Ministry of Energy, Green Technology and Water conducted energy audits and retrofitting works in selected government buildings to estimate the saving potential and to formulate a plan to achieve the stipulated target;

iii) Wider adoption of Green Building Index (GBI) to benchmark energy consumption in new and existing buildings; and

iv) Increasing the use of thermal insulation for roofs in air conditioned buildings to save energy.

v) Implementation of no-cost measure initiative by setting temperature of all government buildings to not lower than 24 degrees Centigrade This step shows the government's commitment in reducing the overall electricity consumption by leading the way by doing it and starting with the no cost measures which can be implemented easily

c) Residential

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

ii) Increasing energy performance labelling from four (air-conditioner, refrigerator, television and fan) to ten electrical appliances (six additional appliances – rice cooker, electric kettle, washing machine, microwave, clothes dryer and dishwasher). Labelling appliances enables consumers to make informed decisions as they purchase energy efficient products; and

iii) Phasing out of incandescent light bulbs by 2014 to reduce carbon dioxide emissions by an estimated 732,000 tonnes and reducing energy usage by 1,074 gigawatts a year.

iv) The amount of targeted energy savings for the SAVE Program would be 127.3GWh equivalent to the savings of electricity bill will be RM 32.04 million yearly based on the current electricity tariffs. The estimated savings in proportion to life span for energy efficient electrical appliance where it is expected to be about seven (7) years for refrigerators and air conditioners, and 15 years for chillers, the projected savings would be up to RM 382.1 million.

f) Future tasks

Enhance the legal framework on energy efficiency improvement through the drafting of the Energy Efficiency and Conservation Law and finalising a National Master Plan on Energy Efficiency and Conservation (Electrical and Thermal) 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), the Energy Commission (EC) and the Sustainable Energy Development Authority (SEDA Malaysia).

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. SEDA Malaysia is the executing agency for Entry Point Project (EPP) on energy efficiency.

d) Covered sectors

Industry, building, 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). SEDA Malaysia was established in September, 2011.

f) Number of Staff

There five officers in MEGTW in charge of renewable energy and energy efficiency, four officers in the Energy Commission (EC) to handle energy efficiency matters and SEDA Malaysia has 12 officers in charge of both renewable energy and energy efficiency.

1.5 Information dissemination, awareness raising and capacity building

A large number of information dissemination seminars and workshops have been held for energy users by 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. CETREE had successfully implemented various activities related to Renewable Energy (RE) and Energy Efficiency (EE) through mass media, competitions, exhibitions, etc. that covered primary and secondary school levels. Capacity building program such as Promotion of Energy Efficiency and Conservation (PROMEEC) – Energy Management and ASEAN Energy Management Accreditation Scheme (AEMAS) has been successfully conducted among the energy auditors, energy managers and focal point of the government agencies in order to gaining knowledge to adopt some of the efficient energy management in their own premises and at the same time recognize the vast business opportunities that lie ahead.

1.6 Research and development in energy efficiency and conservation

Technical research on energy efficiency and conservation are 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

Part VA of the Act provides the 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

Annual budget from the Government.

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

Annual budget from the Government

f) Expected results

Better energy management.

2.3. Voluntary measures

Green Building Index Malaysia (GBI Malaysia) certification.

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.

The *Energy Efficiency and Conservation Guidelines Part 2: Thermal Energy-use Equipment* is 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 boilers, thermal oil heaters, industrial furnaces, absorption chillers, heat exchangers, cogeneration systems, 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 Financing Scheme (GTFS)

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 RM50 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 Association of Energy Service Companies (MAESCO), Federation of Malaysian Manufacturers (FMM), Association of Consulting Engineers *Malaysia* (*ACEM*) and The Electrical and Electronics Association of Malaysia (TEEAM) 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.

Malaysian Chapter of ASEAN Energy Management Accreditation Scheme (AEMAS), initiative under ASEAN Energy Efficiency and Conservation Sub-Sector Network (EE-SSN) has been successfully launched by Government of Malaysia in July 2011. The main objectives of the AEMAS are to reduce energy consumption in the industrial sector in ASEAN, to reduce emissions of greenhouse gases in ASEAN, and to increase the professional standing of accredited energy managers. The launch of the Malaysian Chapter of AEMAS marks an important milestone that will support our transition to an energy efficient nation, as we place priority on the need for human capital competency and the drawing up of a code of practices to use technology effectively.

Promotion of Energy Efficiency and Conservation (PROMEEC) – Energy Management for Malaysia has been successfully organised in November 2011. This program is under EE-SSN as well that was jointly conducted with ASEAN Centre for Energy (ACE) and funded by Government of Japan via Ministry of Economy Trade and Industry. PROMEEC activity is one of the capacity building programs to disseminate the energy data and reinforce the understanding and capabilities in managing energy more effectively and efficiently.

MEXICO

3. GOALS ON EFFICIENCY IMPROVEMENT

3.1. Overall energy efficiency improvement goals

a) Key Official Indicator

Reduction of national energy consumption over a baseline constructed.

b) Goals

To reduce final energy consumption to year 2012, with 26 action lines that include the electrical, thermal and engine fuel energy consumption.

c) Base year

Energy Sector Program (PROSENER): 2006, with a target of 21 685 GWh in savings from electrical power consumption.

National Program for Sustainable Use of Energy (PRONASE): 2009.

d) Goal year

Energy Sector Program (PROSENER): 2012, with a target of 43 416 GWh in savings from electrical power consumption.

National Program for Sustainable Use of Energy (PRONASE): 2012, with impact of around 43 TWh in energy reduction for final use of energy (from baseline).

3.2. Sectoral energy efficiency improvement goals

(a) Sector

From PRONASE, goals are addressed in seven areas:

1. Increase the full performance of the national vehicle park.
2. Increase the lighting park efficiency.
3. Increase the electrical and electronic appliances park efficiency.
4. Increase the cogeneration capacity.
5. Reduce energy consumption by environmental conditioning in buildings.
6. Increase the efficiency of industrial motors park with highest consumption.
7. Increase the water pumping systems efficiency.

In addition, there are some programs in permanent operation such as Daylight Saving Time; Energy Efficiency Standards Program; Energy Saving Program for the Federal Public Administration, among others.

(b) Goals

In the PRONASE, the opportunity areas that have the highest potential to reduce energy consumption are: transport (9.0 TWh 2010-2012), lighting (19.2 TWh in 2010-2012), equipments and appliances (6.6 TWh 2010-2012), cogeneration (2.1 TWh 2010-2012), buildings (1.4 TWh 2010-2012), industrial motors (3.5 TWh 2010-2012) and water pumps (0.2 TWh 2010-2012).

(c) Base Year

The base year is 2006 for PROSENER and 2009 for PRONASE.

(d) Goal Year

For both programs the goal year is 2012, but the impact from PRONASE is estimated up to 2030.

3.3. Action plans for promoting energy efficiency

g) Name

Sustainable Use of Energy for Final Use

h) Objectives

1. Transport. Increase the performance of the national vehicle park.
2. Lighting. Increase the efficiency of the lighting park.
3. Equipment and appliances. Increase the efficiency of equipment and appliances.
4. Cogeneration. Increase the capacity of cogeneration.
5. Buildings. Reduce energy consumption by ambient air conditioning in buildings.
6. Industrial motors. Increase the efficiency of industrial motors of highest consumption in the park.
7. Water pumping systems: Increase the efficiency of water pumping systems.

i) Applicable sectors

Transport, Lighting, Equipments and Appliances, Cogeneration, Buildings, Industrial Motors and Water Pumping Systems.

j) Outline

PROSENER:

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 the 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 householdsand buildings.

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

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

Strategy III.1.7 - To promote a series of regulations to allow 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 distribution and electrical energy consumption activities.

PRONASE:

Strategy 1.1: Increase fuel efficiency of the vehicles added to the national fleet.

Strategy 1.2: Improve best practices in vehicle utilization.

Strategy 2: Increase the efficiency of the lighting inventory.

Strategy 3.1: Increase the efficiency in equipments and appliances added to the inventory inventory.

Strategy 3.2: Replace inefficient equipments and appliances in the inventory.

Strategy 4: Promote the cogeneration in final users with high energy demand.

Strategy 5.1: Improve the insulation on new buildings.

Strategy 5.2: Promote best practices in buildings.

Strategy 6.1: Increase the efficiency of industrial motors added to the inventory.

Strategy 6.2: Substitute inefficient industrial motors in the inventory.

Strategy 7: Refurbish existent pumping systems.

k) Financial resources and budget allocation

National Commission for the Efficient Use of Energy's (CONUEE's) budget is allocated by the Ministry of Energy (SENER).

l) Method for monitoring and measuring the effects of action plans

Monitoring is carried out every six months or annually and results are reported in the following documents: Activities Report of the Ministry of Energy, Government Report, Sector Outlook, and National Energy Balance. In addition, CONUEE has developed its Annual Work Program, according with the Law for the Sustainable Use of Energy and its ordinance, which is the programmatic document that establishes the objectives, strategies, action lines, goals and indicators for each fiscal year.

m) Expected results

PROSENER: 43 416 GWh (electricity)

PRONASE: 43 TWh (of the whole energy abatement impact between 2010 and 2012)

n) Future tasks

Goals are expected to be achieved by 2012

3.4. Institutional structure

1.4.1 Central Institutional Structure

a) Name of organisation

Mexico's public body in charge of energy efficiency programs for final use is the National Commission for the Efficient Use of Energy – CONUEE (formerly known as National Commission for the Energy Saving - CONAE) which is an independent government administrative agency of the Ministry of Energy (SENER), 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 comprises all actions leading to an economically feasible 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.

CONUEE's responsibilities are:

In terms of Standardization and other regulatory practices:

1. Implement the registration of users who have obtained the certificate of a person or institution responsible for energy;
2. Binding opinions to the agencies of the Federal Public Administration, in relation to best practices for sustainable use of energy;
3. Recommendations to states, municipalities and individuals; in relation to best practices for sustainable use of energy;
4. Develop a program for individuals seeking to promote the implementation of certification processes, products and services, and monitoring the implementation of voluntary processes that they develop in order to improve their energy efficiency; and according to the Regulation of the Law for the Sustainable Use of Energy in the ninth transitory, this one establish the publication of the certification program will take place in a period of one year after the publication of the already mentioned.
5. Order verification visits, request the submission of information as well as of personnel carrying out activities related to sustainable use of energy, to supervise and monitor the fulfilment of applicable legal provisions.

In terms of Public Policies for Sustainable Use of Energy:

1. Facilitate the optimal use of energy;
2. Develop and issue methodologies for the quantification of greenhouse gas emissions by the exploitation, production, processing, distribution and consumption of energy as well as emissions avoided, due to the inclusion of actions for the sustainable use of energy.
3. Develop and issue methodologies and procedures for quantifying the use of energy and determine the economic value of consumption and the avoided processes arising from the use of sustainable energy.

In terms of Liaison, Innovation and Promotion:

1. Prepare and publish books, catalogs, manuals, articles and technical reports on the work undertaken by the Commission.
2. Disseminate in scientific publications, results of studies and projects that promote sustainable use of energy.
3. 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.
4. Participate in the dissemination of information between government and social sectors.

In terms of Information and Evaluation:

1. Implement the National Information Subsystem about Use of Energy and its update and availability.

2. Implement and update information about Funds and Trust Funds aimed at sustainable use of energy and that have been constituted by the Federal government, receiving federal resources or where the Federal government offers guarantees.

b) Status of organisation

CONUEE: technical arm of the Ministry of Energy, supervisor and implementation entity with the aim to articulate the sustainable use of energy policies in the country.

c) Roles and responsibilities

- Promote energy efficiency.
- Constitute itself as a technical character body to articulate national policy in sustainable use of energy.

d) Covered sectors

Transport, Lighting, Equipments and Appliances, Cogeneration, Buildings, Industrial Motors, and Water Pumps.

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 also stated allocation of all human and material resources belonging to the formerly National Commission for Energy Saving (CONAE)**.**

f) Number of staff

86 employees

1.4.2 Activities on energy efficiency improvement.

The National Commission for Energy Efficiency (CONUEE) is a quasi-descentralized administrative agency of the Secretary 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. CONUEE was created from the entry into force of the Law for Sustainable Use of Energy, published on November 28, 2008, which states that all human and material resources of the National Commission for Energy Saving (CONAE) shall be allocated to this new Commission

Sustainable Use of Energy, is conceived as the optimal use of energy in all processes and activities for exploitation, production, processing, distribution and consumption, including energy efficiency.

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.

CONUEE's responsibilities are:

a) In terms of Regulations:

1. Implement the registration of users who have obtained the certificate of a person or institution responsible for energy;
2. Binding opinions to the agencies of the Public Federal Administration, in relation to best practices for sustainable use of energy;

3. Issue recommendations to states, municipalities and individuals; in relation to best practices for sustainable use of energy;
4. Develop a program for individuals seeking to promote the implementation of certification processes, products and services, and monitoring the implementation of voluntary processes that they develop in order to improve their energy efficiency;
5. Order verification visits, request the submission of information as well as of personnel carrying out activities related to sustainable use of energy, to supervise and monitor, the fulfilment of applicable legal provisions.

b) In terms of Public Policies for Sustainable Use of Energy:

1. Facilitate the optimal use of energy from their exploitation to its consumption;
2. Develop and issue methodologies for the quantification of greenhouse gas emissions by the exploitation, production, processing, distribution and consumption of energy as well as emissions avoided, due to the inclusion of actions for the sustainable use of energy;
3. Develop and issue methodologies and procedures for quantifying the use of energy and determine the economic value of consumption and the avoided processes arising from the use of sustainable energy.

c) c) In terms of the Promotion and Dissemination:

1. Prepare and publish books, catalogs, manuals, articles and technical reports on the work undertaken by the Commission;
2. Disseminate in scientific publications, results of studies and projects that promote sustainable use of energy;
3. 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;
4. Participate in the dissemination of information between Government and social sectors.

d) In terms of Information and Evaluation:

1. Implement the National Information Subsystem for the Sustainable Use of Energy;
2. Implement and update information about Funds and Trust Funds aimed at sustainable use of energy and that have been constituted by the Federal government, receiving federal resources or where the Federal Government offers guarantees.

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 country. RENACE contributes with the elaboration of a sustainable energy policy at national 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

Achieve the combined efforts of the states with the Federal government to ensure the energy sustainability of the country.

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
- Sector Outlook documents
- National Energy Balance

b) Awareness raising

Electrical Energy Savings of 19 774 GWh in 2008 for PROSENER goals. (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

PRONASE, in order to capture the identified potential by sustainable use of energy strategies, requires actions of collaboration between multiple organizations. These actions must be translated into public policy enforceable in the short and medium term.

The groups of actions to be undertaken to achieve the objectives are:

1. Institutional Strengthening
2. Inter-agency coordination
3. Education, training, information and communication
4. Linking with outside

These groups focus in research, development and conservation in energy efficiency through actions like:

- Set up a formal education and researcher's development

- New institutional programs for all education levels
- Standard Program for energy efficiency.
- Get accurate and effective information for population in relation with their energy consumption
- Prepare and publish books, catalogs, manuals, articles and technical informs about energy efficiency works.
- Promote technology application, and equipment, appliances and vehicles energetic efficiency.

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).

RLASE – *Reglamento de la Ley para el Aprovechamiento Sustentable de la Energía* (Ordinance of the Law for Sustainable Use of Energy)

b) Purpose

Promote a sustainable use of energy through the optimum use of it in all its processes and activities from its holding to its consumption.

c) Applicable sectors

All sectors

d) Outline

28 November 2008 was published.

11 September 2009 was published.

e) Financial resources and budget allocation

Depending on availability of resources for each fiscal year.

f) Expected results

Mexican government expects fulfilment through PROSENER and PRONASE.

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

Firstly, Mexico adopted energy standards in 1995 and has since established standards for eighteen products. Many of their standards are modeled on those of the U.S., but have been adapted to local situations and experience from their own program.

The following table presents the Official Mexican Standards (NOM's) in energy efficiency that have been published:

Norm Code	Product
NOM-011-ENER-2006	Central Air Conditioner (Packaged Terminal)
NOM-011-ENER-2006	Central Air Conditioner (Split Type)
NOM-017-ENER/SCFI-2008	CFL's
NOM-005-ENER-2000	Clothes Washers
NOM-015-ENER-2002	Freezers
NOM-009-ENER-1995	Insulation (Thermal)
NOM-013-ENER-2004	Lighting System (External)
NOM-007-ENER-2004	Lighting System (Indoor)
NOM-014-ENER-2004	Motors (1-phase Induction)
NOM-016-ENER-2002	Motors (3-phase Induction)
NOM-004-ENER-2008	Pumps (Centrifugal)
NOM-006-ENER-1995	Pumps (Deep Well)
NOM-010-ENER-2004	Pumps (Submersible)
NOM-001-ENER-2000	Pumps (Vertical)
NOM-021-ENER/SCFI-2008	Room Air Conditioners (Packaged Terminal)
NOM-021-ENER/SCFI-2008	Room Air Conditioners (Window)
NOM-015-ENER-2002	Refrigerator
NOM-015-ENER-2002	Refrigerator – freezer
NOM-022-ENER/SCFI/ECOL-2000	Refrigerators (Commercial)
NOM-003-ENER-2000	Water Heaters (Gas)
NOM-019-ENER-2009	Tortilla mechanical machines

Sources: www.clasponline.org and www.conuee.gob.mx/wb/CONAE/CONA_1002_nom_publicadas_vigen

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 for the National Commission for the Efficient Use of Energy was $51.35 million Mexican pesos (equivalent to 3.92 million USD) [14]

f) Expected results

From 17 963 GWh (2007) to 22 397 GWh (2012) for PROSENER

From 2009 to 2030 1 738 TWh for PRONASE (new standards for light and heavy vehicles; lighting; appliances and heater; homologation of some other standards with USA and Canada; air conditioning, and industrials engines)

[14] At an average currency of 2009 of 13 MXN per 1 USD.

4.3. Voluntary measures

2.3.1 Voluntary Certification Program for Products, Processes and Services

The Law for Sustainable Use of Energy establishes that the National Commission for the Efficient Use of Energy will develop a program to promote process, products and services certifications, as well as supervision of them. On behalf of these, this Commission will:

- Develop a methodology for process, products and services certifications.
- Establish an approving and accreditation system of official auditors and/or officials. Determining the procedures and requirements that will need to fill the people interested to full fill the already mentioned system, in which on each case, they will observe what is established under the Metrology and Standardization Federal Law.
- Develop training programs in auditory and officially matters of energetic character.
- Instrument an identification system to aloud the identification of the firms that have been certified their process, products and services.
- Promote the creation of support regional centers for small and medium firms, with the final purpose to facilitate the certification of process, products and services.
- Agree or arrange between individual or legal, public or private entities on the certification

2.3.2 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) mark

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 these cover the Sello FIDE requirements if approved, manufacturers pay for marking and sign an agreement stipulating length of validity of the Sello FIDE endorsement, how it can be displayed, renovation and cancellation of labeling, etc. Manufacturers can then display the Sello FIDE (as shown in Figure 4) on their products. FIDE advertises the Sello FIDE in order to entice consumers to look for it when purchasing electrical equipment.

Figure 4. FIDE's Mark 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

No information available

4.4.3. Trusts and Funds

The main goals of the Hydrocarbon Sector Funds is to foster 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 afore mentioned issues. On the other hand, the financial resources of the Sector Fund for Energy Sustainability will be allocated for the financing of projects which main objectives are scientific research and applied technology for renewable energy sources, energy efficiency, use 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 financial resources from the annual payment of PEMEX Exploration and Production's duty which is will reach a rate of 0.65% of the annual crude oil and natural gas sales, in order to support scientific and technological research on energy topics. In 2008 the Income Law considered from an amount of 1 100 million MXN, that 55% would be allocated to the Sector Fund of Hydrocarbons; 10% to the Sectorial Fund for Sustainable Energy and the remainder 35% to the Scientific Research and Technological Development Fund of the Mexican Petroleum Institute (IMP).

The Sectorial Funds will contribute to the development and technological innovation for 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:

Sector 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) Other information:

According to the Law for the Sustainable Use of Energy, CONUEE has gathered information about other funds and trusts that support directly or indirectly the sustainable use of energy, these are:

- Scientific and Technological Development Fund for the promotion of the production and financing of dwelling and housing sector performance from the National Housing Commission.
- Electric Energy Saving Trust (in short, FIDE)
- Trust Fund for the Constitution of a Financing Revolving Fund for the Program of Mexicali Valley House Insulation (in short, Fipaterm)
- Trust Funds for Rural Development (in short, FIRA)
- Fund for the Energetic Transition and Sustainable Use of Energy from the Ministry of Energy.

4.5. Energy pricing

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
- Foro para el Desarrollo Sustentable, A.C.
- Mexico – United States Foundation for Science (FUMEC)
- Fundación para el Desarrollo Sustentable, A.C.
- Greenpeace – Mexico

- Grupo de Estudios Ambientales
- Centro Mario Molina
- International Center on Clean Transportation, among others.

4.6.2. Cooperation through bilateral, regional and multi-lateral schemes

The Mexican Government cooperates through bilateral schemes with some European countries. In the case of Europe, Mexico has bilateral cooperation with Germany by the German Technical Cooperation (GIZ for its name in German, formerly known as 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.

Also, the Mexican Government has multi-lateral schemes such as the North American Energy Working Group (NAEWG) formed by Canada, United States and Mexico, to fostering communication and cooperation among the governments and energy sectors of the three countries; enhancing North America energy trade, development, and interconnections; and promoting regional integration and increase energy security for the people of North America.

On the other hand, the Mexican Government has bilateral cooperation with Japan by the Japan International Cooperation Agency (JICA) to get an Energy Management System which aloud the certification of process, products and services as well as human resources experts on the field and at the superior institutions and engineering colleges that will make future students to get a sustainable and efficient use of energy knowledge.

4.6.3. Other cooperation/efforts for energy efficiency improvements

- No information available

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NEW ZEALAND

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

The New Zealand Government's economy-wide energy efficiency target is for New Zealand to continue to achieve a rate of energy intensity improvement of 1.3 percent per annum[15].

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:

- **Transport -** By 2016: The efficiency of light vehicles entering the fleet has further improved from 2010 levels
- **Business**
  - By 2016: An improvement in the commercial and industrial sector energy intensity level
  - By 2025: To utilise up to 9.5 PJ per year of energy from woody biomass or direct use geothermal additional to that used in 2005
- **Residential -** By 2013: Insulate 188,500 homes.
- **Products -** By 2016: Extend minimum energy performance standards, labelling and EnergyStar product coverage to remain in line with major trading partners.
- **Electricity System -** By 2025: 90 percent of electricity will be generated from renewable sources, providing supply security is maintained.
- **Public Sector -** By 2016: Improve energy use per full-time staff equivalent compared with a 2010 baseline.

1.3. Action Plans for Promoting Energy Efficiency

The New Zealand Energy Efficiency and Conservation Strategy (NZEECS) 2011-2016 is the main program of work for promoting energy efficiency in New Zealand.

a) Objectives

The use of energy efficient technology and practices, energy conservation, and renewable sources of energy can:

1. Enhance economic growth through increased productivity.
2. Improve energy security by reducing energy demand, including for imported sources of energy.
3. Assist with energy affordability by reducing consumer energy costs.
4. Defer the need for more expensive energy supply by making better use of existing energy.
5. Reduce greenhouse gas emissions from energy.
6. Improve people's health, well-being and productivity through warmer and more energy efficient homes.

[15] *The New Zealand Energy Efficiency and Conservation Strategy 2011-2016*.

As such, the New Zealand Energy Efficiency and Conservation Strategy (NZEECS) contributes to the delivery of the Government's energy priorities set out in the New Zealand Energy Strategy.

b) Applicable sectors

Transport, business, residential, products, electricity and government.

c) Outline

The NZEECS was completed as a requirement of the Energy Efficiency and Conservation Act 2000 and released in August 2011. The NZEECS replaced the second Energy Efficiency and Conservation Strategy released in 2007. The Strategy is written as a companion document to the New Zealand Energy Strategy (NZES) and sets out the government's 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 NZEECS promotes the careful use of a mix of Government measures, which can be grouped as:

- Information – targeting consumer and business needs.
- Incentives – funding or financial products to help build capability and leverage investment.
- Codes and standards – to underpin confidence in energy efficient products and practices.
- Research and development – to support innovative capability.

These measures may often be delivered in partnership with industry associations, not-for-profit energy trusts, and other parties. The exact mix of measures adopted by relevant Government agencies to deliver the NZEECS will vary according to the scale of the opportunities and the specific needs of stakeholders.

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 FY2011/12, just under $146 million was allocated for the Energy Efficiency and Conservation Authority's work in promoting energy efficiency. This figure is revised annually.

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, programme 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 2011 EECA had 96 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.

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.

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); 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 17 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 Officials 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 programmes 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) provides 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/16279
- A number of e-zine electronic newsletters designed for different audiences.
- A range of marketing and advertising campaigns for print, radio and television.

c) Capacity-building

Building the capacity of the energy services sector to help businesses identify and implement cost effective efficiency measures is seen as key to achieving the Government's energy saving targets.

Capacity building interventions in the business sector have traditionally been delivered by Universities and Technical Institutes, mostly as part of wider engineering courses. More recently, focus has increased on developing specific energy management training in the following areas of high economic potential:

- Commercial buildings: Courses are in place to improve electricity management and efficiency in the commercial building services industry – targeting energy specialists, facilities managers and commercial property valuers. Courses are delivered by the Energy Management Association New Zealand (EMANZ) which is an industry association of energy management experts including energy auditors, energy managers and suppliers of energy efficiency products and services.
- Industrial sector: The University of Waikato delivers training and accreditation programmes in pumps, fans and compressed air system efficiency.
- Lighting Sector: Massey University delivers specialist training in the science and engineering of lighting with a focus on electricity efficiency.

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, which 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 programme to the standard required. Applicants are 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 has been a sponsor of the annual AWATEA conference and 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 Energy Conservation and Renewable Energy

New Zealand uses international research on energy efficiency, energy, conservation and renewable energy whilst carrying out its own research to establish potential solutions for its distinctive mix of energy resources, infrastructure and cost structure.

The parameters for research are set out in the New Zealand Energy Strategy 2011-2021 and amplified in the New Zealand Energy Efficiency and Conservation Strategy, (NZEECS) 2011-21.

The lead agency for government's policy on research and development is the Ministry of Science and Innovation (MSI). It has the mandate to transform New Zealand by driving science and innovation to increase our economic, environmental and innovation sector.

MSI funding in energy research and development is $12 million per annum through the Energy and Minerals Research Fund. The scope of this fund encompasses sustainable and efficient energy generation, improved energy security and identification and extraction of energy and mineral resources for export growth while minimising the impact on the environment. Investment of about $10 million per annum also occurs in these areas through the core funding for Crown research institutes.

In New Zealand 70% of energy (370PJ annually) is consumed by businesses. 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. Its objectives and targets are set out in the NZEECS and are to enhance business growth and competitiveness from energy intensity improvements.

EECA Business has four areas of priority:

1. Commercial buildings – targeting lighting, HVAC and refrigeration;
2. Industrial – targeting motorised systems and processed heat;
3. Business transport – targeting more efficient fuel use; and
4. Lighting – targeting more efficient lighting technology in businesses and on New Zealand's road

The programmes are designed to overcome market barriers and broadly fit into three groups:

- Capability initiatives – training and accreditation programmes for service providers, and training programmes for end users and key influencers;
- Information initiatives – business information programmes, rating / labelling programmes; and
- Funding initiatives – audit and works funding programmes, product-based subsidy programmes (lighting), and alternative funding programmes (such as Crown Loans).

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 2007 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 biodiesel or biodiesel content of a biodiesel blend. 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 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.

In addition, EECA manages an APEC funded Electric Vehicle (EV) research project on electric vehicles (EV) connectivity across the APEC region. EECA is also providing monitoring methodologies for a Wellington Council electric vehicle trial.

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 programme. This programme 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.

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; 2009/10 NZD 83,173,000; 2010/11 was NZD 150,960,000 and in 2011/12 was NZD 155,761,000.

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; to enhance economic growth through improved productivity; and to 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. The programme stimulates the production and purchase of more energy efficient products whilst ensuring a range of products is available to meet consumer needs. It is a joint Australia-New Zealand programme 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.

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

- Refrigerators and freezers
- Clothes washers
- Clothes dryers
- Dishwashers
- Air conditioners
- Televisions (proposed for 2012)

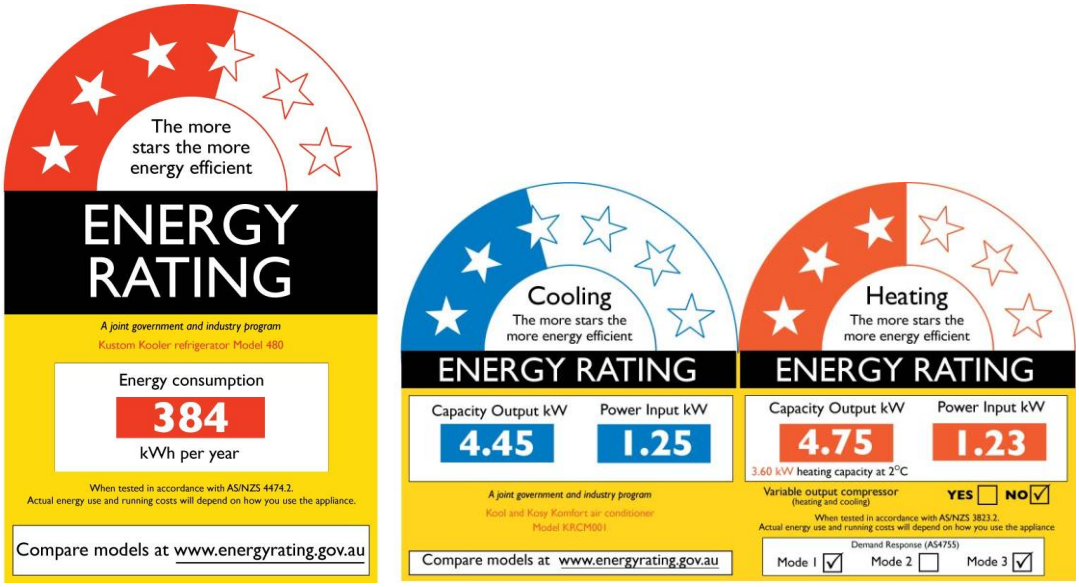
The following products are also regulated on the basis of Minimum Energy Performance Standards (MEPS).

- Refrigerators and freezers (revised 2011)
- Mains pressure electric storage water heaters (from 2002)
- Small mains pressure electric storage water heaters (<80L) and low pressure and heat exchanger types (from 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, 2007, and 2011. Another further revision may occur around 2013)
- Three-phase air conditioners up to 65kW cooling capacity (from 1 October 2001, revised 1 October 2007, and 2011. Another revision may occur around 2013)
- Distribution transformers (from 1 October 2004, revisions proposed for 2012)
- 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 2012)
- External power supplies (from 2011)
- Set top boxes (from 2011)
- Televisions (proposed for late 2012)
- Commercial building chillers (from 2011)
- Close-control air conditioners (from 2011)
- Gas water heaters (from 2011).

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 relevant Ministerial level Council in Australia and the 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

To date, measured results are 11.7 PJ and NZD $729 from the start of the programme in 2002 till March 2011. Annual savings are currently around 3 PJ per annum, which is increasing each year.

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.

A voluntary version of the label was introduced in 2011 for electric vehicles.

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

To date, measured results are 11.7 PJ and NZD $729 from the start of the programme in 2002 till March 2011. Annual savings are currently around 3 PJ per annum, which is increasing each year.

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 and commercial.

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. Products covered include whiteware, home electronics, office equipment, air conditioners, solar water heating, and some types of lighting.

ENERGY STAR™ rated heat pumps (air conditioners) are the only products specified for use under the Warm Up New Zealand: Heat Smart insulation and clean heating programme.

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 programme in the residential sector. Funding is provided to fit homes with insulation and clean heating devices such as heat pumps and approved wood burners, and to remove or decommission non-compliant (dirty) fires and burners.

The programme 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 226,000 homes over the four years of the programme. Between $15 and $20 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.

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; 40,000 homes with clean heating devices.

The evaluation reports confirm and quantify the success of the programme to date – which translates to $1.2 billion net benefits to New Zealand over the expected life-time of measures delivered under the programme, with a benefit cost ratio of 4.3:1. The majority (99%) of the measured net benefit is from improved health.

The major assessed benefit from the programme is in improved health resulting largely from warmer, drier conditions after insulation is installed. Reduced mortality comprises around 74% of the assessed health benefit along with a drop in hospitalisation rates and costs, particularly in relation to asthma, respiratory and circulatory illnesses. Other benefits include avoided pharmaceutical costs, reduced absenteeism from school and work, and fewer medical visits.

The evaluation of the programme found that 85% of the insulation uptake has been additional to the background market rate and is therefore directly attributable to the programme. That equates to an additional 6.6 million m2 of insulation and an additional $35-53 million in producer surplus annually, worth $192 million (NPV 4% discount rate) over the four years of the programme.

The industry will employ more than 1,100people at the peak rate of installation. About 60% are directly employed in installation, production of materials and administration, whilst the remainder are indirectly employed by working for firms supplying the producers, importers, retailers and installers. Over the 4 year programme, direct and indirect employment will be nearly 3,500 person-years. 16

a) Name

Efficient Water Heating Programme

b) Purpose

To increase the uptake of efficient water heating products (including heat pumps).

c) Applicable sectors

Residential.

d) Outline

The Efficient Water Heating Initiative is designed to contribute to industry development by promoting and providing incentives to encourage the uptake of efficient 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 three years starting in 2006 followed by a further NZD 8.3 million for three years ending in 2012/13.

f) Expected results

Approximately 2,600 new efficient hot water heater installations per annum.

a) Name

Commercial Buildings Audit and Works Programmes

b) Purpose

[16] Reports commissioned by MED as the basis for its evaluation of the programme to date are: [A] Grimes A, *et. al.* (October 2011) "Warming Up New Zealand: Impacts of the New Zealand Insulation Fund on Metered Household Energy Use". [B] Grimes A, *et. al.* (October 2011) "Cost Benefit Analysis of the Warm Up New Zealand: Heat Smart programme". [C] Barnard LT, *et. al.* (October 2011) "The impact of retrofitted insulation and new heaters on health services utilisation and costs, pharmaceutical costs and mortality: Evaluation of Warm Up New Zealand: Heat Smart". [D] Covec (October 2011) "Impacts of the NZ Insulation Fund on Industry & Employment".

To encourage commercial building owners to undertake efficiency measures that would otherwise not have occurred due to capital constraints.

c) Applicable sectors

Commercial.

d) Outline

Part-funding (up to 40%) is provided for energy efficiency projects in commercial buildings where there is a genuine financial barrier preventing the project occurring. Projects are delivered through contracted service providers, sourced by way of a RFP process. Electricity savings are guaranteed (90%) with repayment mechanisms in place for any shortfalls. Although most providers focus on multiple project types & technologies, some focus exclusively on one type (e.g. lighting, continuous commissioning, monitoring & targeting).

e) Financial resources and budget allocation

NZD 4.0 million in grant funding for fiscal year 2011/12.

f) Expected results

The commercial programme is currently delivering annual savings of around 0.5 PJ a year; at a cost to Government of around 25% of the cost of building new supply assets.

2.4.4. Other Incentives

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

Compressed Air Scheme

b) Purpose

To increase the efficiency of compressed air systems in the New Zealand industry.

c) Applicable sectors

Commercial

d) Outline

Funding is provided for two levels of audits on large compressed air systems (>=75KW) – a basic walk-through audit of the plant/ system, and an in-depth audit. Auditors must be accredited Compressed Air Systems auditors (trained through a programme referred to in the capacity building section above). The walk-through audit is primarily aimed at identifying and quantifying the opportunity for savings on a site. Some specific recommendations will arise from this as well as an assessment of whether an in-depth audit is justified. Follow-ups are performed after 6 and 12 months to determine the level of savings achieved.

e) Financial resources and budget allocation

NZD $1.0 million for the fiscal year 2011/12.

f) Expected results

The commercial programme is currently delivering annual savings of around 0.2 PJ a year; at a cost to Government of around 25% of the cost of building new supply assets.

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

0.25 PJ of energy savings in 201/2015.

a) Name

Biodiesel Grants Scheme

b) Purpose

The grant assists the production and adoption of an environmentally responsible fuel which reduces greenhouse gas emissions and provides 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 is available to biodiesel producers. The grant is 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

In year one (Jul 2009 – Jun 2010) total grants of $230,000 were made for 542,000 litres of biodiesel.

In year two (Jul 2010 – Jun 2011) total grants of $805,000 were made for 1.893 million litres of biodiesel.

In year three (half year to date - Jul 2011 – Dec 2011) total grants of $417,000 have been made for 982,000 litres of biodiesel. The expectation for the full year is grants to a similar level to those given in year two.

2.5. Energy Pricing

New Zealand's energy sector is guided by free market principles. As an independent Crown entity, the Electricity Authority regulates the operation of the electricity market.

Since New Zealand's pricing is market-based, its effect on energy efficiency improvement programs varies with fluctuating supply and demand for energy. Generally, when energy prices increase 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 programmes 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 their 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 Programme 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 and International Energy Agency (IEA) membership and forums.
- Energy Regulators Advisory Council (Australia and New Zealand) to align regulations for energy using products such as gas/electrical safety and radio spectrum management.

- The Commonwealth Scientific and Industrial Research 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.

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http://www.eeca.govt.nz/node/13339

New Zealand Energy Efficiency and Conservation Strategy 2007: Making it Happen

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PERU

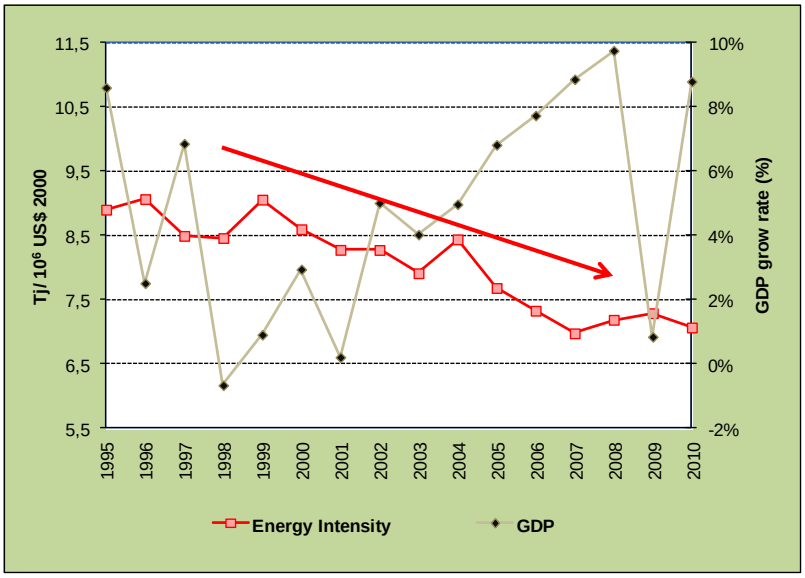
1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

a) Key indicator

The energy intensity is the indicator which gives the idea of the energy system 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

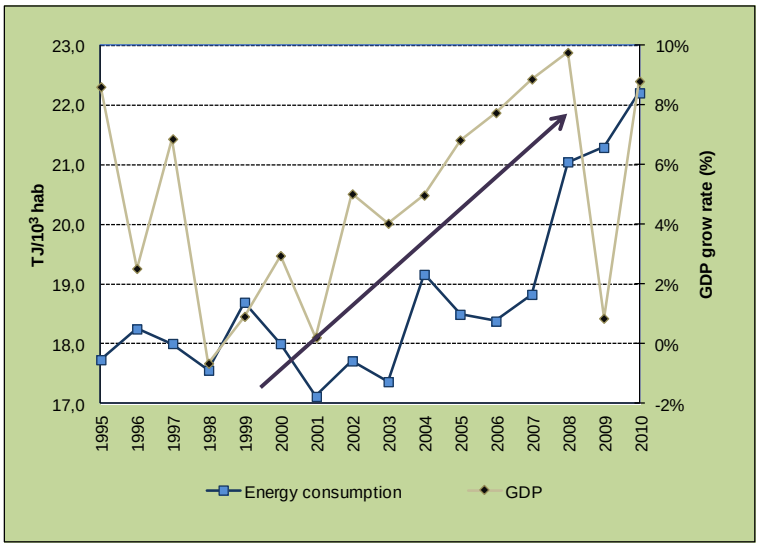


Source: **Energy Balance of Peru 2010/Ministry of Energy and Mines/Central Reserves Bank of Peru**

In the period 1995 – 2010, the energy intensity decreased from 8.90 TJ/10^6 (at US$ 2000) to 7.07 TJ/10^6 (at US$ 2000), the tendency is to decrease.

The other important indicator is the energy consumption per capita as shown in Figure 2.

Figure 2. Peruvian Energy Per Capita Consumption

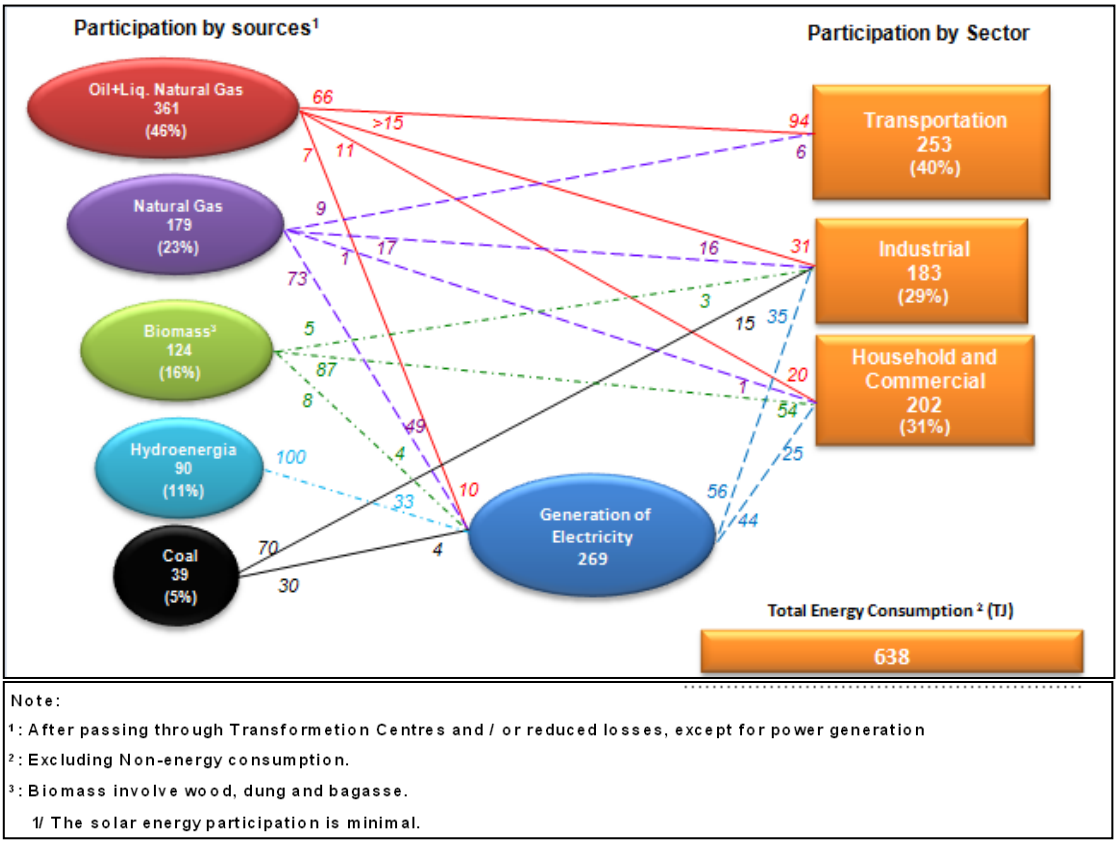


Source: Energy Balance of Peru 2010/Ministry of Energy and Mines/Central Reserves Bank of Peru

The energy consumption per capita increased from 17.7 TJ/Thousand people to 22.2 TJ/Thousand people. It is important to highlight that despite the fact that the GDP growth rate was reduced in 2009, the energy consumption per capita grew.

The energy matrix for 2010 is shown in Figure 3.

Figure 3. Energy Matrix of Peru 2010



Source: Energy Balance of Peru 2009/Ministry of Energy and Mines

Peru's energy matrix is still led by oil and natural gas liquids which represent 46% in the power supply. On the demand side, the transport sector has the largest share due to increased automotive fleet, which results from Peru importing diesel from other countries to meet demand, another important sector in Peru is the residential and commercial sector, finally the industrial sector which includes mining and metallurgical sector, has the lowest share since Peru is not an industrialised country.

b) Goals

Develop energy efficiency programs and promote renewable energy.

c) Base year

2010

d) Goal year

2040

Description

The Ministry of Energy and Mines has developed a strategic review of energy for Peru, with a horizon of 30 years, aimed at supporting the formulation of sector policies and the adequacy of the regulatory framework to serve as a reference for all stakeholders in the Peruvian Energy Sector. The study was developed by the Ministry of Energy and Mines with the support of the Inter-American Development Bank and the Ministry of Economy and Finance. Two important results of this work are the New Sustainable Energy Matrix for Peru (NUMES) and Strategic Environmental Assessment (SEA).

This study also updated the Referential Plan of Efficient use of the Energy 2009-2018 which was developed according to the Law of Promotion for the Efficiency Use of Energy (Law No. 27345).

The study of NUMES was developed based on the Energy Policy of Peru 2010-2040, approved with DS 064-2010-MS, which has nine policy objectives, with the vision for 2040 of having energy system that meets the national energy demand in a reliable, regular, continuous and efficient, to promote sustainable development and supported by the planning and ongoing research and technological innovation.

1.2. Sectoral Energy Efficiency Improvement Goals

a) Sectors

As mentioned before, the Referential Plan for the Efficient Use of Energy 2009-2018 was updated with NUMES study. The referential plan contemplates goals in four sectors and one which considers coordinated work. The sectors to be considered are:

- Residential
- Industry (productive and service)
- Commercial and Public
- Transportation
- Other plans, joint sectors

b) Goals

The Peruvian government has established the goal of achieving 15% of energy savings among the residential, industry (productive and services), commerce and public, transportation and other sectors from a 2010 baseline. To achieve this goal, all action plans will be implemented in each sector as proposed in the referential plan.

c) Base Year

2010

d) Goal year

2040

The reduction of energy demand implementing energy efficiency programs in each sector from 2010 to 2040 is shown in Table 1.

Table 1. Reduction of energy demand by sectors

Sector	Total (PJ)
Residential	621
Industry (Manufacturing & Services)	518
Commercial and Public	8
Transportation	1051
Other plans and sectors	1203
TOTAL	3401

Source: NUMES.

The implementation of the Energy Efficiency Plan requires an investment of 25.9 billion US dollars, and the total savings generated could amount to 94.797 billion US dollars.

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 elaborated the Referential Plan for the Efficient Use of Energy 2009–2018, which is the current legal disposition to achieve the official energy efficiency goals through the action plans described as follows in the four sectors considered:

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:

So far the biggest obstacle is that there is no budget allocated for new action plans. However, the Peruvian Government is working to establish a financing mechanism for the energy efficiency measures. In case of the programs in industry (production and service sectors), the mechanisms are:

- Promotion of finance mechanisms for medium- and large-size companies through 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.

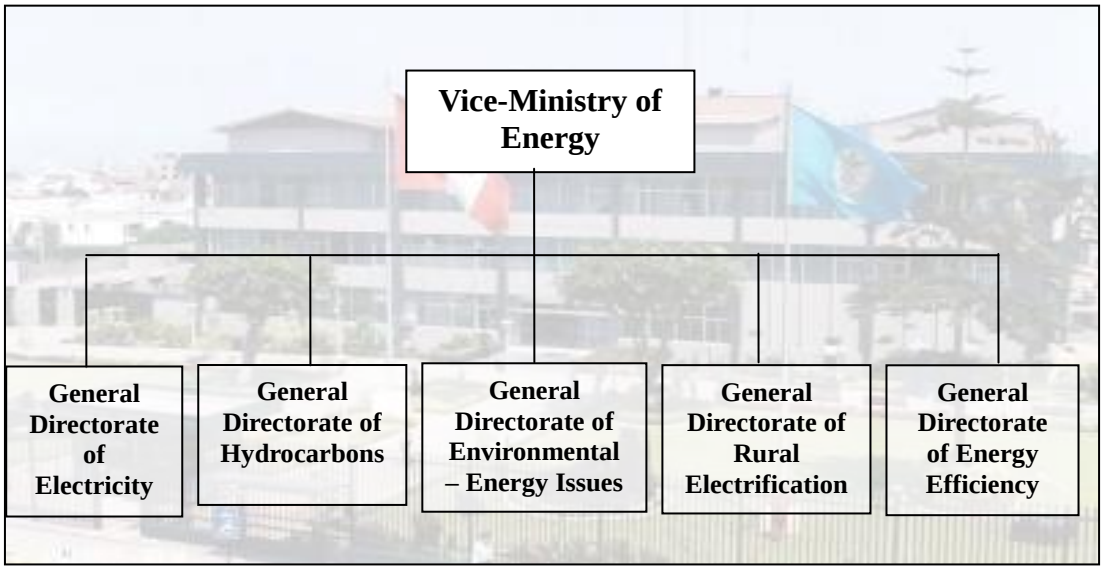
1.4. Institutional Structure

1.4.1 Central Institutional Structure

a) Name of organisation

On May 28 2010 with the passing of Supreme Decree N° 026-2010-EM , the Ministry of Energy and Mines changed its organization. In this sense, the Energy Vice Ministry added the Energy Efficiency Directorate; resulting in the new structure shown in Figure 4.

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

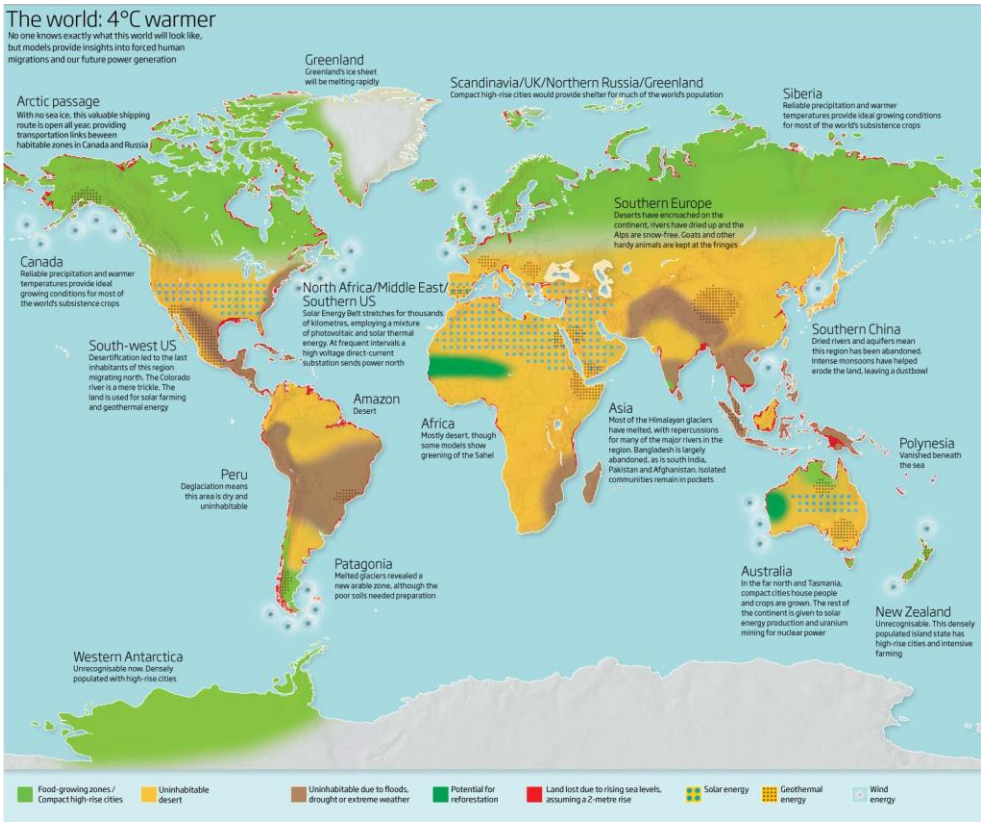
The General Directorate of Energy Efficiency is also in charge of coordinate, supervise and consolidate statistic information of the energy sector, as well as, elaborate and keep the data base updated in coordination of the others General Directorates of the Vice-Ministry of

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 aware of climate change and its effects in the economy, hence public institutions such as Ministry of Energy and Mines, Ministry of Agriculture, Ministry of Environment and others are working together, meeting with private companies and international organizations in this subject.

As 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 study programs 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 includes the inclusion of "National Energy Saving Day", in the school calendars, every year on October 21 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), however, 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.

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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 September 8 2000.

b) Purpose

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 Law No. 27345 gave power to the Ministry of Energy and Mines to be responsible of energy efficiency issues in Peru and:

- 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 applicable.

According to the Law No. 27345 all the equipment sold in Peru must 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; this issue has to be specified in the regulations.

f) Expected results

Utilization of energy efficiency to contribute to secure energy supply, improve the national competitiveness, mitigate environmental impacts, protect the energy consumer and raise people's awareness in this subject.

2.2. Regulatory Measures

2.2.1. Energy Efficiency - Regulatory measures.

a) Name

Regulatory Measures of Law No. 27345, Law for the Promotion of the Efficient Use of Energy—Supreme Decree No. 053-2007

b) Purpose

The objective of these regulatory measures is to promote the energy efficiency in order to secure the energy supply in the long-term, improve the national competitiveness in all sectors, mitigate the environmental impact on energy productions and demand, protect the energy users and raise awareness regarding the efficient use of energy.

c) Applicable sectors

The measures are applicable to the production, transport, transformation, distribution, trading and consumption of energy. It also involve the economic sectors.

d) Outline

To develop the culture of efficient use of energy, the Ministry of Energy must organize activities to promote a culture of efficient use of the energy, in coordination with public and private institutions. These actions are developed at all educational 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 with every October 21 considered "National Saving Energy Day". The Ministry of Energy and Mines is yet to coordinate with Peruvian universities about the dictation of pre and post-graduate courses related to energy efficiency and the development of programs about scientific and technologic research applied to energy efficiency.

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 will implement these actions in coordination with the regional governments.

e) Financial resources and budget allocation

According to the Law No. 27345, the Article states that the Ministry of Energy and Mines will coordinate funding with participant national and international entities in the development of energy efficiency projects. Furthermore, the Law allows the Ministry to gather donations and international cooperation on energy efficiency and renewable energy issues.

f) Expected results

Energy Efficiency culture improvement.

2.2.2. Promotion of the electricity production with renewable energy

a. Name

Promotion of electricity generation with renewable energy through 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 of Energy establishes every five years the share (percentage) for the electricity generated from renewable resources with this percentage being fixed on 5% for the first five years. Renewable resources to be considered include biomass, wind, solar, geothermal and tidal energy. As for hydro energy, it is only considered for power plants whose capacity is equal or inferior to 20 MW. Electricity from renewable energy has priority in the daily electric dispatch planned by COES (Operator of the Electric System) and its variable cost is considered to be zero.

e. Financial resources and budget allocation

In order to sell total or partially its electricity production, owners have to offer the energy in the short term market with its price plus a premium (in case the marginal cost results minor than the tariff determined by OSINERGMIN, the regulator body of the system). The tariff and premiums 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 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

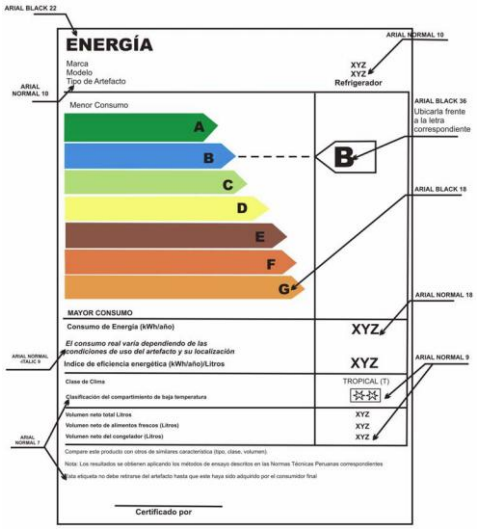
d) Applicable sectors

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

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 next years, this activity should be implemented as it is part of the Law on Promotion of Energy Efficiency and its Regulations, legal dispositions approved in 2007.

2.2.7. Technical Norms (Standards) on Energy Efficiency

a) Name

Technical 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 Financial Corporation for Development (COFIDE) is implementing the "Bio-business Program" with a 65 million Euro capital funded from the German Kreditanstalt für Wiederaufbau (KfW) institution. This Program aims to foster energy efficiency and renewable energy projects by giving low-interest loans to project promoters and developers. All sectors are included. The loans will be given through Peruvian commercial banks.

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 undertakes 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. Up to 2012, 14 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.

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PHILIPPINES

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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 in support of the implementation of energy efficiency plans and programs under its long term 2011–2030 Philippine Energy Plan. However, in FY 2011, the Government enhanced the implementation of energy efficiency under its new campaign theme the *"Bright Now! Do Right. Be Bright"*. This is to effectively promote and sustain the NEECP campaign program mainly to conserve energy and rationalize energy demand consumption. The NEECP's comprehensive plan is to institute programs and measures to improved energy utilization across demand sectors of the economy specifically for electricity, petroleum products and other fossil fuel resources.

The overall goals of the NEECP are:

1) To help ensure adequate supply of energy by contributing to the national energy security of the country.
2) To curb the impact of oil price volatility on the economy, reduce carbon dioxide emissions and protect the environment
3) To improve energy utilisation by all energy demand sectors and achieve an estimated potential cumulative energy savings of 70,643 KiloTons of Oil Equivalent (KTOE), or at an annual average potential energy savings of 3,532 KTOE, at the end of the planning period in 2030.

These goals were highlighted in the 2008 Philippine Energy Summit and have been part of the government's 20 year strategic plans and programs for 2011 to 2030.

Sectoral Energy Efficiency Improvement Goals

The Philippines sets sectoral quantitative goals which target 10% energy consumption reduction in the final energy demand in the commercial and government building, residential, industrial/manufacturing, power, transport and agriculture sectors.

1.2. Action Plans for Promoting Energy Efficiency

The Philippine National Energy Efficiency and Conservation Program is a comprehensive program promoting energy efficiency in the Philippines. Accordingly, the NEECP framework were consist of nine components focusing on the entire area of energy efficiency with specific actions to achieve its goals.

a) Objectives

The specific objectives of NEECP are:

- To reduce 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 potential energy savings of about 70,643 KTOE equivalent to a deferred megawatt capacity of about 31,981 MW and with a CO_2 emission reduction by as much as 117.70 Million Metric Tons CO_2 for the planning period 2011-2030.

b) Applicable sectors

The NEECP contains a comprehensive set of measures that cover six sectors, namely: commercial and government building, industrial/manufacturing, residential, power, transport and agriculture.

c) NEECP Components

The NEECP consists of nine program components across six sectors including[17]:

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 and Conservation* include:

- Fuel Conservation and Efficiency in Road Transport (FCERT)
- Power Conservation and Demand Management (Power Patrol)

Component 9: *Foreign Assisted/Technical Assistance*. This component includes the following projects:

- "Philippine Industrial Energy Efficiency Project for the Philippines" -a UNIDO-GEF assisted funded project with the objective of introducing process system optimisation models in the industrial manufacturing facilities; to introduce and promote energy efficiency projects using financing windows of local banks; and, to establish Philippine Energy Management System based on ISO 50001 framework, through capacity building of industrial energy managers, local consultants and practitioners and energy service providers.
- Development Study on Energy Efficiency for the Philippines – a JICA technical assistance project aimed at on the development of energy efficiency and conservation policy framework for the country.
- Philippine Energy Efficiency Project (PEEP) - a USD 31 million ADB loan by the Philippine Government to promote energy efficiency conservation in households, government buildings, and public street lighting.

[17]NEECP, answers of the Philippine Government from questionnaires for energy efficiency compendium, 2009.

Major EE&C Programs implemented in 2011are as follows:

Consistent with its mandate, the DOE completed the following key activities in FY 2011:

Information-Education-Communication Campaign

a. Bright Now: Do Right. Be Bright. Campaign

In December 1, 2011, DOE in partnership with the Philippine Information Agency spearheaded the coordination and execution for the unveiling of the new campaign dubbed as *Bright Now: Do Right. Be Bright*. Said campaign was launched in line with the Department's celebration of the National Energy Consciousness Month. The campaign aims to educate and empower Filipinos to be smart energy users.

The DOE is expected to conduct a nationwide Bright Now! Caravan to promote the new campaign of the department. The communication campaign for this new branding is set to be launched in 2012.

b. National Training-Workshop on Energy Efficiency and Conservation

The DOE through the Energy Efficiency and Conservation Division (EECD) in cooperation with the Development Academy of the Philippines (DAP) was able to finish 15 sessions of the National Training-Workshop on Energy Efficiency and Conservation held in key cities around the country with over 1,500 participants from industrial, commercial, transport, power sectors, and academe, among others.

Below are the venues for the National Training-Workshop:

1) February 17-18, 2011: Crown Galleria Plaza, Pasig City
2) March 2-3, 2011: Grand Men Seng Hotel, Davao City
3) March 16-17, 2011: Dynasty Court Hotel, Cagayan De Oro
4) March 30-31, 2011: Almont Inland Hotel, Butuan City
5) April 13-14, 2011: Bethel Guest House, Dumaguete City
6) April 27-28, 2011: Burnham Suites, Baguio City
7) May 11-12, 2011: L'Fisher Hotel, Bacolod City
8) May 25-26, 2011: Sarabia Manor Hotel, Iloilo City
9) June 8-9, 2011: Naga City
10) June 22-23, 2011: Cebu City
11) July 13-14, 2011: La Union
12) July 27-28, 2011: Angeles, Pampanga
13) August 10-11, 2011: Subic Holiday Villas, Subic Bay Freeport Zone
14) August 24-25, 2011: Island Cove Hotel and Leisure Park, Kawit, Cavite
15) September 7-8, 2011: Splash Mountain Resort, Los Baños, Laguna

c. Other IEC Activities

EECD staff served as resource speakers/lecturers in a total of 63 activities including forum, workshops, seminars, etc., that benefited around 3,900 participants from the government, private and transport sectors, households, academe, among others.

Government Energy Management Program

Another program being implemented by DOE is the Government Energy Management Program (GEMP), which is aimed at reducing the monthly consumption of electricity and

transport petroleum products by all government offices by at least 10 percent as embodied for compliance under Administrative Orders 103, 110, 110-A, 126 and 183.

Government offices have to submit their monthly fuel and electricity report to the DOE for consolidation of EECD. Currently, there are 590 government offices submitting their monthly report to EECD. Based on the consolidated reports of EECD, a total of PhP1.8 billion savings were obtained from September 2005 to December 2011. This is equivalent to around 206,931,528 kWh and 7,171,573.37 liters savings in electricity and fuel, respectively.

Energy Management Service / Energy Audit

Energy audit is a technical service provided for a fee by the DOE to manufacturing plants, commercial buildings and other energy-intensive companies. A team of engineers from the Department evaluate the energy utilization efficiencies of equipment, processes and operations of these companies and recommend energy efficiency and conservation measures to attain energy savings.

Energy audit services of the Department help companies or establishments determine their energy use patterns and identify energy conservation in all energy-consuming sectors (continuing program).

In 2011, eight (**8**) buildings were audited by the EECD team, namely: Sunlife Financial Inc., Dunlop, San Carlos Seminary, Hotel del Rio, UP Diliman Quezon Hall, UP Technology Management Center, La Salle Greenhills, The Whart, and Tranco.

Recognition Award: The Don Emilio Abello Energy Efficiency Award

The DOE recognizes the importance of the active participation of the private sector in its EE&C initiatives. To encourage this, DOE together with its partner organizations, organize the annual Don Emilio Energy Efficiency Awards (DEAEEA) to give recognition to companies with significant energy savings achieved through the implementation of energy efficient technologies and measures. The much coveted award was named after Don Emilio Abello who is the Father of Enercon Movement in the Philippines and the brainchild of the Philippine Enercon Program. This recognition long started in 1982, a year after the demise of the Enercon Movement Chairman in 1981.

In 2011, 59 industrial and commercial establishments, 33 energy managers and two (2) power-generating plants received honours for their significant contribution in the government's energy efficiency and conservation (EE&C) initiatives at the annual Don Emilio Abello Energy Efficiency Awards (DEAEEA) held at the Meralco Multipurpose Hall, Ortigas Avenue, Pasig City on December 6, 2011.

This year resulted in an aggregate savings of around 92 million liters of oil equivalent (LOE) corresponding to 3.6 billion pesos or avoidance of 148,000 metric tons of carbon dioxide.

From the winners of 2010 DEAEEA, the DOE through EECD then evaluated nominees for the 2011 ASEAN Best Practices Competition Award for Energy Management in Industry and Building held in Brunei Darussalam**.** Five (5) out of the 10 Philippine entries bested other nominees from other ASEAN countries and were hailed as winners and runners up in the competition.

Philippine Energy Efficiency Project

The EECD is the primary unit in charge with the implementation of the Philippine Energy Efficiency Project (PEEP), which aims to demonstrate the societal benefits of implementing

EE&C projects in the commercial, residential and public sectors resulting in the reduction of both the demand for electricity and the emission of greenhouse gases.

PEEP has three key components such as: 1) Energy Efficiency in Government Buildings; 2) Efficiency Initiatives in Buildings and Industries; and, 3) Communication and Social Mobilization. The project involves the retrofitting of 35 government office buildings; replacement of incandescent bulbs with energy efficient compact fluorescent lamps (CFLs) in the residential sector out of the 5million CFLs procured in 2010; installation of 223 LED Solar Home System, a Lamp Waste Management Facility; replacement of incandescent traffic lamps with Light-Emitting Diode (LED) in 159 traffic lights intersection, retrofitting of more than 3,000 inefficient lamps with energy efficient lighting system in Burnham Park and Wright Park in Baguio City and Public street lighting in major roads in Cagayan De Oro City.

With these, the government is expected to obtain 313 Gigawatt-hours (Gwh) savings on electricity equivalent to PhP 1.2 billion annually, 10 to 20 percent reduction in the overall energy consumption in retrofitted government office buildings and an annual emission avoidance of 169,000 tons of CO_2.

The budget of PEEP is US $ 46.5 Million of which $31 Million is funded from an ADB loan, $1.5 Million from an ADB grant, and $14 Million is the counterpart fund from the Philippine government. The International Institute for Energy Conservation (IIEC) was contracted in March 2010 to serve as Project Implementation Support (PIS).

Herewith below are the major project developments under PEEP for FY 2011:
(Note: Most of the project components herein reported are all completed in the first quarter of 2012)

a. Energy Efficiency in Government Buildings

i. Retrofit of Government Office Buildings

The goal of this component is to reduce energy wastage in government office buildings due to inefficient lighting equipment. Older model fluorescent lamps, incandescent bulbs and inefficient magnetic ballasts will be replaced by energy efficient alternatives – new T5 fluorescent lamps, CFLs and electronic ballasts, respectively. This component is consistent with Administrative Order No. 183, which mandates all Government departments, bureaus, offices, agencies and instrumentalities to use Energy Efficient Lighting Systems (EELs) in order to reduce energy consumption by a minimum of 10% relative to 2005 figures.

Accomplishments: As of December 2011, 10 out of the 35 government buildings targeted for retrofitting under PEEP were validated to be completed while the rest are still ongoing. The completed buildings are the following: National Dairy Authority, Securities and Exchange Commission, National Housing Authority, Philippine Information Agency, Department of Environment and Natural Resources, Environmental Management Bureau, Philippine Institute of Volcanology and Seismology, National Telecommunications Commission, Mines and Geosciences Bureau, and National Food Authority. Based on the contract with the service provider, the completion date of this component is on January 31, 2012.

ii. Nationwide Residential Lighting Program

The objective of this component is to reduce energy peak demand by replacing inefficient incandescent bulbs with efficient CFLs in the residential sector. The tasks under this component include: distribution of CFLs to eligible consumers in Metro Manila and to

participating distribution utilities (DUs) and Electric Cooperatives (ECs) nationwide; collection, recording and storage of incandescent bulbs (IBs); and disposal of the IBs.

For the Light Emitting Diode (LED) for Off-Grid Household component, the objective is to evaluate the use of LED lights in place of kerosene, candles and other non-electric alternatives. The tasks under this component include the procurement of a variety of LEDs for general lighting, distribution through identified channels, the conduct of customer satisfaction surveys and reporting.

Accomplishments: Lot 1: At the end of 2011, 2,554,605 CFLs were distributed in Metro Manila, Bulacan and some areas in CALABARZON while 150,400 were allotted for beneficiaries of the National Housing Authority, Department of Social Welfare and Development and DOE.

Meanwhile, 1,640,289 CFLs were also shipped to Mindanao through 33 Electric Cooperatives and two (2) DUs for distribution in 2010 that ended in December 2011. Also, 224,370 CFLs were distributed to large distribution utilities in Visayas and Mindanao.

A total of 4,569,664 CFLs were distributed under Lot 1 with remaining 430,336 still for distribution. As for the disposal of the collected incandescent bulbs, the process of procuring the service provider in Visayas and Mindanao is ongoing.

Lot 2: As for the CFL distribution to district and party-list representatives, bid documents were finalized for the procurement and delivery of 3.6 million CFLs. Invitation to bid was published and consequently, the first pre-bid conference was held on December 14, 2011 at Department of Budget and Management-Procurement Service.

As of December 2011, 91 copies of the Memorandum of Agreement between the DOE and the 285 district and party-list representatives were signed.

Moreover, the financial evaluation for the LED for off-grid Households in Palawan, Antique and Davao del Norte is ongoing. Two hundred twenty-three (223) households will benefit from this subcomponent.

iii. Public Lighting Retrofit Program

This component aims to demonstrate energy savings through the adoption of efficient lighting technologies for public lighting. It also strives to promote compliance with the Roadway Lighting Guidelines to standardize the specifications for public lighting nationwide. This component will target the cities of Baguio and Cagayan de Oro. Included in the project scope are: 1) demonstration of a range of EE technologies in public lighting; 2) replacement of mercury vapour lamps and fluorescent tube lights (FTLs) with high pressure sodium vapour lamps for street lighting; and, 3) the replacement of IBs in existing traffic lights with LEDs.

Accomplishments: Both retrofitting of public park lighting in Baguio City and street lighting in Cagayan de Oro were completed in 2011.

The public lighting in Baguio was inaugurated on August 19, 2011 at Burnham Park attended by His Excellency President Benigno S. Aquino III. It has potential savings of 193,446 kWh per year equivalent to PhP 2.93 million annual cost savings and reduction of 87.0507 tons of CO_2.

Meanwhile, the retrofitting of street lighting in Cagayan de Oro has potential energy savings of 900,720 kWh per year equivalent to PhP 9 Million annual cost savings and reduction of 405.324 tons of CO_2.

For the retrofitting of 159 traffic light intersections with LEDs in Metro Manila, the contract was awarded to DY Infotech Innovation Corporation signed on November 8, 2011. This subcomponent is expected to result in the savings of 1,572,507 kWh per year equivalent to PhP 15.72 million and reduction of 707.628 tons of CO_2.

b. Efficiency Initiatives in Buildings and Industries

i. Super ESCO

The PEEP is establishing a Super-Energy Service Company (ESCO), to overcome the barriers to the implementation of Energy Efficiency projects in the public and private sectors. The principal objective of this component is to draw upon the vast experience of the project team to provide the technical assistance and support to the Super-ESCO to enable it to implement ESCO projects in the public sector and facilitate the creation of a sustainable market for private sector ESCO Operations.

Status: This component was cancelled in April 2011. The fund allocated for this sub-component was allocated to fund retrofitting of 100 additional government buildings under Component 1 and retrofitting of additional 88 public traffic light intersections in Metro Manila. Thus, total government building proponents would be about 135 and total traffic light intersection for retrofitting is 247.

ii. Efficient Building Initiative

The goal of this component is to reduce energy consumption and greenhouse gas emissions in the building sector in the Philippines through a unified Green Building Certification System. This component will accelerate the implementation of the building rating system by streamlining existing initiatives into a single nascent system. The expected output of this subcomponent is the development of software for BERDE rating system and the certification of 10 buildings by March 2013.

Accomplishments: After the bidding procedures, the Philippine Green Building Council (PHILGBC) emerged as the most qualified organization to serve as DOE's partner for the development and implementation of Efficient Building Rating System. The contract was awarded to PHILGBC in September 2011. A Memorandum of agreement between DOE and PHILGBC was also signed on December 8, 2011.

Other Activities

a. DOE-JICA Development Study On EE&C For The Philippines

In 2011, the DOE through EECD forged an agreement with the Japan International Cooperation Agency for the conduct of the Development Study on Energy Efficiency and Conservation for the Philippines.

To strengthen all these efforts, DOE is now working towards the institutionalization of the EE&C measures in the country by drafting the Energy Efficiency and Conservation (Enercon) Bill. The passage of the Enercon Bill will set the pace for a stronger and more holistic EE&C program in the Philippines with the active involvement of other government organizations and the private sector.

As of December 2011, JICA study team completed four missions and is scheduled to go back to the Philippines for the fifth and last mission in January 2012. Stakeholders meeting were held to obtain recommendations and pertinent inputs from concerned agencies. As a result, the proposed bill has gained the endorsements of Congresswoman Maria Evita Arago and Senator Teofisto Guingona III. Further, the bill was presented to the Energy Committee of the House of Representatives chaired by Congresswoman Henedina Abad in November 2011.

b. Memorandum Of Understanding with the International Copper Association Southeast Asia (ICASA) and the United Nation Environment Programme (UNEP)

A Memorandum of Understanding was forged between DOE and the International Copper Association Southeast Asia, which involves the conduct of the Baseline Market Study on Air Conditioning Use in Government Agencies and Government-Owned and Controlled Corporations (GOCCs) in Metro Manila. This was signed on May 17, 2011.

The specific objective of the project is to study and disseminate acceptable and feasible financing options towards the replacement of old and inefficient room air conditioning units by or procurement of new and more efficient ones that meet or exceeds the new minimum energy standards among government offices and buildings.

Results of the study were presented during the October 4, 2011 Inception Workshop at Crowne Plaza Hotel, Ortigas Avenue, Pasig City. In 2012, government buildings will be selected for the installation of new and efficient air conditioning units as part of the validating procedure for the study.

c. Promotion Of Energy Efficiency And Conservation In South East Asia Project (ASEAN PROMEEC) for the Philippines with The Asean Center For Energy (ACE) and The Energy Conservation Center Of Japan (ECCJ)

The DOE, in cooperation with ACE and ECCJ, is implementing the ASEAN PROMEEC for the Philippines with the following objectives: 1) to determine through conduct of surveys the actual status of energy efficiency and conservation (EE&C) implementation; 2) to identify barriers to the implementation of EE&C; and 3) to formulate measures to improve EE&C practices. The project also aims to develop skills that will be instrumental in improving the implementation of EE&C in the commercial and industrial sectors.

Forty-nine (49) participants from commercial and industrial establishments attended the PROMEEC Seminar for Major Industry on October 14, 2011 at the Makati Palace Hotel in Makati City.

Part of this activity is the conduct of energy audit training attended by representatives from DOE Luzon and Visayas Field Offices. An energy audit was likewise conducted at Fuji Electric Philippines and Amherst Laboratories on October 10 to 13, 2011 aimed at assessing the application of energy conservation technologies in their respective sites requiring energy efficiency improvement.

d. Joint United Nations Industrial Development Organization-Department of Energy-Department of Trade And Industry Industrial Energy Efficiency Project

On March 25, 2011, the United Nations Industrial Development Organization granted funds for the Industrial Energy Efficiency Project for the Philippines to be implemented by DOE through EECD and DTI-Bureau of Product Standards.

This project aims to introduce ISO 50001 Energy Management Standard framework and system optimization approach for improvement of industrial energy efficiency; to enhance financing capacity in support for industrial energy efficiency project; and, to address institutional and technical barriers through capacity building interventions and support on demonstration projects.

As of December 2011, UNIDO has hired personnel for the Project Management Unit and housed them within DOE office. A project manager was likewise selected from a pool of applicants interviewed last year.

e. EECD Strategic Planning Workshop

EECD conducted its Strategic Planning Workshop on June 14 to 16 at Island Cove Resort, which resulted in the crafting of the Division's Work and Financial Plan for the second semester of 2011. EECD likewise formulated its mission, vision and values that are significant in the accomplishment of its mandate.

Way Forward

1. Implementation of the joint UNIDO-DOE-DTI Industrial Energy Efficiency Project
2. Finalization of the Enercon Bill
3. Nationwide Bright Now! campaign caravan
4. Validation of ICASEA Study
5. APEC Peer Review on Energy Efficiency on February 6 to 10, 2012
6. Develop energy benchmark for the commercial and government buildings and the manufacturing industry sectors
7. Enhance Standard and Labeling program through product testing and research of the DOE's lighting and appliance testing laboratory and to consider accreditation of private testing laboratories and to encourage private sectors/entities participation to move investment in this new business industry area.
8. Intensify promotion of heat rate improvement in power plants
9. Establishment of energy labels for all new vehicles regarding the fuel mileage rating
10. Expand promotion of the Energy Efficiency and Conservation Program and Energy Consumption Monitoring in large seaborne vessels such as passenger and cargo ships; power generation plants; and power distribution utilities.

d) Financial resources and budget allocation

The annual budgetary requirement of the DOE in the promotion of energy efficiency and conservation increased from Php 12 million pesos (USD 279,000) in 2012 to Php 25 million pesos (USD 581,000) in 2013. The significant increase was attributed to the dynamic intervention of the government to reach a wider numbers of energy users to inculcate the good values formations, best practices and technological development update.

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 formulation. The Department of Energy-Energy Utilization Management Bureau (Energy Efficiency and Conservation Division) (DOE EUMB-EECD) has the duty to implement

monitoring and reporting system. The following are government-initiated activities aimed at monitoring the energy consumption as well as reportorial compliance :

- 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 future Vehicle Labelling Program.

f) Expected results

For FY 2012, the following are the expected major results of energy efficiency programs of the DOE at the end of this year:

- To be able to meet revised target of 313 Gwh of electricity saving under the Philippine Energy Efficiency Project (PEEP) by 2013.
- To post a savings of more than PHP 1.6 billion (USD 32 million), based on FY 2011 results of the recognition award program (Don Emilio Abello Energy Efficiency Award.
- To increase promotion of EE&C awareness campaign in major energy demand sectors such in the commercial, industrial, household, transport and power sectors.

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);
- 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 rating system through energy efficiency concepts and the development of appropriate policy framework;
- Develop and submit to the 15th Philippine Congress proposed Philippine energy conservation policy or Enercon Bill;
- Develop web-based energy consumption database monitoring system to monitor energy consumption and annual energy conservation programs of all demand sectors consuming more than 500,000 liters of oil equivalent annually or 2 million Kwh of electricity and these include industrial, commercial, government buildings, power, transport and Medium size Enterprises (MEs) sectors.

1.3. Institutional Structure

a) Name of organisation

The Department of Energy as a National Government Agency (NGA) was created by virtue of Republic Act 7638 or the Department of Energy Act of 1992. The Department's mandate is to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the Government relative to energy exploration, development, utilization, distribution and conservation thereof.

Moreover, pursuant to Republic Act 9136 otherwise known as the Electric Power Industry Reform Act of 2001, in addition to DOE's existing powers and functions, its mandate has been expanded to include supervision over the restructuring of the electricity industry, thereby amending its powers and functions. However, relative to reforms on energy efficiency and conservation, herewith are some of the applicable Sections and as quoted as follows: ***Sec. 37(a)*** *Formulate policies for the planning and implementation of a comprehensive program for the efficient supply and economical use of energy consistent with the approved national economic plan and with policies on environmental protection and conservation and maintenance of ecological balance, and provide a mechanism for the integration, rationalization, and coordination of the various energy programs of the Government;* ***Sec. (d)*** *Ensure the reliability, quality and security of supply of electric power; and* ***Sec. (l)*** *Formulate and implement programs, including a system of providing incentives and penalties, for the judicious and efficient use of energy in all energy-consuming sectors of the economy.*

The Energy Efficiency & Conservation Division (EECD) under the Department of Energy-Energy Utilization Management Bureau has been mandated to formulate national policies, plans and programs related to energy efficiency and energy conservation. The Division's public services covers demand sectors that includes government buildings, industrial/manufacturing, commercial, residential, transport, agriculture and the power sectors. As such, EECD is the governments' focal coordinator for EE&C that implements the National Energy Efficiency and Conservation Program (NEECP). In addition, DOE has three regional offices, the DOE-Luzon Field Office, DOE-Vizayas Field Office and the DOE-Mindanao Field Office. These offices also implement energy efficiency and conservation programs in conjunction with the plans and programs of the EUMB-EECD.

b) Status of organisation

The DOE as one of the National Agencies under the Executive Department of the Office of the President of the Republic of the Philippines implement plans and programs pertaining to energy matters of the country.

In terms of manpower complement there is no more than 60 personnel which are directly involved in the implementation of energy efficiency and conservation. In the matter of promotion of energy efficiency and conservation program nationwide, the role and functions of the three (3) DOE field offices (Luzon Field Office, Vizayas Field Office and Mindanao Field Office) is crucial in attaining, the DOE as an organization, its overall national target goals. Reaching appropriate targets sectors in key cities around the country have been done through intensified awareness information, education and communication (IEC) campaign which is part and parcel of the target particulars drawn in the national energy efficiency execution plan of the country.

Moreover, to widen the reach of IEC campaign nationwide, the DOE tapped the services of other government offices such as the Philippine Information Agency (PIA), Development Academy of the Philippines (DAP) and the University of the Philippines-National Engineering Center (UP-NEC) to handle critical IEC matters targeting the household, industrial/manufacturing, commercial, transport, and power sectors.

Also, the DOE's umbrella organizations just like of the National Electrification Administration (NEA) support CFLs distribution in the island of Mindanao through its 33

member Electric Cooperatives (ECs). There are likewise two (2) other Private Distribution Utilities (PDUs) who voluntarily cooperated to similarly distribute CFLs in their franchise areas.

c) Roles and responsibilities

The following are the roles and responsibilities of the Energy Efficiency and Conservation Division:

1) Promote national energy efficiency and conservation awareness campaign program in all energy demand sectors;
2) Formulate policy recommendations on the promotion of energy efficient technology for adoption and application in the country and recommend incentives;
3) Develops and implement energy efficiency and conservation plans and programs for adoption and implementation by the government, industrial/manufacturing, commercial, residential, and transport sectors, and electric power industry.
4) Maintains and enhances computerized national energy database for the government, industrial/manufacturing, commercial, power, and the transport sectors.
5) Conduct sectoral performance monitoring and evaluation of energy consumers based on adopted/established parameters;
6) Develops and prepares energy utilization indices for the government, industrial/manufacturing, commercial, residential, power and transport sectors;
7) Conduct recognition program on best energy efficiency and conservation practices;
8) Promote Minimum Energy performance Standard (MEPS) in all energy consuming equipment and devices and enhance Energy Management Standard (EMS) system in the industrial and commercial and government building sectors.

d) Covered sectors

The sectors covered under the national Energy Efficiency and Conservation Program includes the household, commercial buildings, government buildings, industrial/manufacturing establishments, transport industry, and the power sectors.

e) Established date

The Energy Utilization Management Bureau-Energy Efficiency and Conservation Division (EUMB-EECD) has been established after upon the enactment of Republic Act 7638 of 1992 an act which created the Department of Energy.

f) Number of staff members

The EECD had a plantilla positions of eighteen 18 personnel. The EECDs' Organizational structure showed that it had two sections and these are the Energy Management and Consultancy Section (EMAS) and the Technology Promotion and Assessment Section (TPAS) with a personnel distribution of eight personnel per section.

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

a) Information collection and dissemination

General information about NEECP is readily available to the 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:Energy Efficiency Standards and Labelling Program* 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, school and industrial sectors; (c) energy efficient technology promotion in all demand sectors; and (d) provide tips for saving energy in all demand 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.

1.5. Research and Development in Energy Efficiency and Conservation

The Philippines has had very limited policy on research and development on energy efficiency and conservation. 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 is an example of an energy efficiency demonstration project which intended to promote efficient lighting system, including the establishment of a lamp waste management facility and promotion of Energy Service Companies (ESCOs), among others.

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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

The regular budget allocated for EECD include Maintenance and other Operating Expenses (MOOE) which is about Php 5 Million pesos. On the other hand, the Locally Funded Project (LFP) for FY 2012 had a budget approval of about Php 12 Million Pesos. However, for the FY 2013 budget, the new requested budget has been doubled to around Php 25 Million pesos.

Expected results

All of the policies indicated above are meant for wider IEC awareness campaign, project support implementation, 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

1) 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.
2) Guidelines on Energy Conserving Designs of Buildings (this guideline has been a referral code of the National Building Code).

b) Applicable sectors

For the Minimum Energy Performance Standard (MEPS) it applied only to selected home appliances such as window type air-conditioners, Refrigerators, and CFLs. Most of these are for household use.

For the Guidelines on the Energy Conserving Design In Buildings, it is applicable only to the Building Sector. The regulatory function and imposition as requirement rest to the Local Government Units through the City or Municipal Building Officials.

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

For the year 2011, the budget allocated is more than 1 million USD to complete the new appliance testing facilities which includes testing equipment which had a significant share and chunk of the entire allocated budget. The expansion of the facility shall include a new calorimeter room, and other testing area for lighting and household appliances.

Expected results

- Compliance by home appliance manufacturers and importers of Airconditioners, Refrigerators and Freezers, CFL and linear fluorescent lighting, among others;
- Compliance by the building designers and architects and users (consumers) of energy using equipment and devices;
- Compliance by the local government units (LGUs) in rehabilitating inefficient roadway lighting especially in parks and streets and/or passage of local ordinance

regulating issuances of building permits to comply with the provisions set forth on energy efficiency guidelines in buildings.

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, tax incentives is regulated by the Board of Investment-Investment Priority Plan (BOI-IPP) and limited only to the *Green Growth Projects*. However, in the early part of 2012, considerations were given to include for possible approval by the Office of the President some energy-efficient facilities as in the likes of District Cooling/Heating, Thermal Storage Plant Facility, Co-Generation facility, Smart-Grid, among others.

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, Asian development Banks as well as local banks.

2.4.2. Subsidies and Budgetary Measures

The DOE does not provide any financial subsidies to any private or even to other government entities for efficiency improvements or projects.

2.4.3. 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 DOE for Walk-through Audits are charge free 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 6,000–7,000). It is expected as a result an average energy saving of not less than Php 1 billion pesos (or USD 20 million) can be achieve.

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. The DOE cooperates in some major EE&C awareness raising program campaign with the Energy Practioners Assoication of the Philippines (ENPAP).

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. It includes 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.

Other cooperation were established between the DOE and JICA on the Development Study of Energy Efficiency and Conservation for the Philippines as well as technical cooperation between the DOE and the UNIDO-GEF on Philippine Industrial Energy Efficiency Project.

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. Moreover, 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).

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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).[18] Furthermore, in order to boost energy conservation, the strategy envisioned the USD 244–259

[18] ES2030, Appendix 2 "Indexes of energy security: Indexes of energy efficiency".

billion total budget for the period 2009–30, constituting about 10% of the overall ES2030 budget during the same period.[19]

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.[20]

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.[21]

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.[22]

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[23].

[19] 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".
[20] "Federal Program "Energy Conservation and Improvement of Efficient Efficiency for the period until 2020", (in Russian only), p.18.
[21] Ibid, p. 20 and p. 26.
[22] PEEREA report, p. 36.
[23] FP, p.21.

Transport

In accordance with the FP, due to the introduction of Western energy efficient technologies in the Russian domestic automobile production and overall improvement of energy efficiency in the transportation sector, total energy savings during 2011-2020 should reach 72.2 million tfe.[24] 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.[25]

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.[26]

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.

[24] FP, p. 23.
[25] Ibid, p. 25.
[26] Ibid, p. 22.

The program is to be implemented in two stages, 2011-2015 and 2016–2020. During the first stage, energy intensity of the Russian economy should decline by at least 7.4%, and by the end of the second stage, by 13.5%, which is the final EE target of the FP.

d) Financial resources and budget allocation

The financing for the first stage will reach 3.31 billion roubles and 5.527 billion roubles during the final stage of the program. The financing for the implementation of the FP is expected to come from federal and regional budget as well as the private (commercial) sector, totalling 8.837 trillion roubles[27] (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

[27] FP, p. 6.

program should help overcome negative development tendencies in the fuel and energy complex as well as the achievement of the targets listed in Section 1.2 of this report.

g) Future tasks

The FP envisions the following two key policy directions for the improvement of energy efficiency of the Russian economy: 1) the stimulation of various cross-sector processes and mechanisms encouraging the improvement of energy efficiency of the Russian economy, and 2) the realisation of the energy conservation projects by sectors to reach the energy saving potential of the Russian economy. To reach these goals, the program proposes such measures as:

1) Significantly increasing the share of renewable energy resources in the total energy consumption balance
2) Enhancing and coordinating federal, regional and municipal energy efficiency and energy saving programs
3) Establishing information dissemination, public awareness and promotion of education initiatives
4) Introducing various financial assistance measures for the promotion of the efficient use of energy and heat resources, and many others.

Additionally, a number of regional and local energy saving programs, which identify major energy saving and energy efficiency measures at a regional or municipal level and use regional or municipal budgetary resources for their implementation, have also been developed and put in effect to supplement the above-mentioned federal programs. Currently, several regions of the Russian Federation have already established or are currently establishing regional energy efficiency programs or initiatives.

In addition to above-mentioned measures and policies for the strengthening of the EE legal framework under the auspices of the FP, the Russian government has launched the following six pilot "Presidential EE projects" that are currently being implemented in several regions of the Russian Federation. Upon their successful completion, these projects are expected to be applied across all regions.

1) metering (installation of metering devices and automation)
2) EE in budget sector (piloting of energy performance contracting in schools and public buildings)
3) energy efficient district (targeting the residential sector)
4) energy efficient lighting (replacement of street lighting and other measures)
5) small-scale cogeneration
6) new energy sources (renewable and other, non-carbon, energy resources).

1.4. Institutional Structure

In the Russian Federation, legislative power is vested with the two-chamber Federal Assembly consisting of the State Duma (more powerful lower house) and the Federation Council (upper house). In addition, policy responsibility for energy efficiency actions varies between the levels of government, with the federal government holding the higher jurisdiction.

At the federal level, until May 2008, energy saving and energy efficiency policy was placed within the competence of the Federal Assembly. However, during the administrative restructuring of the Russian government in May–June 2008, the responsibility for energy policymaking and oversight was transferred from the Ministry of Economic Development and Trade (which was reorganised into the Ministry of Economic Development and a separate Ministry of Industry and Trade), the Ministry of Industry and Energy and the Federal Energy Agency to the newly established Ministry of Energy (Minenergo), currently headed by Sergey Shmatko.

Within the new Ministry of Energy, for the first time, the Department of the State Energy Policy and Energy Efficiency (currently headed by Mr. Sergei A. Mikhailov) was created to deal specifically with the issues and policies pertaining to energy saving and efficiency. In addition, in 2009, to facilitate policymaking and improve inter-government communication concerning energy saving and energy efficiency, two special intergovernmental groups were established. The first group, the commission on the fuel and energy complex, is located at the prime minister's office and headed by Minister of Energy Sergey Shmatko. It is engaged in legal aspects and institutional structures, as well as preparing and monitoring the National Program. The second group, the Expert Group on energy efficiency within the Commission on Modernization and Technological Development of the Russian Economy, was established in May 2009. The Commission's Expert Group is located at the president's office and is headed by President Dmitry Medvedev himself. It holds regular monthly meetings and is engaged in the coordination of federal, regional, and municipal projects and initiatives, as well as choosing and funding the most innovative projects in energy efficiency and renewable energy that can be implemented within the Russian Federation.

At the government level, the responsibility for the state energy policy, including energy saving and energy efficiency, is also shared by the Ministry of Regional Development, the Ministry of Natural Resources and Ecology, the Ministry of Finance, the Ministry of Agriculture, the State Atomic Energy Corporation "Rosatom", the Federal Tariff Service, and other agencies. At the level of the Russian constituent entities, the relevant functions are performed by the regional legislative and executive bodies.

Furthermore, on December 22, 2009, the government established the "Russian [Federal] Energy Agency" (hereafter REA) within the Ministry of Energy. The REA currently has 70 regional branches. Its key tasks currently focus on operating the federal EE and energy saving information system; administering, monitoring, and coordinating efforts for the effective implementation of the EE law, the FTP, and other measures for the improvement of EE and energy conservation efforts in the budgetary, power generation, industrial, and residential sectors of the Russian economy.

In addition to governmental organisations, there are several energy efficiency centres operating under different external supporting programs in the Russian Federation. Some of the largest are: the Center for Energy Efficiency (CENEF), Center for Energy Policy, AcademEnergoServis, Institute for Energy Policy, RusDem, ESCO Negawatt, Rus Esco, 3E, Energo Servis and regional centers for energy efficiency with the major located in Kaliningrad, Murmansk, Kola, Karelia, and Ekaterinburg.

In order to improve policy coordination at different levels, a number of Coordination Councils for the realisation of energy saving and energy efficiency policies have been established in Russian regions and municipalities. Energy saving and energy efficiency issues and policies have been addressed by energy service organisations and associations, as well as by energy producer and end-user economic entities at the regional and municipal levels. The majority of the Russian constituent entities have relevant energy saving management infrastructures (in 2007 there were 75 centres and agencies and 24 energy saving foundations).[28] 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

[28] Ibid, p. 19.

The Ministry of Energy of the Russian Federation; its official website is available in Russian only at http://minenergo.gov.ru/.

b) Status of organisation

The Ministry of Energy is a Federal governmental body within the legal branch of the Russian government. In accordance with the administrative reform of May 2008, it replaced the Federal Energy Agency and the Ministry of Industry and Energy. The ministry reports to the executive branch of the Russian Federation, the prime minister's office and the Russian president.

c) Roles and responsibilities

The ministry is responsible for design, realisation, and oversight of the state energy policy and legal framework of the Russian energy structure, particularly in the oil and gas, power generation, coal, renewable energy sectors as well as in the area of energy efficiency, saving and transportation.

d) Covered sectors

The Ministry's Department of the State Energy Policy and Energy Efficiency covers all sectors of the Russian economy.

e) Established date

In May 2008, the Ministry of Energy replaced the old Ministry of Industry and Energy and the Federal Energy Agency.

f) Number of staff members

No information available

Russian Energy Agency

Important step in implementation of the Russian energy efficient programme was establishment 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.)[29]

[29] 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.[30]

[30] 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).

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SINGAPORE

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

In its Sustainable Singapore Blueprint (April 2009), Singapore has set a target of achieving a 35% energy intensity improvement from 2005 levels 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[31].

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

Energy efficiency is applicable to most sectors of Singapore economy, but emphasis is placed on its top five most energy intensive sectors: power generation, industry, transport, buildings, and households.[32]

c) Outline

- Power generation

The liberalisation of Singapore's energy market since 2000 has promoted competition in the electricity and gas markets by encouraging investments in more 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.

Industry is increasingly depoloying co-generation and tri-generation technologies into ongoing and future developmental plans.

Power Grid System

The Energy Market Authority (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 success of the IES pilot project will enable the adoption and roll-out of workable solutions for Singapore's power system, thereby enhancing its efficiency and resilience of Singapore's energy system as a whole. The pilot comprises two phases: Phase 1 which focuses on the development of the enabling smart grid infrastructure has been completed. Phase 2 to test and evaluate smart grid applications for consumers is expected to start in the first half of 2012. For phase 2, about 4,000 smart meters will be installed for commercial and

[31] Ministry of National Development (2009).
[32] Ministry of National Development (2009); Energy Market Authority (2007).

industrial consumers and households. For commercial and industrial consumers, which make up the bulk of Singapore's electricity consumption, applications to be tested include:

1. A demand response programme where they can work with service companies to reduce their electricity consumption in event of high prices. This will allow them to save on electricity costs when prices are high.
2. Building owners and industrial consumers can install or upgrade their Energy Management System for integration with the IES infrastructure. This will provide them with timely access to information for businesses to optimise and reduce their electricity consumption to achieve better energy efficiency.
3. Time-of-use pricing scheme will be introduced to some commercial and industrial consumers to assess whether pricing signals can encourage reduction in their peak load consumption.

Households participating in this trial will receive convenient in-home display units which will enable them to monitor their energy consumption on a real-time basis to achieve savings in their electricity bills.

- Industry

  Energy efficiency in the industrial sector leads to higher productivity and greater profitability. A variety of assistance schemes and grants have been implemented to drive energy efficiency improvements in the industrial sector.

  - The Energy Efficiency Improvement Assistance Scheme (EASe)
    - EASe provides up to 50% funding for companies to engage the services of an Energy Services Company to carry out detailed energy assessments of buildings and industrial facilities.
  - Grant for Energy Efficient Technologies (GREET)
    - GREET provides co-funding for energy efficiency retrofits, capped at SGD 4 million per project, to encourage owners and operators of industrial facilities to invest in energy efficient equipment or technologies.
  - 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, capped at SGD 600,000, to encourage investors in new facilities in Singapore to integrate energy and resource efficiency improvements into development plans early in the design stage.
  - 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.

- Transport

  As the transport sector accounts for a substantial and rapidly growing share of total energy use and carbon emissions, Singapore is promoting the use of public transportation 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. Other measures also include:

  - 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
  - Test-bedding new technologies such as the Diesel Particulate Filter (DPF), diesel-hybrid buses, electric cars
  - Developing 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.

- Buildings

  The Building and Construction Authority, a statutory board under the Ministry of National Development, is spearheading efforts to drive energy efficiency improvements in the building sector. There are regulatory requirements implemented, such as the building envelope thermal performance standard, which has been improvised since 1979 to ensure better energy efficiency performance in buildings. In recent years, energy-related regulations such as minimum energy efficiency for cooling equipment and natural ventilation for all residential buildings have been introduced.

  In 2008, BCA established the Building Control (Environmental Sustainability) Regulations. This regulation sets out the minimum environmental sustainability standard for new buildings and the administrative requirements, which was largely adopted from the criteria under the BCA Green Mark Scheme. In 2009, the Singapore Government mandated that all new and existing public sector buildings would be required to meet the Green Mark Platinum and Gold^{PLUS} standards respectively by the year 2020.

  - 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 developed the Green Mark for Office Interior and Restaurants to support businesses in driving green initiatives within premises and has worked with other agencies like the Ministry of Education (MOE) to come up with the Green Mark for Existing Schools. BCA has also introduced the Green Mark for Existing Residential Buildings to recognise the eco-conscious efforts and initiatives by the Town Councils and managing agents in reducing the energy consumption and environmental footprint of their buildings.

Suite of Green Mark (GM) schemes that aims to shape the built environment in an integrated manner

GM Schemes - New Buildings
Residential Buildings
Non-Residential Buildings
Landed House
GM Schemes - Existing Buildings
Residential Buildings
Non-Residential Buildings
Schools
GM Schemes - Within Buildings
Office Interiors
Restaurants
GM Schemes - Beyond Buildings
New Parks
Existing Parks
Districts
Infrastructures
Rapid Transit System

- 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. Due to overwhelming response, the $20million fund has been fully committed in 2010. 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 was initiated in 2009. 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. A $5 million Green Mark Incentive Scheme (Design Prototype) was launched in 2011 to encourage both private and public developers to go beyond Green Mark Platinum rating and achieve 10% better energy efficiency than the level of Green Mark Platinum.

- Pilot Building Retrofit Energy Efficiency Financing (BREEF) Scheme

To help building owners overcome the first cost barrier, BCA has introduced a new pilot scheme called the Building Retrofit Energy Efficiency Financing (BREEF) where financial institutions provide loans to building owners and energy services companies for them to carry out building energy retrofits. This provides opportunities for financial institutions to diversify retail product lines.

- Public Sector Taking the Lead in Environmental Sustainability (PSTLES)

  The public sector is taking the lead in moving towards environmental sustainability for its buildings. Under this programme, public sector buildings will have to meet energy efficiency targets to reduce energy expenditure. New public sector buildings and existing public sector buildings undergoing major retrofitting works of an air-conditioned area with more than 5,000m^2 would need to attain Green Mark Platinum rating, and the existing public sector buildings with air-conditioned area more than 10,000m^2 are required to attain Green Mark Gold^{PLUS} rating by 2020. To spur environmental sustainability of strategic areas, four key growth areas in Singapore are required to meet Green Mark Platinum or Gold^{PLUS} standards as part of the Government Land Sales requirements.

- 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.

- Households

  - Mandatory Energy Labelling Scheme

    Under the Environmental Protection and Management Act, all household refrigerators, air conditioners and clothes dryers that are sold in Singapore must be affixed with an Energy Label. Minimum Energy Performance Standards (MEPS) for household refrigerators and air-conditioners were introduced in September 2011 to phase out the most energy inefficient models from the market.

d) Financial resources and budget allocation

- The Sustainable Energy Fund - SGD 28 million
- The EASe scheme - SGD 10 million
- The Green Mark Incentive Scheme for New Buildings - SGD 20 million
- The Green Mark Incentive Scheme for Existing Buildings – SGD 100 million
- GREET – SGD 46.8 million
- EASe – SGD 12.3 million
- The Green Mark Gross Floor Area Incentive Scheme
- The Sustainable Construction (SC) Capability Development Fund - SGD 15 million
- The Green Mark Incentive Scheme for Design Prototype (GMIS-DP) - SGD 5 million
- The Building Retrofit Energy Efficiency Financing (BREEF) Scheme
- The Smart Energy Challenge - SGD 25 million

(Note: Other funding in relation to R&D is stated in point 1.6)

e) Method for monitoring and measuring the effect of the measures

The various energy efficiency measures have differing methods for monitoring and measuring the effect of measures, and are used at the discretion of the government agencies implementing the programmes.

f) Expected results

-

g) Future task

-

1.4. Institutional Structure

Singapore takes a sectoral, yet integrated approach to energy efficiency. Although energy efficiency spans across many sectors, and government agencies have implemented energy efficiency programmes specific to the area under their purview, the Energy Efficiency Programme Office (E^2PO) was established to promote and facilitate the adoption of energy efficiency in Singapore.

E^2PO coordinates the energy efficiency efforts between the five biggest energy-consuming sectors – power generation, industries, transport, buildings and households. The E^2PO is a multi-agency committee co-chaired by the Energy Market Authority and National Environmental Agency. The key agencies involved are: (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. Other member agencies include: Infocomm Authority of Singapore (IDA) for ICT; Agency for Science, Technology and Research (A*STAR) for Research & Development; Urban Redevelopment Authority (URA); Jurong Town Corporation (JTC); and the National Research Foundation (NRF).

The E^2PO has identified four key thrusts in promoting energy efficiency strategy:

1. **Stimulate demand for energy efficiency** through regulation and standards, incentives and open information.

2. **Develop human and institutional capabilities** by developing local knowledge base and expertise in energy management and collaborating with Institutes of Higher Learning (IHLs)

3. **Promote emerging energy efficient technologies and innovation** through supporting the research development and demonstration of new energy efficient technologies, innovations and business process improvements

4. **Profile and promote energy efficiency internationally** through various platforms such as Singapore International Energy Week (SIEW).

1.5. Outreach and Capacity-building

a) Outreach programmes

- The 10% Energy Challenge was launched in April 2008 to raise the awareness of households on ways they can reduce energy consumption at home through simple

energy-saving tips. The campaign also includes raising public awareness in choosing energy efficient air-conditioners, refrigerators and clothes dryers.

- The Energy Efficiency National Partnership (EENP) programme, a key recommendation of the Sustainable Singapore Blueprint, was launched on 29 April 2010 to promote a culture of energy efficiency improvement in industry. The voluntary EENP programme targets companies that are interested in improving their energy efficiency and implementing energy management practices. The EENP comprises three key elements:

  i) Energy management system,

  ii) Learning network, and

  iii) Annual EENP Awards – recognise the efforts and achievements of corporations and corporate teams in improving energy efficiency, and aim to encourage corporate EENP Award recipients to share their EE projects and good practices on improving energy efficiency. The inaugural EENP Awards Ceremony was held in conjunction with the National Energy Efficiency Conference (NEEC) 2011 on 24 May 2011.

- 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 3rd Singapore Green Building Week was held in September 2011 and involved three major events – the International Green Building Conference, the Green Mark Tour and the Build Eco Xpo Asia. This forms a crucial part of BCA's public outreach activities to raise awareness on the need to provide a sustainable future for Singapore.

a) Capacity building

- Singapore Certified Energy Manager (SCEM) Programme & Training Grant

  The Singapore Certified Energy Manager (SCEM) Programme offers a formal training and certification system in the area of energy management. A training grant is available to support the training of local engineers and improve capability in professional energy management. The programme targets engineers who manage manufacturing facilities and buildings and provide energy services or engineering consulting services.

- The National Energy Efficiency Conference (NEEC), a key event of the EENP, brings together energy efficiency experts and industry energy professionals to provide thought leadership on energy efficiency and share best practices and success case stories. The inaugural NEEC 2011 was held on 24 and 25 May 2011.
- ESCO Accreditation Scheme

  The Energy Services Companies (ESCOs) Accreditation Scheme was introduced 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).

BCA has recently introduced a Certificate Course on "Measurement & Verification of Central Chilled-Water Plant Efficiency" to equip participants with the knowledge and skills required to implement Measurement and Verification (M&V) measures in central chilled-water plants in conformance with Green Mark version 4 and the relevant international standards.

- Executive Development and Degree 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 540 executives had been trained for the three 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.

1.6. Research and Development in Energy Efficiency and Conservation

In 2007, the Ministry of National Development (MND) Research Fund established a $50 million research fund for the Built Environment to support R&D efforts in green building technologies and energy efficiency.

To further harness multi-disciplinary research and development capabilities, Singapore 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.

As part of the inaugural Smart Energy Challenge (SEC) [33], launched in November 2009, the Energy Market Authority awarded Singapore-based companies a total of up to $10 million to fund & support the development of new energy technologies and solutions in three focus areas – Power Generation, Energy for Transport and Energy Efficiency for Industry.

2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1. Government Laws, Decrees, Acts

Energy efficiency is governed through a number of regulatory measures.

2.2. Regulatory Measures

Energy Labelling & Standards:

- Environmental Protection and Management Act (EPMA)
- 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.
- Minimum Energy Performance Standards for household air conditioners and refrigerators in September 2011

Vehicles:

- Vehicle Quota System (VQS) (see section 1.3 for details)
- Off-Peak Car scheme
- Electronic Road Pricing (ERP)
- Building Green Framework for Rapid Transit System (RTS) which specifically address and evaluate energy concerns and sustainable design efforts for RTS.

Buildings:

- Building Control (Environmental Sustainability) Regulations 2008
- Code for Environmental Sustainability of Buildings 2nd Edition
  - BCA Green Mark Scheme – New Buildings
- Code on Envelope Thermal Performance for Buildings 2008
- Mandatory Higher Green Mark Standard For Government Land Sales Sites In Key Strategic Areas

2.3. Voluntary Measures

Voluntary measures to drive energy efficiency improvements in Singapore include the BCA Green Mark Scheme, Green Label Scheme (SEC), Singapore carbon Label

[33] 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.

(SEC), Green Building Product Certification Scheme (SGBC), Green Office Label (SEC), public sector energy audits and others (see section 1.3 for details).

Financial Measures Taken by the Government

2.3.1. Tax Scheme

Investment Allowance (IA) Scheme and Accelerated Depreciation Allowance Scheme (see section 1.3 for details)

2.3.2. Low-Interest Loans

NA

2.3.3. Subsidies and Budgetary Measures

Subsidies available are: 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. (Note: The information was provided in earlier sections.)

2.4. Energy Pricing

As Singapore imports most of its energy, energy prices in Singapore are subject to volatility in regional and global energy prices. 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.

2.5. Other Efforts for Energy Efficiency Improvements

2.5.1. Cooperation with Non-Governmental Organisations (NGOs)

- Sustainable Energy Association of Singapore (SEAS) and the Institution of Engineers Singapore (IES) for the Singapore Certified Energy Manager Programme
- NEA is a member of the Renewable Energy and Energy Efficiency Partnership (REEEP)
- SGBC-BCA Green Individual Award recognises the contributions of professionals and individuals who have been leading the green building movement in Singapore.

2.5.2. Cooperation through Bilateral, Regional and Multilateral Schemes

Singapore actively participates in multilateral fora on energy, such as APEC Energy Working Group, ASEAN, and East Asia Summit (EAS) Energy Cooperation Task Force (ECTF).

2.5.3. 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 technologies, policies and exchange of best practices in energy efficiency and other aspects of sustainable development.

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CHINESE TAIPEI

1. GOALS FOR EFFICIENCY IMPROVEMENT[34]

1.1. Overall Energy Efficiency Improvement Goals

a) Goals

The goal is to improve energy efficiency by more than 2 % per annum, so that when compared with the level in 2005, energy intensity will decrease 20% by 2015. Supplemented by further technological breakthroughs and proper administrative measures, energy intensity will decrease 50% by 2025.

b) Base year

2005

c) Goal year

2015 and 2025

1.2. Sectoral Energy Efficiency Improvement Goals

a) Industry

Reform the industrial sector towards a high value-added and low energy intensive structure, so that its carbon intensity could reduce more than 30% by 2025.

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

Raise appliance efficiency standards by 10% to 70% in 2011. Further raise the efficiency standards in 2015 to promote high efficiency products.

d) Government

Reduce the energy use of governmental agencies and schools by 10% in 2015.

e) Base year

2008

f) Goal year

2025 (for industry), 2015 (for transport and government), 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

[34] BOE (2008A).

A number of measures have been introduced to achieve the energy efficiency goals.

- Raise power generation efficiency
- Replace coal-fired power plants with high-efficiency generating units (efficiency raised 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[35]
- 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

[35] BOE (2008B).

All sectors of the economy are covered.

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 12 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 160,000 kilolitres of oil equivalent, and energy efficiency increases of 25% for air-conditioners, 70% for refrigerators, 36% for hot-warm water drinking fountains, 16% for fluorescent Lamps with embedded ballasts, 20% for clothes washers, 5% for electric cookers, 15% for warm-hot water dispenser, 20% for dehumidifier, 50% for electric fans, 10% for electric pots, 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, transport, residential, commercial, energy, and government

d) Outline

The MEPS and efficiency standards for the following products will be raised:

- Private vehicles by 2015
- Fluorescent Lamps with embedded ballasts from 2010
- Compact fluorescent lamps from 2010
- Room air-conditioners and refrigerators from 2011
- Dehumidifiers from 2011
- Incandescent lamps from 2012

2.3. Voluntary Measures

a) Name

Energy 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, 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.

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THAILAND

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

Thailand has adopted the aspirational goal expressed by APEC leaders in 2007 of reducing the energy intensity of GDP 25% by 2030 (with base year 2005) and also in line with the ASEAN goal agreed to by ASEAN Energy Ministers to improve energy intensity by at least 8% by 2015 compared to 2005.

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

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

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

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

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

1.2. Sectoral Energy Efficiency Improvement Goals

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

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

1.3. Action Plans for Promoting Energy Efficiency

Thailand has the following strategic approach for promoting energy efficiency.

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

6. **Promote technology development and Innovations** to increase self-reliance and access to high-efficiency technology. R&D will be promoted to improve energy efficiency and reduce technological costs.

a) Objectives

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

1. To **set the energy conservation targets** in the short term (5 years) and long term (20 years), both at the national level and by energy-intensive economic sectors, i.e. transportation, industry, commercial and residential sectors.
2. To **lay down strategies, guidelines, measures and work plans promoting energy conservation** to serve as the framework for concerned agencies in formulating their respective action plans.

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

b) Applicable Sectors

All sectors, especially industry, transport and household

c) Outline

i. Industrial Sector

Thailand has established Energy Efficiency (hereafter EE) Improvement Program for the industrial sector to reduce energy demand and promote the efficient use of energy. Several major measures have still be carried on, such as a) promotion of energy management, b) EE loan program, c) tax incentives, d) technical assistance, e) standards and regulations, f) collaboration with major private corporations (firm commitment and top-down approach), and g) promotion of the energy service company (ESCO) business. Additional measures are: a) speeding up industry structural reform, b) EE awareness programs and campaigns, c) knowledge and information dissemination, d) capacity building programs, and e) competitions for best practices in energy conservation.

ii. Transport Sector

Thailand has established various energy efficiency measures in the transport sector for improving an end-use energy efficiency by better management and logistics such as: 1) promotion of gasohol to replace gasoline consumption by at least 10% (currently gasohol E10, E20 and E85 are available in the market); 2) promotion of biodiesel production (eight-year tax holidays and exemptions of import duties from major equipment); 3) natural gas for vehicles, or the use of Compressed Natural Gas (CNG), targeting to replace 14.6% of oil consumption in 2014 (with expected NG demand to increase from 229 MMSCFD (averaged Jan-Nov) in 2011 to 317 MMSCFD in 2014); and 4) establishment of tax measures to promote energy-saving vehicles (e.g. ECO cars and FFVs). PTT and the Ministry of Energy have put together a fund of THB

9,000 million, or USD 265 million to provide low-interest loans for conversion costs from LPG to NGV-engines for taxi and fleet corporations.

iii. Residential

Thailand has developed several measures to enhance the energy efficiency of households. Those measures are: 1) Minimum Energy Performance Standards (MEPS) for equipment (target 50, actual 11), 2) High Energy Performance Standards (HEPS) for equipment (target 54, actual 8), for example for air conditioners, refrigerators, ballasts, fluorescent lamps and compact fluorescent lamps, 3) energy labelling program for appliances and houses, 4) promotion of energy efficiency in home design, and 5) public awareness campaigns.

iv. Other Sectors

Factories and commercial buildings which have a peak demand of ≥ 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.

v. The 20-Year EEDP Milestones

Phase	Target Group	EE Target (at end of Phase)	Project/Work Plan
Immediate Term 2011-2012	○ Flood victims		○ Soft loans/Subsidy/ ESCO services ○ Change to high efficiency equipment/appliances
Short Term 2011-2016	○ Existing buildings/houses ○ Old industrial facilities ○ Transport (transportation efficiency) ○ Public services (Street lighting-billboards)	• Energy saving 5%, 14 ktoe • CO_2 reduction 27 M tons	○ Continue implementing projects proven successful (e.g. ESCO/DSM Bidding) ○ Promote high EE equipment, via tax and monetary measures ○ Strictly enforce the laws imposed on designated buildings/factories ○ Push through the Voluntary Agreement to enhance EE cooperation ○ Speed up capability building, awareness creation and change in energy consumption behavior
Medium Term 2011-2022	○ Transportation sector ○ Commercial buildings (newly constructed) ○ Industrial sector	• Energy saving 21,058 ktoe • CO_2 reduction 72 M tons	○ Enforce MEPs, HEPs, labeling for equipment/machinery ○ Develop EEC using Energy Foot Print in order to reduce energy use and CO_2 ○ Enforce energy conservation and CO_2 reduction in new buildings ○ Promote EE improvement in the production process
Long Term 2011-2030	○ Power generation sector ○ Transportation sector (Technology) ○ Industrial sector (Structural level)	• Energy saving 38,200 ktoe • CO_2 reduction 130 M tons	○ Structural reform to keep equilibrium between energy and economics ○ Structural reform of transport, e.g. using high EE transport systems ○ Improve EE of power plants and distribution systems

d) Financial resources and budget allocation

Government budget and ENCON Fund budget: approximately about THB 4,000 million/year

e) Method for monitoring and measuring effects of action plans

Methods for monitoring include energy consumption reporting, submission of energy conservation targets and plans of designated facilities, and analysis of energy consumption against energy benchmarks of individual sectors.

The outcomes of monitoring involve the evaluation of the overall achievement of individual projects and the strategic plan implementation after a specified time frame, the result of which will be used for improving and developing the strategic plan for another time frame. The main method used for monitoring and evaluation of the action plans is PMQA Method on the following activities: database creation, EE program evaluation, surveys, auditing, statistics (data gathering) benchmarking, diagnostics, end-use information, monitoring, trends analysis, potentials, and others. Several tools have been used together in order to do the monitoring. Those tools are databases, program evaluation, benchmarking, and information surveys.

The Department of Alternative Energy Development and Efficiency (DEDE) plays the major role in monitoring and reporting tasks for the industrial sector. Energy Policy and Planning Office (EPPO) monitors residential, transportation and government sectors. The outputs by monitoring are compiled in the annual government report, annual report of Energy Conservation Promotion Fund, and annual organisation report. Financial resources used for monitoring EE projects are allocated from ENCON Fund.

f) Expected results

In 2030, the accumulated final energy savings will be no less than 38,200 ktoe, which is worth THB 707 billion Baht. Also, the avoided CO_2 emissions will be about 130 M tons.

g) Future tasks

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

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

1.4. Institutional Structure

The following departments/entities under the Ministry of Energy of the Royal Thai Government deal with energy efficiency improvement:

- Energy Policy and Planning Office (EPPO) (policy maker) recommends economy-wide energy conservation policies, management and development plans; establishes energy conservation measures and the framework of energy conservation promotion budget allocation; and coordinates, follows up on and

evaluates the implementation outcome of the policies, management and development plans.

- Department of Alternative Energy Development and Efficiency (DEDE) (regulator/implementer) promotes, supports and monitors energy conservation activities; undertakes research and development for energy efficiency improvement; establishes regulations and standards and disseminates technologies related to production, processing, transportation and energy use efficiency; and follows up on and evaluates the implementation of energy efficiency improvement.
- Electricity Generating Authority of Thailand (EGAT) owns and operates various types of power generating plants located at 38 sites together with transmission and main distribution systems economy-wide. It has a unit called the DSM Office to promote energy conservation, especially in electrical appliances through standard and labelling schemes. EGAT is also a significant player in encouraging energy efficiency in major industries via ESCO programs.
- PTT Public Company Limited (PTT) is an integrated energy and petrochemical company, conducting its business as the economy's energy company and being listed on the Thai stock market. PTT also puts great emphasis on energy conservation and alternative fuels by conducting research and development together with supporting energy efficiency and alternative energy policies of the government.

Besides, the Energy Conservation Center of Thailand (ECCT), established in 1987 pursuant to a cabinet resolution as an agency to promote energy conservation activities in the economy, has provided technical expertise and services in energy conservation by working closely with DEDE.

a) Name of organisation

Central Institutions: The Energy Policy and Planning Office (EPPO) and the Department of Alternative Energy Development and Efficiency (DEDE) of the Ministry of Energy.

b) Status of organisation

EPPO—policymaker; DEDE—regulator/implementer

c) Roles and responsibilities

EPPO recommends economy-wide energy conservation policies, management and development plans; establishes energy conservation measures and the framework of energy conservation promotion budget allocation; R& D on EE policy/management-related issues; and coordinates, follows up on and evaluates the implementation outcome of the policies, management and development plans.

DEDE promotes, supports and monitors energy conservation activities; undertakes R&D for energy efficiency improvement; establishes regulations, standards and disseminate technologies related to production, processing, transportation, and energy use efficiency; and follows up on and evaluates the implementation of energy efficiency improvement.

d) Covered sectors

All sectors: industry (including agriculture), transport, residential, commercial, power, government, etc.

e) Established date

EPPO was established in 1992 (formerly, National Energy Policy Office (NEPO) under the Office of the Prime Minister). DEDE was established in 1953 (formerly, Department of Energy Development and Promotion (DEDP) under the Ministry of Science, Technology and Environment).

f) Number of staff members

EPPO—approximately 5 persons (responsible for EE); DEDE—approximately 136 persons (responsible for EE); in addition, Thailand has a regional or local institutional structure for energy efficiency improvements.

Regional Institutional Structure

a) Name

- Regional Energy Offices 1-12 under the Ministry of Energy
- Regional Center 1-10 under DEDE

b) Status of organisation

Regulator/implementer/information service

c) Roles and responsibilities

Regional Energy Office is responsible for energy policy coordination at the provincial level, safety standard inspection of gas stations and LPG retailers as well as promotion and dissemination of information about efficient use of energy, including renewable energy, in line with the government policy and measures.

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

d) Covered sectors

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

e) Established date

Regional Energy Office was established in October 2008

Regional Centre was established in December 2008

f) Number of staff members

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

g) Future tasks

Work along with other local authorities in energy matters and strengthen sustainable development of local communities.

In addition, the present government aspires to have the Local Administration Organizations (LAOs) act as focal points in creating and disseminating "energy-saving culture" via such target groups as children and juveniles, women (mostly housewives), and the aged, under the "Community Energy Volunteers" mechanism.

Workshops, meetings, and seminars are regularly organised by LAOs to disseminate government policy, targets, and action plans as well as to obtain feedback on the implementation of the plans and recommendations to improve future action plans.

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

a) Information collection and dissemination

Relevant information and public relations activities implemented by EPPO under the energy saving PR campaign, generally known as "Divide by Two (÷ 2)" campaign, as well as those carried out by DEDE and EGAT can be easily accessed by the general public and various media and have been used to reach every target group. Also, the information can be accessed via the website of the respective agencies.

b) Awareness-raising

Examples of these activities are: production of series of television commercials on energy saving methods and benefits to be gained; dissemination of energy conservation issues through various types of media—newspapers, magazines, energy talks via TV programs, etc.; energy mobile units undertaken by Regional Energy Offices; energy camps for students, plays and cultural shows based on energy conservation themes and the establishment of energy information centres to disseminate materials, posters, and other printed matter on issues related to energy conservation and renewable energy.

c) Capacity-building

The implementation of the *Strategic Management Program* under the ENCON Program includes:

1) Policy research and study to provide recommendations, options or situation overviews, comprising several dimensions, from the energy supply/demand to the economic, social and environmental impacts, to be an element for decision-making pertaining to the improvement of the Energy Efficiency Improvement Program or Renewable Energy Development Program so that the programs would be appropriate and correspond with the changing situations. The study outcomes could serve as a guiding tool for setting the work priorities and budget allocation.
2) Monitoring and management to ensure efficient and effective implementation of the Energy Conservation Program.
3) Special tasks to support and enhance the implementation that is of particular importance or urgency.

Additional capacity-building measures and policies aimed at the community include:

1) Development of curriculum, teaching/training materials, aiming to integrate the study of energy conservation and environment into the learning process so that energy conservation consciousness can be fostered among the young generation
2) Short-term projects/activities (e.g., school recycling banks, energy conservation competitions), aiming to increase participants' knowledge and understanding of energy conservation and to stimulate improvement in their energy consumption behaviour so that they could expand/share their experience and knowledge with their peer groups

3) Short-term HRD and technical visits abroad
4) Undergraduate and post-graduate scholarships—local and abroad
5) Provision of research funds to encourage students in public and private universities to seriously consider research on energy management, and energy efficiency and renewable energy technologies
6) Public awareness campaigns on energy saving.

1.6. Research and Development in Energy Efficiency and Conservation

The Thai government, via the ENCON Fund, has continuously supported research and development (R&D) work as part of the Energy Conservation Program of the economy. Each year, a budget of THB >100 million (USD 3 million) is allocated for funding R&D on energy conservation technologies, which can be accessed by academic institutions, research institutions of the public sector and those of the private sector that are non-profit-making. In the Fiscal Year 2011, a total of THB 107.8 million has been allocated for EPPO (100 million) and DEDE (7.8 million) for R&D on EE projects. In addition, there are research funds of about THB 5 million each year for postgraduate and Ph.D. levels. The R&D work under the Energy Conservation Program has to demonstrate its practical application in line with the short-term measures designed for EE improvements.

2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1. Government Laws, Decrees, Acts

a) Name

The Energy Conservation Promotion Act, B.E. 2535 (1992), as amended to No. 2, B.E. 2550 (2007)

b) Purpose

To enforce energy conservation, particularly in designated factories and buildings

c) Applicable sectors

Economy-wide (industry, commercial and government building sectors)

d) Outline

The NEPC is responsible for the promotion of energy conservation pursuant to the provisions specified in the ENCON Act and the management of the ENCON Fund. To assist the NEPC, the Energy Conservation Promotion Fund Committee has been established to be responsible for the management of the ENCON Fund and ensure that the allocations are made in compliance with the regulations stipulated in the Act. The Act stipulates duties of owners of designated factories/buildings with regard to energy conservation in their facilities and promotes the use of energy-efficient machinery or equipment as well as materials contributing to energy conservation. The Act also contains penalty clauses for those who violate or fail to comply with the Ministerial Regulations, issued under this Act.

e) Financial resources and budget allocation

The Energy Conservation Promotion Fund (ENCON Fund) has been established under the ENCON Act to serve as working capital, grants or subsidies for implementing in energy conservation programs in both public and private sectors, including energy efficiency improvement, renewable and alternative energy development, R&D projects, human resources development, public education and campaigns on energy conservation, and for the expenses for management and monitoring of the Energy Conservation Program. In FY 2011, THB 1,087 million has been allocated for the EE Improvement Program.

f) Expected results

Under the ENCON Program, Phase 3 (2008-2011), the target is to reduce energy consumption by 10.8% in 2011, compared with the BAU case.

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

2.2. Regulatory Measures

2.2.1. Minimum Energy Performance Standards and Labelling

Thailand has Minimum Energy Performance Standards (MEPS) for seven types of equipment – air-conditioners, refrigerators, double-capped fluorescent lamps, self-ballasted lamps, single-capped fluorescent lamps, LPG cooking stoves, and 3 phase motors.

In addition, the government introduced the Energy Efficiency Labelling No. 5 Programme (for further information, refer to Section 2.3. on voluntary measures).

2.2.2. Compulsory Energy Management Program for Designated Buildings and Factories

Buildings and factories with energy consumption ≥ 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, have to implement the energy management system in their facility according to the guideline under the Ministerial Regulation Prescribing Standards, Criteria and Energy Management Procedures in Designated Factories and Buildings, B.E. 2552 (2009). An energy management report which is preliminarily audited by a certified energy auditor has to be submitted to the Department of Alternative Energy Development and Efficiency (DEDE) within March of each year, starting from year 2010. The improvement of energy efficiency is expected to increase by around 5-10% from the implementation of this energy management system.

2.2.3 Building Energy Code (BEC)

A mandatory energy code has been set under the Ministerial Regulation Prescribing the Type or Size of Building and Standards, Criteria and Procedures for Designing Buildings for Energy Conservation, B.E. 2552 (2009), with the purpose to improve energy efficiency of the design and construction of new buildings which occupy area over 2,000 sq.m.. The code was set for major energy systems in the building, such as

building envelope, lighting, air-conditioning and heating, by promoting the concept of EE design as well as the utilization of high-efficient equipment and materials. Under the regulation, all new buildings have to comply with the codes before getting the construction permission. By implementing this program, it is expected to save energy around 10-20% from the code compliance buildings compared with the conventional design.

a) Name

Royal Decree on Designated Buildings, B.E. 2538 (1995), effective since 12 December 1995, and Royal Decree on Designated Factories, B.E. 2540 (1997), effective since 17 July 1997

b) Purpose

To improve energy efficiency of the design and construction of the new and existing buildings/factories

c) Applicable sectors

Industry and commercial, including government buildings

d) Outline

Under the ENCON Act (1992), the following two major regulations have been enacted:

- Royal Decree on Designated Buildings, B.E. 2538 (1995), effective since 12 December 1995, stipulating the characteristics of "designated" buildings (energy consumption ≥ 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.

In 2007, Thailand established another Energy Efficiency Labelling for non-appliances on voluntary basis which is responsible by DEDE.

2.4. Financial Measures Taken by the Government

Various measures have been introduced to boost energy efficiency improvement in the industrial sector, including tax incentives, revolving funds (soft loans), Demand Side Management by Bidding Mechanism, and investment promotion via the Board of Investment (BOI), to encourage energy efficiency improvement. These measures are sought to help achieve the energy saving target as follows (source: DEDE, Thailand, January 2010).

2.4.1. Tax Scheme

a) Name

Tax incentives (monitored by DEDE)

b) Purpose

To induce operators' decision-making to invest in the purchase of energy-efficient equipment/machinery as well as the promotion on EE business

c) Applicable sectors

Various sectors

d) Outline

e) Two schemes of tax incentives are offered as follows:

1) Investment in the purchase of energy-efficient equipment/machinery can be claimed for the additional 25% of purchasing cost for the deduction amount for the tax calculation in that year.
2)
3) (Terminated)
4) 2) A privilege from the Board of Investment for investors who invest in EE and RE business by receiving the waiver of income and import tax for a maximum of eight years.

f) Financial resources and budget allocation

ENCON Fund

g) Expected results

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

2.4.2. Low-Interest Loans

a) Name

Revolving funds or soft loans (monitored by DEDE)

b) Purpose

This measure is provided to stimulate and expedite energy efficiency investment in large buildings and factories.

c) Applicable sectors

Buildings and factories

d) Outline

Provide loans with 0% interest rate and 7-year final maturity to local commercial banks as an incentive to encourage the banks to lend money to RE/EE projects, including ESCO companies, at a maximum interest rate of 4%.

The maximum loan size is THB 50 million (USD 1.5 million) per project. The banks will manage all aspects of loans and report the project status to DEDE. DEDE will 1) ensure that the projects are genuinely energy-saving projects, not simply equipment replacement; 2) monitor the performance of the banks to ensure that they meet their targets in terms of projects, lending and repayment; and 3) evaluate the program to measure energy savings.

e) Financial resources and budget allocation

Launched in January 2003, with an initial budget of THB 2 billion (about USD 58.8 million) allocated from the ENCON Fund. Up to the present, almost THB 6 billion has been allocated to be soft loans.

f) Expected results

Since its introduction in 2003, the Fund has recruited 11 public and commercial participating banks and extended some USD 200 million loans via the banks in support of approximately 300 projects with about THB 7 billion (USD 206 million) aggregated project costs. The Fund has been successful in familiarising the participating banks with RE/EE business.

In addition, the Thai Government introduced the following loan scheme for households.

a) Name

Household Energy Credits

b) Purpose

To assist the general public who are interested in changing to use energy efficiency household electrical appliances, including the No. 5 energy-saving equipment and those items identified by the Ministry of Energy.

c) Applicable sectors

Residential (households)

d) Outline

Loans were provided via local financial institutions, without any interest rate (0%). A maximum loan for each household was THB 10,000, except for those who want to change to use energy-efficient air-conditioners for which the loan was at a maximum of THB 20,000. Program duration was May 2008 to September 2009.

e) Financial resources and budget allocation

Sponsored by the ENCON Fund with a budget of THB 1,000 million

f) Expected results

Approximate annual energy saving of 50 ktoe by 2011

2.4.3. Subsidies and Budgetary Measure

a) Name

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

b) Purpose

The initiative's main purpose is to provide financial support to encourage business operators to invest in higher energy efficiency machines and equipment. In addition, Demand Side Management by Bidding Mechanism, or DSM Bidding, offers financial support to private sector operators to encourage investment in improving the energy efficiency of their companies by replacing or retrofitting existing machines or equipment, thus reducing energy consumption.

c) Applicable sectors

Private industrial and commercial sectors

d) Outline

In accordance with the initiative, subsidies are granted based on actual energy saving achieved in a year resulting from such investment. The subsidy is defined as "annual energy saving x subsidy rate (as bid by each company)". With this bidding mechanism, proposals with lower weighted subsidy rate will be subsidised first. The weighted subsidy rate takes into account not only the bid rate but also the lifetime of such investment, i.e. how long the investment will result in energy saving.

The maximum subsidy rate set for each energy type is as shown in the table below.

Table 1: Subsidy rates

Energy Type	Maximum Subsidy Rate
Electricity	THB 1/kWh
Heat from liquid and gas fuels (fuel oil, LPG, natural gas, etc.)	THB 75/MMBtu
Heat from solid fuels (coal, wood, rice husks, sawdust, bagasses and other agricultural waste) **Heat from by-product fuels** (derived from the production process), e.g. black liquor, distillery slop	THB 15/MMBtu

e) Financial resources and budgetary allocation

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

Project duration: 2008-2012, via 8 bidding rounds (2008-2010)

f) Expected results

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

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

2.4.4. Other Incentives

In 2008, the Thai Government introduced a new initiative, the ESCO Venture Capital (monitored by DEDE). The ESCO Fund has been established as a source of venture capital for the investors to jointly invest between public and private operators in energy efficiency and renewable energy projects through various channels—venture capital, equity investment, equipment leasing, carbon market, technical assistance and credit guarantee facility. The Fund was launched in October 2008, with an initial capital of THB 500 million (about USD 14.7 million) targeted for potential investors; and as a pilot venture capital initiative to address the issue of lack of equity capital for small developers. The Fund provides equity capital up to 50% of total equity; and in the case of very small projects, provides its support through equipment leasing. The Fund has outsourced the identification and appraisal of projects to two entities, playing the role as Fund Managers (THB 250 million each for ECFT and E for E[36]). As of August 2010, the Fund has approved as many as 33 projects, with total co-investment of around THB 328 million from the ESCO Fund, including, for instance, solar firms, biomass power plants, gasification projects and lighting devices.

In addition, Thailand has a number of other supportive measures for SMEs and the residential sector (monitored by various organisations) which provide grants for SMEs for the replacement of existing production processes and technologies by proven high-efficiency ones. Some examples of energy efficiency improvement due to these measures include technological upgrades in the tobacco curing process, ceramic shuttle kilns, and Chinese sausage dryers.

2.5. Energy Pricing

The oil market in Thailand has been liberalised; thus, the pricing of crude oil and all petroleum products, except LPG and NGV, are based on international prices and the market mechanism.

Policy Purpose/Justification

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

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

Due to LPG price fixing by the government, coupled with oil price hikes in the recent past, LPG use has been increasing in the industrial and transport sectors and as feedstock in the petrochemical industry, resulting in a huge burden of subsidies by the Oil Fund. As for the NGV price, which has been fixed since 2005, the price adjustment is required so as to reduce the cost burden of the trader (PTT). Therefore,

[36] Energy Conservation Foundation of Thailand and Energy for Environment Foundation.

the government is trying to reduce subsidies for LPG and NGV to have the prices better reflect actual costs so that consumers will be given an accurate signal of energy prices and hence more efficient use of energy.

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

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

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

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

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

For naturally monopolistic businesses like electricity and natural gas, the government set the pricing policy and framework to be fair for both energy service providers and consumers, whereas the regulation of electricity tariffs and natural gas pricing and throughput fees are under the authority of the Energy Regulatory Commission (ERC) to ensure compliance with the government policy and framework.

2.6. Other Efforts for Energy Efficiency Improvements

2.6.1. Cooperation with Non-Government Organisations

Stand-alone PEA Renewable Energy and Energy Efficiency Project

PEA (Provincial Electricity Authority) is collaborating with the Forest Industry Organization (FIO) to invest in a pilot biomass power generation project using biomass residuals from FIO plantations as fuel source with a potential to scale up to about 100 sites (with an approximate total capacity of 100 MW) in the next five years, and associated transmission lines and substations. PEA also has a plan to improve energy efficiency of street lighting on highways throughout the economy with private participation of ESCO.

In addition, PEA has a Master Plan for Energy Conservation which focuses on: a) energy conservation projects for public and street lighting, b) energy efficiency for PEA buildings (air conditioning and lighting), and c) consulting services in energy management for PEA customers. PEA estimates a reduction in energy consumption of at least 300 GWh per year, equivalent to THB 750 million. The financing structure of the EE activities includes the following items: a) PPP scheme to finance EE street lighting, b) turn-key method for building retrofitting, and c) normal EE consultancy services for PEA customers. To implement this Master Plan, PEA has established a subsidiary (100% owned) named PEA ENCOM International. However, PEA informed that its wholly owned subsidiary, PEA ENCOM International, will be the entity to invest in the above-mentioned EE projects and not the PEA mother company.

2.6.2. Cooperation through Bilateral, Regional and Multilateral Schemes

Thailand has established close relationships in EE in the areas of capacity building and technical assistance with neighbouring economies, such as Lao PDR, Cambodia, Myanmar, Malaysia, and Viet Nam. Regarding multilateral and regional cooperation, Thailand, as ASEAN Chair in 2008, led ASEAN toward the leaders' aspiring goal of achieving 8% of EE improvement by 2015.

2.6.3. Other Cooperation/Efforts for Energy Efficiency Improvements

There is financial support from designated banks to support energy audit and investment in EE in university compounds, hospitals and public buildings through the ENCON Fund. Other EE programs also involve joint studies, R&D and promotional activities to enhance efficient use of energy in transportation, industrial and household sectors as well as capacity building and development of personnel dealing with EE improvement projects/activities through academic conferences, seminars, training, and technical visits, including scholarship granting to pursue further study at the bachelor, master and Ph.D. levels, through the ENCON Fund.

UNITED STATES

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1 Overall Energy Efficiency Improvement Goals

The United States has adopted the aspirational goal expressed by APEC leaders in 2007 of reducing the energy intensity of GDP 25% by 2030 (relative to 2005).

1.2 Sectoral Energy Efficiency Improvement Goals

The United States Department of Energy (DOE) has goals for the research, development and deployment (RD&D) of energy efficient technologies and practices.

1.2.1 Buildings

The energy used in residential and commercial buildings represents 40% of total US energy consumption. The Building Technologies Program (BTP) developed by the United States Department of Energy (DOE) aims to construct partnerships among industry, end users and other stakeholders to prioritize research, development and the deployment of energy efficient technologies. Innovations in energy efficiency for residential and commercial buildings, energy efficient appliances and lighting, alongside advances in renewable energy technologies could stabilize the total primary energy consumption by the buildings sector at levels well below current levels by 2025. BTP programs that are helping to reduce US energy demand include Building America, Better Buildings, Commercial Building Initiative, Commercial Building Energy Alliance, Energy Smart Schools and Hospitals, Energy Star and Home Energy Score, Energy Codes, and Appliance and Equipment Standards.

a) Residential

Building America, which is an industry-driven program, supports research to reduce energy consumption of new and existing homes. BTP will invest in whole-building strategies to reduce the energy consumption of new homes by 50% before 2020.

b) Commercial Buildings

DOE is developing integrated whole-building strategies to enable new commercial buildings to be designed, constructed, and operated to use up to 50% less energy before 2020, relative to the commercial building energy standard, ASHRAE Standard 90.1-2004. In November of 2010, U.S. Energy Secretary Steven Chu announced that $21 million will be awarded to help reduce energy consumption in commercial buildings. The goal is to achieve 30% energy savings in existing buildings and 50% savings in new projects.

1.2.3 Other Sectoral Goals

The industry sector currently accounts for more than 30% of the energy used nationwide. To substantially reduce energy use in this sector, the DOE now focuses on the development of new manufacturing processes and materials that use half the energy currently required. DOE also establishes voluntary agreements with industrial partners to reduce energy intensity (annual energy consumption per unit of physical output) 2.5% per year over 10 years.

According to the Energy Independence and Security Act of 2007, federal government buildings are required to reduce energy intensity (energy consumption per unit area of floor space) 30% by 2015 (relative to 2005).

1.3 Action Plans for Promoting Energy Efficiency

1.3.1 The United States Strategic Approach for Promoting Energy Efficiency

a) Objectives

Invest in the RD&D of energy efficient technologies. Support programs and development of best practices relating to energy efficiency implementation.

b) Applicable sectors

Industry, buildings, vehicles, and government

c) Outline

The US government has, over decades, supported the promotion of energy efficiency through legislation, regulation and dedicated funding. Earlier emphasis, in keeping with economy-wide economic practices, has been on leveraging the market system and the self-interest of decision makers, with occasional explicit efficiency requirements in selected sectors. More recently, with greater recognition of the economic, environmental and security benefits offered by energy efficiency, there has been a series of increasingly stringent energy efficiency targets and mandates, most often expressed by sector or technology. Financial incentives and funding levels have also grown.

d) Financial resources and budget allocation

For FY2012, the EERE budget for energy efficiency R&D programs totalled $821 million:

- Advanced Manufacturing: $115 million
- Building Technologies: 219 million
- Federal Energy Management Program: 30 million
- Vehicle Technologies: 329 million
- Weatherization and Intergovernmental Activities: 128 million

The numbers below represent the additional funding made available for EERE's energy efficiency programs from FY2009 – FY2013 through the American Recovery and Reinvestment Act:

- USD 46.2 million for high-efficiency solid-state lighting development and manufacturing
- USD 74.64 million for advanced energy-efficiency building technologies and commercial building training programs
- USD 21.73 million for the federal energy management program
- USD 160.1 million for industrial energy efficiency projects
- USD 47.01 million for information and communication technologies
- USD 2.8 billion for energy efficiency and conservation block grants
- USD 3.1 billion for state energy program
- USD 452.04 million for better buildings
- USD 4.98 billion for weatherization assistant program
- USD 106.06 million for heavy-duty truck and passenger vehicle efficiency
- USD 298.5 million for alternative fuelled vehicles pilot grant programs
- USD 1.99 billion for advanced battery and electric drive component manufacturing grants
- USD 386.23 million for transportation electrification projects
- USD 20.3 million for small business clean energy innovation projects

1.3.2 The National Action Plan for Energy Efficiency

a) Objectives

Boost energy efficiency through actions by participating organisations to overcome barriers to energy efficiency investment

b) Applicable sectors

Utilities, industry, NGOs, private and public sectors

c) Outline

The National Action Plan for Energy Efficiency was issued by the electric and gas utility industry and State regulators who see the need to increase energy efficiency and have the ability to do so. This Action Plan, facilitated by technical assistance from the US Department of Energy and US Environmental Protection Agency, aims to create a sustainable, aggressive commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organisations. Over 120 organisations, including leading electric and gas utilities, all three of their trade associations, many state regulators and governors, and the National Association of Regulatory Utility Commissioners have endorsed the Action Plan's five main recommendations and have pledged to take individual actions to carry them out.

The five main recommendations are:

1) Recognise energy efficiency (EE) as a high priority resource
2) Make a long-term commitment to implement cost-effective EE
3) Communicate benefits of EE
4) Fund programs to deliver EE
5) Align utility incentives with delivery of cost-effective EE.

d) Financial resources and budget allocation

Commitments by participating organisations are expressed as advocacy for priority and funding, communication/education, support for legislation, commitments to efficiency and procurement goals, and funding, among other commitments. Many of the participating organisations fund/operate energy efficiency programs within their spheres of influence.

e) Method for monitoring and measuring effects of action plans

Self-reporting by stakeholders

f) Expected results

Not quantified

g) Outputs of monitoring

Annual update describing accomplishments

h) Outcomes

The wide range of outcomes includes legislation, deployed efficiency, education, and increased funding

1.3.3 State and Local Energy Efficiency Action Network (SEE Action)

a) Objective

To help the states to achieve cost-effective energy efficiency improvements by 2020

b) Applicable Sectors

Buildings and industry

c) Outline

The goals of the program are as follows:

- Establish real-time metering systems that enable the user to access current usage and costs of their electricity
- Assist state and local governments in the development of energy efficiency policies and programs

- Removing barriers to energy savings
- Increase the investments in energy efficiency technologies
- Expansion of residential and commercial retrofits for existing buildings
- Reduction of industrial energy intensity and increased use of combined heat and power
- Innovative financing solutions
- Strengthened building codes and compliance plans
- Innovative methods of evaluation, measurement and verification

During 2011, SEE Action established eight working groups that focus on specific energy efficiency program and policy issues. Each group represents stakeholders from across the country, including state and local governments, associations, business leaders, and non-government organizations. Each group has collaborated to produce a blueprint to guide near- and long-term goals to capture cost effective energy efficiency. These blueprints will guide implementation efforts that focus on leveraging existing measures and targeting new activities to help state and local governments achieve energy efficiency on a broad scale.

- Customer Information and Behavior Working Group will assist regulators and policymakers with considering data issues associated with energy efficiency and using customer feedback programs to help customers save energy.
- Evaluation, Measurement and Verification Working Group will provide tools and training to improve energy efficiency management by increasing the accuracy, credibility, and timeliness of evaluation, measurement, and verification results.
- Existing Commercial Buildings Working Group will engage state and local governments on model programs and policies, such as on benchmarking/disclosure.
- Industrial Energy Efficiency and Combined Heat and Power Working Group will provide guidance on model state programs and policies for industry and combined heat and power.
- Building Energy Codes Working Group will work to increase adoption of and compliance with building codes for new buildings and renovations to existing buildings.
- Financing Solutions Working Group will work to remove financing barriers to energy efficiency in the United States through improved financing tools and mechanisms such as loans, leases, and service agreements.
- Residential Building Retrofits Working Group will establish a robust, sustainable, private sector industry that provides home energy upgrade services.
- Utility Motivation and Energy Efficiency Working Group will work to implement policies that motivate utilities to support energy efficiency initiatives that target all cost-effective energy efficiency.

d) Financial resources and budget allocation

The U.S. DOE provides funding to states and local governments that promote energy efficiency savings through the development of policies and programs.

1.3.4 Advanced Manufacturing Office

a) Objectives

Reduce energy consumption per unit of output of an industrial partner by 25% over 10 years and reduce carbon emissions by 70% by 2030. This goal derives from the Energy Policy Act (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. In August 2011, DOE released an update to the State Incentives and Resource Database which provides access to more than 3,900 programs offered by federal and state governments, regional and nonprofit organizations, and utilities to help manufacturers identify and implement energy-saving projects. Users can quickly search for information about energy assessments, grants, rebates, loans, training and other tools by location (state, city, zip code), program sponsor, resource, industrial system, or energy type.

Energy efficiency R&D develops technologies addressing top energy saving opportunities in the industrial sector. R&D activities are divided between industry specific R&D and crosscutting R&D. Industries supported in the industry-specific R&D include aluminium, cement, chemicals, food processing, forest products, glass, metal casting, mining, refining, and steel. Crosscutting areas cover energy-intensive processes, nanomanufacturing, fuel and feedstock flexibility, sensors and automation, clean distributed energy and materials R&D. The EISA of 2007 provides grants for R&D for universities, research centers and other institutions to support eight Regional Clean Energy Application Centers.

More broadly, the United States is supporting improved industrial energy efficiency through international efforts to implement ISO energy management standard 50001 which was issued in final form in June 2011. The Global Superior Energy Performance (GSEP) initiative that was launched under the Clean Energy Ministerial supports efforts in economies to encourage widespread adoption of ISO 50001 by major energy-using industries and commercial firms. Domestically, the Superior Energy Performance initiative is supporting implementation of the ISO 50001 standard by U.S. industry and commercial building owners.

d) Financial resources and budget allocation

The Recovery Act of 2009 provided USD 256 million for industrial energy efficiency R&D projects: USD 156 million for combined heat and power, district energy systems, waste energy recovery systems and efficient industrial equipment; USD 50 million for improved energy efficiency for information and communication technology; and USD 50 million for advanced materials in support of advanced clean energy technologies and energy-intensive processes. In January of 2010, DOE announced USD 47 million to improve efficiency in the information technology and communication technology sectors. The budget for the Advanced Manufacturing Office is USD 116 million in 2012; USD 290 million is requested for 2013..

e) Method for monitoring and measuring effects of action plans

The DOE maintains databases of activities and results for a majority of industrial activities. Impacts are reported annually in a publication of results. Effects of the plan are analysed annually as required by the Government Performance and Results Act of 1993 (GPRA). This analysis includes a GPRA data call and DOE programmatic evaluations.

f) Expected results

Working with industry, DOE's Industrial Technologies Program seeks to reduce industrial energy intensity by 25% over 10 years.

g) Responsibility for monitoring

The Industrial Technologies Program

h) Outputs of monitoring

The Industrial Technologies Program releases an annual Impacts Report

i) Outcomes

Energy savings, reduction in industrial energy intensity, and newly commercialised technologies[37]

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

[37] OMB (2009).

energy efficiency and renewable energy technologies that provide a diverse supply of reliable, affordable, and environmentally sound energy for the economy. EERE achieves this goal through a strong and balanced program of research, development and market deployment. EERE is organised around the three main energy users in the renewable and energy efficiency resource and demand markets—industry, transportation, and buildings.

The *Advanced Manufacturing Office* leads the drive to increase energy productivity and foster innovations that will bolster U.S. technology leadership and global competitiveness. The office sponsors cost-shared R&D and provides support for the widespread use of energy management systems and best practices across the supply chain.

The *Vehicle Technologies Program* supports R&D in vehicle systems, hybrid electric systems, hybrid and electric propulsion, advanced combustion engines, advanced materials technologies, and fuels technology. Focus areas for technology deployment include: alternative fuel vehicles, alternative fuel infrastructure development, idling reduction for commercial trucks and buses, expanded use of non-petroleum and renewable fuel blends, hybrid vehicles, driving practices for improved efficiency, and engine/vehicle technologies that maximise fuel economy.

The *Building Technologies Program* develops technologies, techniques and tools for making residential and commercial buildings more energy efficient, productive, and affordable. The portfolio of activities includes efforts to improve the energy efficiency of building components and equipment and their effective integration using whole building system design techniques, the development of building codes and equipment standards, the integration of renewable energy systems into building design and operation, and the accelerated adoption of these technologies and practices.

The *Federal Energy Management Program* works with Federal agencies and private sector partners to help agencies realise energy, environmental and cost savings potentials, including Federal energy intensity goals, as set by Presidential Executive Orders or Congressional legislation.

c) Covered sectors

Residential, commercial, industry, manufacturing, transport, power, and public sectors

d) Established date

Department of Energy Organization Act (1974)

e) Number of staff members

Approximately 800 (in Washington D.C. and Golden, Colorado)

1.4.2 Environmental Protection Agency

a) Status of organisation

Regulator, implementer

b) Roles and responsibilities

The EPA mission is to protect human health and the environment by developing and enforcing regulation, giving grants, studying environmental issues, sponsoring partnerships, and informing people about the environment. Efforts in support of energy efficiency include Clean Energy programs, Energy Star (with DOE), the Responsible Appliance Disposal program, the Electronic Product Environmental Assessment tool, and activities to improve energy efficiency at water utilities.

c) Covered sectors

Residential, commercial, industry, transport, and public sectors

d) Established date

1970

e) Number of staff members

Estimated dozens of people spread across clean energy and other EPA programs

1.4.3 Regional Organisations

State and local governments and utility regulators have introduced energy efficiency policy measures that address all sectors. These measures include minimum performance standards (that is, building codes) and a variety of financial incentives.

1.5 Information Dissemination, Awareness-Raising and Capacity-Building

a) Information collection and dissemination

Energy Information Administration: The Energy Information Administration collects and interprets data on energy production, trade, transformation, and consumption. This includes collection of energy use data for many industrial sectors and for residential and commercial buildings.[38]

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.[39]

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.[40]

1.6 Research and Development in Energy Efficiency and Conservation

1.6.1 Research and Development on Building Technologies

The Building Technologies Program supports innovation, emerging technologies, systems integration, and reducing market barriers of advanced technologies to improve energy efficiency in America's buildings. The 2012 budget allocation for the Building Program was USD 219 million and the 2013 request is USD310 million. The primary barriers to improved building efficiency are technological (greater energy efficiency) and marketbased (acceptable cost to purchase) in nature. The principal strategy of BTP is to support research, development, demonstration and deployment (RDD&D) of technologies that have the potential to achieve significant improvements in building efficiency. The Program also supports market-priming measures to ensure that these technologies overcome the barriers to widespread adoption, such as first cost, the various building trades' acceptance of new technology, and insufficient availability of consumer information.

Widespread adoption of building efficiency technologies is critical to the success in meeting the Program's goals and includes both voluntary efforts such as Energy Star and the Better Buildings Program (Residential and Commercial) as well as regulatory activities, such as, the Appliance Standards Program.

The Program strategy is divided into three interwoven pathways, each of which can result in lowering building energy use:

- Improve building components (solid state lighting, windows, heating ventilation and cooling, building envelope, sensors and controls), both performance and cost to manufacture/install, through ground breaking research and development; and develop whole building energy simulation programs such as Energy Plus that engineers, architects, and researchers can use to model energy and water use in buildings;

- Increase market pull from private industry through cooperation with stakeholders, improvement of building design and audit tools, and the creation of reliable efficiency benchmarks and databases to facilitate energy efficiency financing and to define

[39]DOE (2009) and EPA and DOE (n.d. - a).
[40]DOE and EPA (n.d. - b).

efficiency's value-add to consumers (Better Buildings Residential and Commercial, HUB, Energy Star); and

- Raise the standards for new energy consuming equipment and new buildings with continually updated equipment and model building codes based on cost effective, higher performing technology that has been successfully commercialized.

The program applies all three interwoven pathways to pursue market opportunities to achieve five main mid-term goals:

- Appliance and Equipment: Provide cost-effective energy savings through national appliance and equipment standards; issue 23 final rules by the end of FY2015; deliver 1,350 trillion BTUs annual savings by 2030;

- New Construction: Reduce the energy required to operate new residential and commercial buildings by 50 percent, at less than the cost of the energy saved. Prove existing technologies and practices and accelerate deployment through model building codes to deliver:
  - 350 trillion BTUs in annual savings by 2020;
  - 1,600 trillion BTUs in annual savings by 2030;

- Existing Commercial Buildings: Reduce the energy required to operate existing commercial buildings by 40 percent, at less than the cost of the energy saved. Bring needed technologies and practices to market delivering:
  - 1,600 trillion BTUs in annual savings by 2020;
  - 6,000 trillion BTUs in annual savings by 2030;

- Existing Residential Buildings: Reduce the energy required to operate existing residential buildings by 50 percent at less than the cost of the energy saved. Bring needed technologies and practices to market delivering:
  - 1,250 trillion BTUs in annual savings by 2020;
  - 4,500 trillion BTUs in annual savings by 2030; and

- Technology Development: Bring to market technologies that save 70 percent of lighting, 60 percent of water heating, 40 percent of HVAC, and 20 percent of other appliances energy use at less than the cost of the energy saved.

1.6.2 Advanced Manufacturing Research and Development

Formerly the Industrial Technologies Program, EERE's Advanced Manufacturing Office is the lead government program to develop and deploy new, energy-efficient technologies for manufacturing. The FY2012 budget of USD 116 million is being invested in:

R&D for Next Generation Manufacturing Processes: New manufacturing processes, simulation tools, and technologies are pursued in four key areas to lower the energy intensity of manufacturing:

- Reactions and Separations
- High-Temperature Processing
- Waste Heat Minimization and Recovery
- Sustainable Manufacturing

R&D Next Generation Materials: Novel materials can open new design spaces for high-performance and renewable energy technology manufacturing. Projects focus on three areas with clear energy, carbon, and economic benefits:

- Thermal and Degradation Resistant Materials
- Highly Functional, High-Performance Materials
- Lower-Cost Materials for Energy Systems

Technology Deployment Activities: The Energy Resource Center helps manufacturers across the supply chain reduce energy costs and learn how to improve energy efficiency by selecting state-of-the-art technology and adopting energy management best practices.

The FY13 budget request is USD 290 million, representing a 150% increase in funding.

1.6.3 Research and Development in Transport Sector Energy Efficiency

The mission of the Vehicle Technologies Program (VTP) is to accelerate the development and deployment of cost-effective, energy-efficient, and environmentally-friendly technologies for on-highway passenger and commercial vehicles that meet or exceed performance expectations and other requirements, enabling the United States to use significantly less petroleum and reduce greenhouse gas emissions. The program's 2012 budget allocation was USD $329 million. The FY2013 budget request is approximately $420 million, with the largest increase supporting additional work in batteries and electric drive technology.

The program focuses primarily on research and development, with approximately 10% of its total budget supporting technology deployment. Research covers a broad portfolio of technologies including batteries; power electronics and electric machines; advanced combustion technologies; materials technologies, including lightweighting; and advanced fuels and lubricants. The program also supports a comprehensive testing and evaluation effort, a robust analysis and modelling capability, and related codes and standards and education activities. Precompetitive research is coordinated with industry through two partnerships – U.S. DRIVE (Driving Research and Innovation for Vehicle efficiency and Energy sustainability) for light-duty vehicle technologies, and the 21st Century Truck Partnership for heavy-duty vehicle technologies. These partnership efforts provide a valuable means for leveraging technical expertise, ensuring government-funded activities remain focused on critical barriers to technology commercialization, and preventing duplication of effort between government and industry.

The program has established the following specific targets that drive its activities:

- Reduce battery pack cost to $300/kWh by 2015 and $125/kWh by 2020;
- By 2020, reduce traction drive system cost to $8/kW, power electronics to $3.3/kW, and electric motor cost to $4.7/kW;
- By 2015, demonstrate an engine-/powertrain-only approach that achieves fuel economy improvements of 25% for light-duty gasoline vehicles and 40% for light-duty diesel vehicles (compared to a 2009 gasoline vehicle);
- By 2015, demonstrate an optimized heavy-duty diesel engine that achieves a 20% fuel economy improvement;
- By 2020, achieve estimated weight reductions in the following vehicle systems: 35% for the body structure, 25% for the chassis and suspension, 10% for the powertrain, and 5% for the interior;
- By 2015, identify fuel formulations using non-petroleum-based blending components that are optimized for use in high-efficiency heavy truck engines, while meeting

prevailing emissions standards, with the potential to achieve at least a 15% replacement of petroleum fuels by 2030;

- By 2015, demonstrate cost-effective lubricant with a 2% fuel economy improvement;
- By 2020, to achieve a petroleum reduction of over 2.5 billion gallons per year through voluntary adoption of alternative fuel vehicles and infrastructure.

1.6.3 Electric Power Sector Energy Efficiency Technology Research and Development

The Office of Electric Delivery & Energy Reliability supports the development of technologies to modernise the electric grid. Some of these technologies will have important benefits for energy efficiency. The total 2010 budget allocation for this office was approximately USD 172 million. The budget request for 2011 is approximately USD 186 million. The Recovery Act provided USD 4.5 billion to the Office of Electric Delivery & Energy Reliability.

Research on *high-temperature superconductivity* (HTS) is focused on improving the current carrying capability of long-distance cables; its manufacturability; and cost-effective ways to use the cable in equipment such as motors, transformers, and compensators. Research goals include HTS wires with 100 times the capacity of conventional copper/aluminium wires. The program aims to develop and demonstrate a diverse portfolio of electric equipment based on HTS, with half the energy losses and half the size of conventional equipment with the same rating.

Research on *transmission and distribution technologies* is focused on real-time information and control technologies; and systems that increase transmission capability, allow economic and efficient electricity markets, and improve grid reliability. Examples include high-strength composite overhead conductors, grid-status measurement systems that improve reliability by giving early warning of unstable conditions over major geographic regions, and technologies and regulations that enable the customer to participate more in electric markets through a demand response. Research program goals in this area include, by 2010, demonstrated reliability of energy-storage systems; reduced cost of advanced conductors systems by 30%; and operation of a prototype smart, switchable grid in a region within the United States transmission grid.

Research on *energy storage* is focused in two general areas. One goal is storage technologies that reduce power-quality disturbances and peak electricity demand, and improve system flexibility to reduce adverse effects to industrial and other users. A second goal is to improve electrical energy storage for stationary (utility, customer-side, and renewable) applications. Research focuses on storage technologies with high reliability and affordable cost.

2. MEASURES FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1. Government Laws, Decrees, Acts

a) Name

There have been many laws, decrees and acts including provisions intended to achieve energy efficiency improvements enacted at Federal, state and local levels. Some of the most important examples at the Federal level include US Code Title 42, Chapter 77; Code of Federal Regulations (CFR) Title 10, Chapter II; Energy Policy Act of 2005 (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 about 50 categories of appliances and equipment. DOE has energy efficiency standards in place for most major types of energy-using appliances and equipment, including air conditioners, clothes washers and dryers, space and water heaters, kitchen ranges and ovens, refrigerators and freezers, lighting, electric motors and distribution transformers.

Section 135 of 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.

In 2011, the Department of Energy updated minimum energy efficiency standards for furnaces, central air conditioners, clothes dryers, room air conditioners, residential refrigerators, fluorescent lamp ballasts, refrigerators and freezers, and direct heating equipment. DOE has also proposed a significant update to standards for utility distribution transformers and anticipates updating standards on clothes washers and dishwashers in 2012. Further, DOE is exploring the potential costs and benefits of establishing minimum standards for commercial and industrial pumps and for industrial fans, blowers and fume hoods.

DOE issued a policy statement in 2011 that commits to adopting full fuel cycle analysis as part of its standards development process and to improving the information available to product buyers and users on product emissions and energy impacts over the full fuel cycle. In addition, DOE has issued a number of public notices or rules affecting its appliance and equipment test procedures, as well as its efficiency certification and enforcement efforts. In December 2011, DOE launched a web-based data base of all product certification data.

EISA outlines a rigorous lighting efficiency program, which mandates increases in the energy efficiency of light bulbs by 25%-30% starting in 2012. This will effectively phase out most common types of incandescent light bulbs by 2014. EISA mandates revised lighting efficiency standards effective in 2020 which could be met by compact fluorescents, LED or other energy efficient bulbs. EISA sets efficiency standards for metal halide lamps and requires amended standards in 2012 and 2019. DOE is progressing on rule-making to update and expand the scope of energy efficiency standards for fluorescent lamps and ballasts, and incandescent reflector lamps.

EISA requires that test procedures for covered consumer products be amended to include standby mode and off mode energy consumption, taking into consideration the most current versions of Standards 62301 and 62087 of the International Electro technical Commission. EISA mandates that any final rule establishing or revising a standard for a covered consumer product, adopted after 1 July 2010, incorporate standby mode and off mode energy use. DOE is revising test procedures for battery chargers and external power supplies and developing an efficiency standard to address standby energy use. With accurate measurement of standby power needs included in testing to meet appliance standards, as well as with standards for external power supplies, typical appliances will use less standby power. The Federal government is required to buy devices that use less than 1 watt of standby power. Some states have implemented standby limits on certain consumer electronics products.

DOE is implementing a round-robin test program to assess the repeatability and reproducibility of test procedures for various appliances. The National Institute of Standards and Technology (NIST), the Appliance Technology Evaluation Center (ATEC) at the National Enrgy Technology Laboratory (NETL), and many third parties and manufacturers perform these tests. The round robin testing will document the variability of test results, both within a test lab (repeatability) and among test labs (reproducibility), and seek to identify the potential contributing causes of variability. The results will form the basis of recommended corrective actions for facilities and highlight needed modifications to test procedures.

The *Energy Star® labelling* program is designed to clearly signal high efficiency in buildings and products to consumers and businesses. Over 50 types of products can now earn the label. The US Environmental Protection Agency (EPA) manages the labelling of buildings, new homes, office equipment, home electronics, and residential heating, ventilation and air conditioning (HVAC). DOE manages the labelling for a variety of residential products, including appliances, compact fluorescent lamps (CFL), solid state lighting, windows, and residential water heaters. In July 2011, EPA and DOE announced the first products recognized as the most energy-efficient in their categories among those that have earned the Energy Star label. "EnergyStar Most Efficient 2012" product identification is available for clothes washers, refrigerators, televins, central air conditioners, furnaces, and heat pumps.

The EISA of 2007 states that as of December 19, 2010, federal agencies are generally required to lease space in buildings that have earned an Energy Star label in the previous year. There are exemptions to this rule; agencies are allowed to remain the previously occupied buildings, even if not Energy Star labelled.

2.2.2. Building Energy Codes

a) Name

Energy Efficiency Standards for Buildings

b) Purpose

Reduce energy used in the heating, cooling and ventilation of buildings

c) Applicable sectors

Residential and commercial

d) Outline

The United States has developed energy efficiency standards for new buildings since 1975, with the first codification of those standards taking place in 1977. Adoption and enforcement of these codes and standards is the responsibility of the states, with the US DOE playing a major support role in the development of new economy-wide model codes. According to the Database of State Incentives for Renewables & Efficiency, all 50 states and the District of Columbia have building energy codes. The goal expressed by the 2009 Recovery Act is for 90% compliance with energy code requirements for each state.

In 2007, DOE undertook to support a 30% improvement in ASHRAE/IESNA Standard 90.1 for the year 2010 (relative to Standard 90.1-2004). Standard 90.1 is the primary reference for economy-wide model commercial codes. In 2008, DOE provided support to a 30% improvement in the economy-wide model residential code.

The Building Energy Codes Program estimates an energy cost savings of more than USD 2.5 billion per year. The program supports the development, adoption and compliance of energy efficiency standards in buildings.

e) Financial resources and budget allocation

At the Federal level, about USD 4 million was allocated in 2008. Additional budget is allocated at the state level.

f) Expected results

Many new residential and commercial buildings will use 30% less energy in 2010 than in 2007 due to widespread state compliance with model buildings codes developed.

2.2.3. Vehicle Fuel Efficiency Standards

a) Name

Corporate Average Fuel Economy (CAFE) Standards for Light Vehicles and Greenhouse Gas and Fuel Efficiency Standards for Trucks and Buses

b) Purpose

Improve the fuel economy of light vehicles, trucks and buses

c) Applicable sectors

Transport

d) Outline

The Energy Independence and Security Act of 2007 (EISA) mandates a corporate average fuel economy standard of 35 miles per gallon for new light vehicles (cars and light trucks

(vans, SUVs, and pickups)) throughout the United States by 2020. On 19 May 2009, President Obama greatly accelerated the vehicle efficiency improvement by introducing a policy aimed at both increasing fuel economy and reducing greenhouse gas pollution. The new standards, covering model years 2012-16, require an average fuel economy standard of 35.5 miles per gallon in 2016 (6.6 liters/100 km; 250 g CO2/mile),. On April 1, 2010, the U.S. Environmental Protection Agency and the National Highway Traffic Safety Administration issued regulations to implement this standard. It is estimated that the new requirements will save 1.8 billion barrels of oil and cut carbon emissions by about 960 million metric tons.

On July 29, 2011, President Obama announced more new standards to increase fuel efficiency and reduce greenhouse gas pollution for new cars and light trucks sold in the United States. These new standards will cover cars and light trucks for Model Years 2017-2025, requiring performance equivalent to 54.5 mpg in 2025 while reducing greenhouse gas emissions to 163 grams per mile. The standards will save an estimated 12 billion barrels of oil in total – 2.2 million barrels per day by 2025 and over 4 million barrels per day by 2045 when new vehicles meeting the 2025 fuel economy requirement replace nearly the entire vehicle fleet. They will also reduce carbon dioxide emissions by a total of over 6 billion metric tons.

On August 9, 2011, The Environmental Protection Agency and National Highway Traffic Safety Administration established the first-ever U.S. fuel economy standard for heavy trucks which should reduce vehicle fuel consumption by 10–20% between 2014 and 2018 with net cost savings of $42 billion to commercial truck owners. Based on projected fuel savings, vehicle owners are expected to recover the additional upfront costs of the more efficient vehicles in one to five years.[41] The standards are projected to reduce oil consumption by 530 million barrels and carbon dioxide emissions by 270 million tons over the life of these trucks.

The United States has also greatly expanded support for development and manufacture of more fuel-efficient vehicles. Loan guarantee authority funded in 2008 and the economic stimulus program enacted in 2009 have expanded support for the retooling of auto manufacturing plants to increase fuel efficiency, the manufacture of advanced batteries, and purchase of plug-in hybrid vehicles. This support is in the form of expanded R&D, loan guarantees, direct financial assistance, and tax incentives.

e) Financial resources and budget allocation

Information not available

f) Expected results

Average fuel economy for new cars and light trucks will gradually increase to 35.5 miles per gallon by 2016 and then further to 54.5 miles per gallon by 2025. The new CAFE standards are expected to result in savings of 12 billion barrels of oil over the lifetime of the vehicles. Average fuel economy for heavy trucks will also increase, saving another half billion barrels.

2.3. Voluntary Measures

2.3.1. Climate VISION-Voluntary Innovative Sector Initiatives

a) Purpose

Reduce energy intensity and greenhouse gas intensity of industrial output

b) Applicable sectors

Industry

c) Outline

[41] NHTSA (2010)

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.

2.3.3. Better Buildings Program

a) Purpose

Reduce energy use in commercial buildings

b) Applicable sectors

Commercial

c) Outline

The program, launched by DOE in February 2011, catalyzes private sector investment in upgrades to make commercial buildings 20 percent more energy efficient over the next decade. On June 30, 2011, 14 partners announced commitments to the Better Buildings Challenge, including private companies, financial institutions and local governments. Companies will provide data on energy savings and efficiency strategies which can serve as models to others. Financial institutions have agreed to help finance efficiency projects.

2.4. Financial Measures Taken by the Government

2.4.1. Tax Schemes

Federal Tax Credits for Energy Efficiency: Home Improvements

a) Level

Federal

b) Purpose

Promote energy efficiency in existing residential buildings

c) Applicable sectors

Residential

d) Outline

Individuals can get an income tax credit for 30% of the cost of energy efficiency measures.

e) Financial resources and budget allocation

Given there are about 100 000 000 households in the United States, this credit represents a potential investment in the order of USD 150 billion dollars for as much as USD 450 billion in efficiency improvements. Clearly the actual uptake will be some fraction of this potential.

f) Expected results

Improved residential uptake of energy efficiency measures

g) Description

Home improvement tax credits were available for home improvements "placed in service" from 1 January 2009 through 31 December 2010. The maximum that a taxpayer could claim was USD 1500. It had to be an existing home and principal residence to receive this tax credit. New construction and rentals did not qualify. Geothermal heat pumps, solar energy systems, wind energy systems and fuel cells qualify for a 30% tax credit through 2016.

In January of 2011, the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 was passed in Congress and extended the tax incentives for home improvements through 2011. The new tax incentives are for home improvements made in 2011. The ones made in 2010 were still subject to the previous tax credit requirements. The new tax credit amounts for 10% of the cost of building envelope improvements, excluding labor costs; and limited to USD 200 for windows, and specific dollar limits for heating and cooling equipment. The total credit cannot exceed USD 500 and applies to cumulative claims dating back to 2006. To be eligible a home must be the taxpayer's principal residence.

Tax Credit for Manufacturers of Energy-Efficient Appliances

a) Level

Federal

b) Purpose

Promote the production of energy-efficient appliances

c) Applicable sectors

Commercial

d) Outline

Tax credits for manufacturers of high-efficiency residential clothes washers, refrigerators, and dishwashers

e) Financial resources and budget allocation

Information not available

f) Expected results

Increased domestic manufacturing of energy efficiency appliances

g) Description

The credits are in the form of a tax credit for increases in unit production of efficient appliances over a two-year baseline. The amount of the credit is tied to specified efficiency ratings, and varies according to appliance and the level of achieved efficiency. The appliances must be produced in the United States.

The appliance tax credit was extended until the end of 2011 and follows the criteria:

- Dishwashers –
  - USD 25 - models using no more than 307 kilowatt hours/year and 5.0 gallons of water/cycle (this is the ENERGY STAR level effective July 1, 2011)
  - USD 50 - models using no more than 295 kilowatt hours/year and 4.25 gallons of water/cycle
  - USD 75 - models using no more than 280 kWh kilowatt hours/year and 4 gallons of water/cycle

- Clothes Washers –
  - USD 175 – top-loading models that meet/exceed 2.2 MEF, and does not exceed 4.5 WCF
  - USD 225 – 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 was available for hybrid vehicles placed in service after 31 December 2005 and purchased by December 31, 2010. Plug-in hybrid-electric vehicles and all electric vehicles purchased in or after 2010 were eligible for a federal tax credit of up to USD 7,500, depending on the capacity of the battery used. Some diesel vehicles purchased or placed into service after December 31, 2005 were eligible for a federal income tax credit of up to USD 3,400. The credit amount began to phase out for a given manufacturer once it sold over 60,000 eligible hybrid and diesel vehicles.

e) Financial resources and budget allocation

The net US investment depends on consumer uptake of the certified vehicles.

f) Expected results

Increased consumer uptake of the certified vehicles, reducing fuel consumption and associated emissions

g) Description

Private or commercial purchasers of certified vehicles received a USD 250-USD 3400 tax credit for certified vehicles. For the case of hybrid-electric vehicles, the tax credit for a given manufacturer was phased out after the first 60 000 certified vehicles were sold. For plug-in hybrid-electric vehicles, the tax credits were: PHEV10 (vehicles with a range of 10 miles): USD 2500, PHEV20 (20 miles): USD 4000, PHEV30: USD 5000, PHEV40: USD 5000. For plug-in vehicles, the tax credit for a given manufacturer was phased out after 200 000 vehicles were sold.

Federal Tax Credits for Energy Efficiency: Fuel Cells

a) Level

Federal

b) Purpose

Promote the use of energy-efficient fuel cells for stationary applications

c) Applicable sectors

Residential

d) Outline

Credits are available for residential fuel cells and micro turbine systems.

e) Financial resources and budget allocation

Information not available

f) Expected results

Increased installation of fuel cell/microturbine systems

g) Description

There is a residential consumer tax credit of up to 30% of the cost (up to USD 1500 per 0.5 kW of capacity maximum) for installing a qualified fuel cell and microturbine system. The system must have an efficiency of at least 30% and a capacity of at least 0.5 kW. The credits are available for systems placed in service from 1 January 2006 through 31 December 2016. This credit is not limited to the USD 1500 home improvement cap.

2.4.2. Low-Interest Loans

Qualified Energy Conservation Bonds

a) Level

Federal

b) Purpose

Accelerate the deployment of energy efficiency improvements

c) Applicable sectors

State, local, and tribal governments

d) Outline

For qualified projects, which include certain energy efficiency improvements, the borrower pays back the principal of the bond, and the bondholder receives Federal tax credits instead of bond interest.

e) Financial resources and budget allocation

The tax credit bond limit in the original October 2008 legislation was USD 800 million but was increased in the ARRA 2009 to USD 3.2 billion. Recent legislation provides that tax credit bonds may also be issued as Build America Bonds in which the bonds bear taxable interest and the obligor receives a subsidy directly from the federal government equal to 70% of the taxable interest cost.

f) Expected results

Larger-scale adoption of energy efficiency measures

Energy Efficient Mortgages

a) Level

Federal

b) Purpose

Help homebuyers or homeowners save money on energy bills by enabling them to finance the cost of adding energy-efficiency features to new or existing housing as part of their home purchase or refinancing mortgage.

c) Applicable sectors

Residential

d) Outline

Cost-effective energy saving measures may be financed as part of the mortgage. A buyer's debt-to-income ratio on the loan for an energy efficient home could be stretched, so that a larger percentage of the borrower's monthly income can be applied to the monthly mortgage payment. All homes built to the Council of American Building Officials Model Energy Code (MEC) can qualify for an Energy Efficient Mortgage.

e) Financial resources and budget allocation

Maximum loan amounts vary by originator, but may be expressed in terms of a maximum dollar amount or as a percentage of the home's appraised value.

f) Expected results

Larger-scale adoption of energy efficient technologies

State and Utility Based Loan Programs

a) Level

State and local government, utilities

b) Purpose

Promote adoption of energy efficient technologies

c) Applicable sectors

Residential, commercial, non-profit, state/local government

d) Outline

More than 200 state and utility programs are identified at the DSIRE website www.dsireusa.org/summarytables/FinEE.cfm?&CurrentPageID=7&EE=1&RE=1.

e) Financial resources and budget allocation

Varies

f) Expected results

Wider adoption of qualifying energy efficiency measures

2.4.3. Subsidies and Budgetary Measures

Weatherization Assistance Program (WAP)

a) Level

Federal

b) Purpose

Improve the energy efficiency of homes inhabited by low-income families

c) Applicable sectors

Residential

d) Outline

The program provides cost-effective energy efficiency improvements to low-income households through the weatherisation of homes. It thereby helps low-income families to permanently reduce their energy bills. DOE's weatherisation program performs energy audits

to identify the most cost-effective measures for each home, which typically includes adding insulation, reducing air infiltration, servicing heating and cooling systems, and providing health and safety diagnostic services. Priority is given to the elderly, persons with disabilities, families with children, and households that spend a disproportionate amount of their income on energy bills (utility bills make up 15% to 20 % of household expenses for low income families, compared to 5% or less for all other Americans).

e) Financial resources and budget allocation

The Recovery Act made available approximately USD 5 billion for weatherization efforts from 2009 - 2013. The annual WAP program budget for FY2012 is USD 128 million and the request for 2013 is USD 195 million.

f) Expected results

Over 36 years, as of February 2012, WAP has provided weatherization services to more than 7.3 million low-income households, with 707,000 funded through the Recovery Act.

Numerous economy-wide, state and local energy efficiency subsidies

a) Level

Federal, state and local governments, local utilities

b) Purpose

Improve the energy efficiency of residences and commercial buildings

c) Applicable sectors

Residential, commercial, industry, and agriculture

d) Outline

Numerous subsidies are available to assist private citizens and business owners in obtaining energy efficiency audits and perform efficiency improvements. See the summary information at www.dsireusa.org.

e) Financial resources and budget allocation

Varies

f) Expected results

Improved energy efficiency in applicable sectors

Energy Savings Performance Contracts

a) Level

Federal

b) Purpose

Facilitate financing of energy efficiency improvements by Federal government agencies

c) Applicable sectors

Public sector

d) Outline

Energy Savings Performance Contracts (ESPCs) are a contracting vehicle that allows agencies to accomplish energy efficiency projects for their facilities without up-front capital costs and without Congressional appropriations. An ESPC project is a partnership between the customer and an energy services company (ESCO). The ESCO conducts a comprehensive energy audit and identifies improvements that will save energy at the facility. In consultation with the agency customer, the ESCO designs and constructs a project that meets the agency's

needs and arranges financing to pay for it. The ESCO guarantees that the improvements will generate savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the agency. Contract terms up to 25 years are allowed. Federal agencies structure ESPCs so that financial savings cover costs of their investments.

e) Financial resources and budget allocation

More than 570 projects worth USD 3.9 billion have been awarded by 25 different Federal agencies and organizations as of May 2011. These projects saved an estimated USD 13 billion in energy costs, from which USD 10 billion goes to fund energy efficiency projects and the remaining USD 3 billion in savings reduces government spending.

f) Expected results

The current ESPC contract permits 16 energy service companies to receive contractor payment of up to USD 5 billion for projects. This has the potential to result in up to USD80 billion of energy efficiency, water conservation, greenhouse gas emissions reduction and renewable energy projects at federally owned buildings and facilities

Utility Energy Service Contracts

a) Level

Federal

b) Purpose

Facilitate financing of energy efficiency improvements by Federal government agencies

c) Applicable sectors

Public sector

d) Outline

Utility arranges financing to cover the capital costs of an efficiency project; the costs are paid back by efficiency savings achieved by the installed measures.

e) Financial resources and budget allocation

Since 1991 more than 1,600 projects attracted USD 2.3 billion in capital investment for energy and water efficiency upgrades at Federal facilities.

f) Expected results

It is estimated these projects are providing more than 19 million MMBTU in annual energy savings and USD 350 million in annual cost savings.

2.5. Energy Pricing

The pricing mechanism is generally market based. However, particularly in the electric power sector, there is a significant regulated element in the price for many customers. Most of the wholesale electricity business is based on competitive supply to various utilities. But only about half the states offer retail choice of suppliers to small customers. The transmission and distribution component of price is generally regulated by states on a cost-of-service model. There are also a variety of taxes and fees which are levied, for example highway tolls and gasoline taxes on automobiles, which affect market prices and vary considerably from state to state within the United States.

Demand for energy fluctuates with price but is rather inelastic, particularly in transport and residential buildings. As a result, policies to improve automotive fuel efficiency have focused

on regulating the fuel economy of new vehicles, and policies to reduce energy use in buildings have focused on efficiency standards and labels.

2.6. Other efforts for energy efficiency improvements

2.6.1. Cooperation with non-government organisations

Many NGOs are prominent in promoting energy efficiency in the United States. Examples include Alliance to Save Energy; American Council for an Energy Efficient Economy; American Society for Heating, Refrigeration and Air Conditioning Engineering; Northwest Energy Efficiency Alliance; Precourt Institute for Energy Efficiency; Resources for the Future; Rocky Mountain Institute; and various trade associations.

2.6.2. Cooperation through bilateral, regional and multilateral schemes

The United States cooperates extensively with other economies to develop energy efficiency standards, and on developing and deploying energy efficient technologies and processes. US agencies including DOE, EPA, and AID maintain relevant cooperative efforts with numerous economies and organisations involving work on all continents. For example, the United States participates in IEA Implementing Agreements on Buildings and Community Systems, Demand Side Management, District Heating and Cooling, Energy Storage, Heat Pumps, Combustion, Superconductivity, Fuel Cells, Hybrid and Electric Vehicles, and Advanced Motor Fuels. The United States participates in APEC, United Nations programs, and the Asia Pacific Partnership on Clean Development and Climate (APP). The United States is also actively engaged in efforts to launch the International Partnership for Energy Efficiency Cooperation (IPEEC) which will help economies to share best practices in implementing energy efficiency technologies and monitoring progress toward their energy efficiency goals.

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VIET NAM

1. GOALS FOR EFFICIENCY IMPROVEMENT

1.1. Overall Energy Efficiency Improvement Goals

In 2005, the 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[42]:

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.

[42] 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"[43]. 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

[43] 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).

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