A Description of Current Regulatory Practices for the Promotion of Energy Efficiency

A presentation of information gathered from the world's energy markets on regulatory practices aimed at fostering energy efficiency

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1 Executive Summary

Introduction

In the framework of the G8 of Energy Ministers, Rome, 24-25 May 2009, gas and electricity regulators from around the world committed to prepare a report on regulatory practices for energy efficiency[1] to be presented to the Muskoka G8 meeting of 25 and 26 June 2010.

This report is the first ever produced by the ICER, the recently founded International Confederation of Energy Regulators[2]. ICER was founded in October 2009 to enable the world's gas and electricity regulators to co-operate on major global issues. The report presents information gathered from the world's energy markets on regulatory practices aimed at fostering energy efficiency.

In the preparation of this report we encountered a number of challenges:

- Energy efficiency is a relatively under-researched field in comparison with its importance as an area of great policy interest in tackling climate change;
- There is very limited systematic gathering of information on energy efficiency beyond national or regional boundaries;
- Comparative analysis of the different approaches used to promote energy efficiency worldwide is also very limited.

This report is the first step in seeking to address these challenges, and through our planned future work we expect to provide a significant contribution to the development of energy efficiency policy and the identification and spread of best regulatory practice.

Proposals for further work

This report is still "work in progress". We aim to continue our work in this area. Specifically we intend to:

- identify case-studies that have proved particularly effective in order to facilitate the spread of good practice in a practical way;
- continue, on an ongoing basis, the gathering of information on regulatory approaches to fostering energy efficiency, particularly in those regions where information is currently less detailed;
- undertake further comparative analysis of the different approaches to fostering energy efficiency as an aid to policy makers in this area, and assess in particular the

[1] For the purposes of this report the following definition of energy efficiency has been used:

"Energy efficiency is the practice of reducing the amount of energy used without reducing the end-use benefits enabled by that energy. Energy efficiency can be categorized in a number of ways including end-use efficiency and end-to-end efficiency" - Electricity Power Research Institute – www.EPRI.com.

[2] ICER was founded on 19 October 2009. Additional information is available on: http://www.iern.net/portal/page/portal/IERN_HOME/ICER_HOME

prerequisites (e.g. legal, economic and technical criteria) for introducing specific regulatory practices.

Summary of world regulatory approaches to energy efficiency

This section of the paper summarises at a high level the detailed information included in the report. A very wide range of approaches have been identified. The report groups the measures into the following categories:

- Legal and regulatory obligations
- Financial instruments
- Market based incentives (including tradable certificates, tenders and demand side management)
- Voluntary agreements
- Energy audits
- Consumer education and information provision (including billing regulation and smart metering)

Moreover the report highlights provisions on the role of the public sector. A brief definition of each measure has been provided.

Many of the energy efficiency initiatives described in this report have not been put in place by Energy Regulators, but rather by other government agencies. In some cases the energy regulator has a role in the administration or oversight of the programme. This report should therefore be seen as a compendium of energy efficiency measures.

A number of energy efficiency indicators, such as primary energy intensity, primary energy per capita and carbon intensity have been used to facilitate comparison between regions and countries. The analysis shows a general trend towards increased per capita primary energy consumption in most areas, including those which started from a low consumption base. However, most OECD countries, as well most emerging economies such as China, India, Brazil and South Africa show that remarkable gains in energy efficiency have been achieved since the early seventies as there is a marked decoupling between GDP growth and per capita primary energy consumption.

We collected extensive and accurate information for all major jurisdictions through our regional associations and through cooperation with organisations such as the International Energy Agency, the Renewable Energy, the Regulatory Assistance Project (RAP) and Energy Efficiency Partnership (REEP). We would like to thank them for their support in providing relevant data and reviewing parts of this report.

Data has been organised by continent and covers the following jurisdictions:

- **Africa and the Middle East:**

  Algeria, Egypt, Israel, Jordan, Morocco, Saudi Arabia, South Africa, Togo, Tunisia.

- **North America:**

  Canada (Alberta, British Colombia, Nova Scotia and Ontario).

  Mexico.

  USA (California, Maine, Massachusetts, Minnesota, New York, Oregon, Texas, Vermont, Washington and Wisconsin).

- **South America:**

  Brazil and Uruguay.

- **Asia:**

  China, India and Japan.

- **Australia**

- **Europe:**

  Armenia, Croatia, European Union Member States, Macedonia, Norway, the Russian Federation and Ukraine.

Competencies of Energy Regulators in terms of energy efficiency vary from country to country and States or Provinces in federal countries such as the US and Canada. Many regulators seem to have at least some competencies, especially with regards to end-use measures, roll out of smart meters, setting demand-side management and administration of energy efficiency programmes, although their elaboration of such programmes and of underpinning energy efficiency legislation usually rests with governments.

An outline of the main findings can be found below.

Africa and the Middle East

Energy efficiency policies has reached up to now very different levels of implementation in this area.

Financing tools to promote energy efficiency differ significantly among Africa and Middle East States: some countries have not established support schemes for energy efficiency yet while others have defined relatively more precise and focused mechanisms to financially promote the reduction in energy consumption (e.g. **Algeria, Egypt, Tunisia** and **Togo**). Support mechanisms are often in the form of funds, grants and subsidies given directly to the party implementing an energy efficiency project; in few cases soft loans are also provided to beneficiaries. Most of the time, all sectors are eligible for financial support although some countries have also established programs tailored to specific sectors or categories of beneficiaries.

A relatively small number of countries has set legal requirements and technical standards to improve the energy efficiency of buildings, electrical appliances and vehicles. Moreover, the

enforcement of existing rules represents a critical issue also in countries that have established energy efficiency standards.

With regard to regulation for buildings, existing standards often only apply to non-residential buildings. Labelling and efficiency standards for electrical appliances are often based on the experience of other countries where their effectiveness has been already proven: for example, the European label has been used as a model in **Tunisia**.

Energy audits exist in a mandatory or voluntary form in several North African and Middle East countries. They are more common for the building sector while in the transport sector they are at a very early stage and often limited to fleet owners (for example, **Tunisia** and **Algeria**).

A number of African and Middle East countries consider to gradually replace the old meters with electronic ones for energy efficiency purposes. In **Egypt**, for example, a feasibility study has been carried out for the introduction of smart meters on a large scale, and a pilot project has been implemented, involving the installation of about 20.000 electronic meters.

In most countries, no specific regulation of billing exists and no special information that enables customers to understand and reduce their own consumption is provided in bills (like, for example, the level of consumption articulated among different aggregations of hours, or the distributor's energy mix and the related environmental impact).

However, few initiatives have been taken in some countries in order to achieve energy efficiency goals through bills.

Public institutions, both national or international, energy utilities and other organisations carry out information campaigns and programmes to educate the public about what they can do to save energy in many countries.

Load Response programs to avoid shortcomings in the energy supply are not very common in African and Middle East countries.

North America

Canada

The Canadian Government offers financial incentives through initiatives like the EcoENERGY program, which is available throughout the country; some provinces also offer various programs and initiatives. These programs and initiatives can be targeted to the residential, commercial and industrial sectors. For instance, the Ontario and British Columbia Government's installation of smart meters is intended to reduce electricity consumption because, once a smart meter is activated, bills will be calculated based on real-time data, not estimated consumption, which will provide consumers with the necessary information to better manage their electricity costs. Other programs and initiatives are mentioned throughout this report.

In order to achieve the objectives of conservation, some provinces have put in place legal and regulatory instruments which have led to an expanded role for Energy Regulators in assisting the provinces in achieving these objectives. As an example, in Ontario, the Green Energy and Green Economy Act, 2009, establishes important responsibilities for the Ontario Energy Board and other entities in achieving the Ontario Government's conservation objectives. In provinces like New Brunswick and Quebec, they have established energy efficiency agencies. The mandate of these agencies is to create, monitor and encourage energy efficiency

programs/opportunities where necessary.

Mexico

In Mexico, a national program promotes the sustainable use of energy and focuses on increasing energy efficiency and reducing energy consumption in several targeted areas, including lighting, appliances, industrial motors, and buildings. There are several programs that provide low-interest loans to promote improvements in energy efficiency programs. In addition, Mexico is developing a program to promote process, products, and services certification, including the necessary auditing requirements needed for the certification system. Mexican law also requires that electric bills include information promoting the sustainable use of energy. Mexico is taking actions to promote research on the sustainable use of energy, and the development of experts in that field.

United States of America

Individual states are primarily responsible for designing and implementing energy efficiency services in the United States, although the federal government has provided significant funding for existing efficiency programs in recent years. Generally, the provision of information to consumers coupled with financial incentives to implement cost-effective technologies or practices has been a key characteristic of the majority of successful efficiency programs in the U.S..

State public utilities commissions have adopted a wide range of strategies to promote energy efficiency that can include removing natural disincentives for utilities for efficiency, mandating efficiency and/or demand-side management programs.

In some states, the electric utilities implement efficiency programs, and the state public utilities commission develops regulatory mechanisms to ensure that the utilities have the proper incentives to implement efficiency programs without losing revenues from electricity sales. In other states, third parties, independent of the electric utilities, are selected to provide efficiency programs, sometimes in conjunction with electric utilities.

In addition to efficiency programs, certain states have adopted energy building codes, which provide the minimum energy efficiency standards that must be met to construct a building, and appliance standards. Some states create higher efficiency standards for public buildings, such as schools and governmental offices. In addition, the federal government is responsible for maintaining a system for labeling energy efficient appliances, so that consumers have additional information when making purchases of energy-intensive appliances such as refrigerators.

Many states have identified smart grid technologies as an additional mechansim for informing consumers of the amount of power consumed. To date, very few states have had much experience with advanced metering to determine whether smart grid technologies will provide the reductions anticipated. However, the ability to provide customers with information about real-time energy usage and the prices associated with that usage may influence customer behavior. The majority of utilities in the U.S. provide customers information on their monthly usage and compare the prior month's usage to a comparable time period the previous year; in this way consumers now have the ability to discern trends in energy usage and respond

accordingly, albeit over the course of several weeks.

South America

Brazil and **Uruguay** have developed national energy efficiency programs affecting the industrial, public, residential, commercial, lighting, sanitation sectors as well as education and schools.

Brazil has two long-established programs, PROCEL and CONPET that aim to reduce electricity consumption in the above-mentioned sectors and the consumption of petroleum based products respectively, as well as a labeling scheme for appliances marketed or produced in Brazil (PBE).

Uruguay has set dual time tariffs for consumers (residential and general) and triple time tariffs (industrial), and is in the process of developing an energy efficiency certificates trading system. It has also launched a campaign aimed to exchange incandescent bulbs for efficient low consumption bulbs.

Asia

China has been implementing an ambitious energy policy in the framework of its 11th Five-year Plan for National Economic and Social Development (2006-2010), which sets a binding energy efficiency target whereby energy consumption per unit of GDP in 2010 should be 20% below 2005 levels.

Existing measures include energy intensity and emissions reduction targets, modernisation of the coal generation fleet, efficiency benchmarks for industries, differential pricing for energy intensive industries, industry-specific energy consumption standards including coal-fired power generation and demand-side management.

China has not implemented market-based instruments, but has developed several effective and innovative instruments, such as the efficiency benchmarks set by the Top 1000 Energy Consuming Enterprises Program, the demand side management in the framework of the Efficiency Power Plant (EPP) and pricing reforms.

The Top 1000 Energy Consuming Enterprises Program is a voluntary tool that sets out requirements and incentives to foster energy efficiency in 1008 participating enterprises responsible for around a third of China's energy consumption and a similar proportion of carbon dioxide emissions.

According to the action plan of the program, the top-1000 enterprises shall establish an energy conservation organisation, formulate energy efficiency goals, establish an energy utilisation reporting system, conduct energy auditing, formulate an energy conservation plan, invest in energy efficiency improving, adopt energy conservation incentives, and conduct training. Because of the centralised nature of the Chinese economy, compliance to the Top 1000 Programme is mandatory in all but name, which ensures that the objectives of the programme are effectively complied with.

The Efficiency Power Plant is a programme currently being developed in five provinces. An EPP is a bundle of energy efficiency programs designed to yield electricity savings in amounts, timing, and durations that very closely resemble – and are as predictable and substantial as – the output of a conventional power plant. The EPP concept was developed partly to help convey

the idea that energy efficiency is a resource comparable to supply-side resources, but also to simplify program design and implementation. By packaging energy efficiency program into large blocks, greater or equal to 300 MW, planners and policymakers more readily see the advantages of incorporating EPPs in power sector planning and investment.

China has also adopted innovative pricing reforms, which link the prices that large industrial consumers pay for electricity to the efficiency of their production. The program applies to the largest energy-consuming industries in the country, such as aluminium, cement and steel. It assigns different electricity prices based on the relative energy efficiency of each enterprise. The most efficient ones pay the standard regional prices for electricity without penalty, while the poorer performers pay surcharges which are being increased on a regular basis.

India launched an extensive energy conservation plan in 2001 which prescribes energy consumption norms and standards for the most energy intensive industries. In addition, the 11th Indian Five Year plan, which sets out key economic development objectives for the country for the period 2007-2012, sets a mandatory energy efficiency target of 5% by 2012 below business as usual levels. Within this framework India has launched several programs such as Bachat Lamp Yojana, which aims to replace incandescent light bulbs with energy efficient and high quality CFLs in households. One of the most innovative aspects of the scheme is that it is partially funded through the UNFCCC Clean Development Mechanism. Other programmes include a standards and labelling scheme, which lays down minimum energy performance standards for energy intensive equipment and appliances, the Energy Conservation Building Code (ECBC), a voluntary system setting minimum energy standards for new commercial buildings and Agricultural Demand Side Management measures that aim to replace inefficient pump sets, other agricultural equipment and street lighting. India is now developing new policy tools that mark a shift from the existing command-and-control measures towards a more market-based policy. The flagship tool of this new policy is Perform, Achieve and Trade, a tradable energy efficiency certificate system for large energy-intensive industries.

Japan has deployed an array of energy efficiency measures covering all sectors of its economy over the past three decades and is one of the most efficient countries in the industrialised world.

The centrepiece of Japan's efficiency policy is the Top Runner programme, which was established in 1998.

It sets energy efficiency performance targets for categories of machinery and equipment, including imported and domestically manufactured vehicles on the basis the level of the most energy-efficient products on the market at the time of the value-setting process.

Other key policies include the energy efficiency requirements for large scale factories, a mandatory scheme for the reporting of energy efficiency measures for residential and non-residential buildings of over 2 000 square metres (m2), labelling of energy efficiency levels and the assessment of energy-efficient product retailers. Like many other industrialised countries, Japan has launched this year a pilot programme for the development of smart grids and the roll-out of smart meters.

Australia

In Australia a range of legal, regulatory and financial instruments for the promotion of energy efficiency have been introduced by State, Territory and Federal governments. A national framework for policy development by individual governments in respect of energy efficiency – the National Framework on Energy Efficiency (NFEE) - has been in place since 2004 following agreement at the Ministerial Council on Energy (MCE)[3]. In 2008, the Council of Australian Governments (COAG)[4] agreed to develop a National Strategy for Energy Efficiency, building on and providing $88m in additional funding to support policy initiatives being progressed under the nine strands of the NFEE. The 2008 COAG agreement was motivated in part by the perceived role of energy efficiency in supporting households and businesses in the context of the planned implementation of an emissions trading scheme (ETS). The measures anticipated in the national strategy include assistance to businesses and households, more consistent and stringent efficiency standards, reduction of barriers to demand response, and further assessment of vehicle efficiency. The National Strategy was endorsed and given further practical impetus by COAG in July 2009 through the National Partnership Agreement on Energy Efficiency. These national strategies provide an overarching direction for energy efficiency policy in Australia, and build on initiatives put in place by State and Territory governments, as well as policies previously implemented at the Federal level.

The Prime Minister's Task Group on Energy Efficiency was established in late 2009 to provide advice on options for improving Australia's energy efficiency by 2020. The Task Group is scheduled to provide recommendations to Ministers by mid 2010.

[3] The MCE is the national policy and governance body for the Australian energy market, including for electricity and gas. The MCE was established by the Council of Australian Governments (COAG) in 2001.

[4] COAG is the peak intergovernmental forum in Australia. COAG comprises the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association. The MCE is therefore sub-ordinate to COAG.

Europe

European Union, Croatia and Norway

The European Union has established a legal and regulatory framework to promote energy efficiency and to create the conditions for the development of a market for energy services.

The pillars of this policy are the Directive on Energy End-use Efficiency and Energy Services, the Energy Performance of Buildings Directive and the Energy Labelling Directive and various implementing measures and the 2006 EU Energy Efficient Action Plan, now under revision[5].

In 2007, the EU Council committed to deliver the 20% potential for cuts in primary energy consumption by 2020. EU Member States are required to put in place institutional and legal frameworks and measures needed to remove barriers to efficient end-use of energy.

In most countries traditional financial tools as well as regulatory instruments have been adopted to boost energy efficiency, in particular in the residential sector. Substantial savings in the building sector have been achieved in those countries requiring stricter provisions than those envisaged in the EU legislation. Moreover, gradual phasing out of incandescent light bulbs has been planned in many EU Member States.

Some countries have introduced innovative measures. For example, the Portuguese “efficiency cheque” reduces electricity costs to consumers with verified energy savings stemming from investments in energy efficiency and the British “pay-as-you-save scheme” uses saving on energy bills to pay for the upfront costs of smart meters roll-out. Moreover, some countries (e.g. Austria and the United Kingdom) established a link between energy efficiency support and social policy (programs for schools and low-income households).

Examples of market-based instruments are national tradable energy efficiency certificates systems (so called “White Certificates”) adopted by France and Italy (and in a near future by Poland) and the tender mechanism introduced in Portugal to select energy efficiency measures through a competitive procedure. Other countries, like Norway, rely on energy funds administered by flexible and market-oriented organisations.

In general the introduction and success of a measure depend also on national and local conditions. For example, voluntary agreements between state and local governments on the one hand and the business community on the other have been successfully adopted for years by Northern countries; these measures target particularly energy-intensive industries which contribute significantly to the overall economic activity of these countries. Moreover both the availability of efficient technologies and the availability of information for all the relevant actors (building professionals, end-users, energy managers, etc.) are important pre-conditions to achieve energy savings.

Five countries are proceeding to a roll-out of electricity smart meters and have adopted a legal framework for implementation of measures in this field. A roll-out is under discussion in another twelve countries. These policies will enable suppliers to develop new price models and end-

[5] Information included in this report with regards to European countries is based on data collected by Energy Regulators through questionnaires and internal reports and other public sources (European Commission documents, IEA and Odyssee-Mure data-bases).

users to be more active in the electricity supply market. Because of the accurate information smart meters can provide on actual time of use, customers should be encouraged to increase their efficiency in consumer energy and be part of demand-response plans. So far Demand-Side-Management Programs include mostly load interruptibility and time-of-use tariffs.

Most European Energy Regulators don't have any competences on main energy efficiency matters; these rest mainly with the government and ad hoc governmental agencies. Some Energy Regulators play a role in the management of market-based schemes (white certificates schemes and tenders) and/or roll-out of smart meters. In all European countries transmission and distribution tariffs, set or approved by Energy Regulators, are cost reflective and therefore don't include any incentives to increase the volume of transported energy. Some Energy Regulators regulate energy bills and therefore require that bills contain all the elements necessary to ensure that the customer has a complete and clear understanding of the bill. Moreover, in some cases they participate to information dissemination activities to raise public awareness on energy-saving practices.

Armenia, Macedonia, Russian Federation and Ukraine

Most of the Energy Regulators, who responded to our questionnaires, have very little competences and responsibilities in terms of energy efficiency, which are usually shared by several Ministries. Lack of information has been a major obstacle that has prevented us from providing an accurate picture of energy efficiency measures in these countries.

In general, billing is either not regulated or includes minimal information. In most respondent countries there haven't been introduced either certificates or tenders to promote energy efficiency. Energy Regulators from these countries do not support Demand-Side-Management programs and haven't yet adopted energy efficiency measures targeted to low income households. However, from the responses it was evident that smart metering is considered as a topical issue and projects are being initiated in this area. Despite these shortcomings, Energy Regulators rank energy efficiency as an issue of high priority both for their organisations and their countries.

There is a basic need to foster appropriate conditions and prepare a viable legal environment for regulators. It would be also useful to introduce financial measures (grants, subsidies, tax relief) to promote investments in the region.

2 Introduction

Energy Regulators in the framework of the G8 of Energy Ministers, Rome, 24-25 May 2009, committed to prepare a report on regulatory practices for energy efficiency to be presented at the Muskoka G8 meeting of 25 and 26 June 2010.

This report is the first ever produced by the ICER, the recently founded International Confederation of Energy Regulators[6]. It is the first step taken by Energy Regulators at worldwide level to gather data on regulatory practices aimed at fostering energy efficiency, a relatively young policy area and still under-researched field. The report focuses on regulatory practices which are closely related to, or of direct competence of, Energy Regulators and as such it does not include all energy efficiency measures, e.g. those related to the transport sector.

As time available for researching and drafting the report was relatively short, it contains more detailed information on some areas than on others. For example, some jurisdictions such as Canada, the United States, Australia, and the European Union are covered more extensively than others due to lack of available data[7].

We did our best to collect information extensively and accurately for all major jurisdictions through our regional associations and cooperation with organisations such as the International Energy Agency, the Renewable Energy, the Regulatory Assistance Project (RAP) and Energy Efficiency Partnership (REEP). We would like to thank them for their support in providing relevant data and reviewing parts of this report.

This report is still "work in progress". We aim to continue our work in this area by identifying a number of case-studies that have proved particularly effective.

[6] ICER was founded on 19 October 2009. Additional information is available on: http://www.iern.net/portal/page/portal/IERN_HOME/ICER_HOME

[7] With regard to South America, our analysis focussed on Brazil and Uruguay as they have implemented the most advanced policies to date.

We encountered difficulties in collecting data for Asian countries and focussed on its major economies. We were unfortunately unable to collect significant data for other major economies in the area, such as South Korea, Indonesia, Malaysia, Thailand and Vietnam. We have been able to gather information on Australia, but not on neighboring countries such as New Zealand.

All 27 EU Member States, Norway, the Russian Federation and Ukraine have been covered. Information was also gathered on other countries such as Armenia, Croatia and Macedonia.

2.1 How to read this report

Information gathered for each measure is listed by continent and country in alphabetical order.

The following countries have been covered in each continent:

- **Africa and the Middle East:**

  Algeria, Egypt, Israel, Jordan, Morocco, Saudi Arabia, South Africa, Togo, Tunisia.

- **North America:**

  Canada (Alberta, British Colombia, Nova Scotia and Ontario).

  Mexico.

  USA (California, Maine, Massachusetts, Minnesota, New York, Oregon, Texas, Vermont, Washington and Wisconsin).

- **South America:**

  Brazil and Uruguay.

  Our analysis focused on these two countries as they have implemented the most advanced policies to date.

- **Asia**

  China, India and Japan.

  We encountered difficulties in collecting data for Asian countries and focused on its major economies. We were unfortunately unable to collect significant data for other major economies in the area, such as South Korea, Indonesia, Malaysia, Thailand and Vietnam.

- **Australia**

- **Europe and the Russian Federation**

  All 27 EU Member States have been covered. Information was also gathered on other major countries such as Armenia, Croatia, Macedonia, Norway, the Russian Federation and Ukraine.

2.2 Definition of energy efficiency

For the purposes of this report the following definition of energy efficiency has been adopted:

"*Energy efficiency is the practice of reducing the amount of energy used without reducing the end-use benefits enabled by that energy. Energy efficiency can be categorised in a number of ways including end-use efficiency and end-to-end efficiency*".

(From Electricity Power Research Institute - EPRI.com -)

The present report focuses on end-use efficiency and the end-to-end efficiency as they are relevant to energy regulatory practices.

The above definition is a technical one: it focuses on measures that allow energy consumers to

derive the same benefits (or “utility”) while at the same time consuming less energy. Yet, when relevant to energy regulatory practices, the definition of energy efficiency has been extended to take into account the trade-off between cost and consumption – recognising that consumers might be willing to incur some dis-benefits by consuming less if the financial compensation is sufficient (and that this can enhance efficiency overall if the price at which load is willingly curtailed is less than the cost of supplying that increment of load).

3 Energy efficiency indicators

The energy efficiency indicators considered in this report have been chosen to facilitate cross-region and cross-country comparisons. An effort has been made to base the Report on sources of data with consistent definitions and methodologies. In particular, all the charts presented in this chapter are based on the annual historical series from 1971 to 2007 collected by the International Energy Agency (IEA). The economic time series on GDP and population come from OECD, World Bank and CHELEM-CEPII data bases, while CO_2 emissions and energy consumption were computed by IEA.

A general indication of energy efficiency performance is given by the **primary energy intensity** indicator, which relates the total energy supply of the geographical region or country to its GDP.

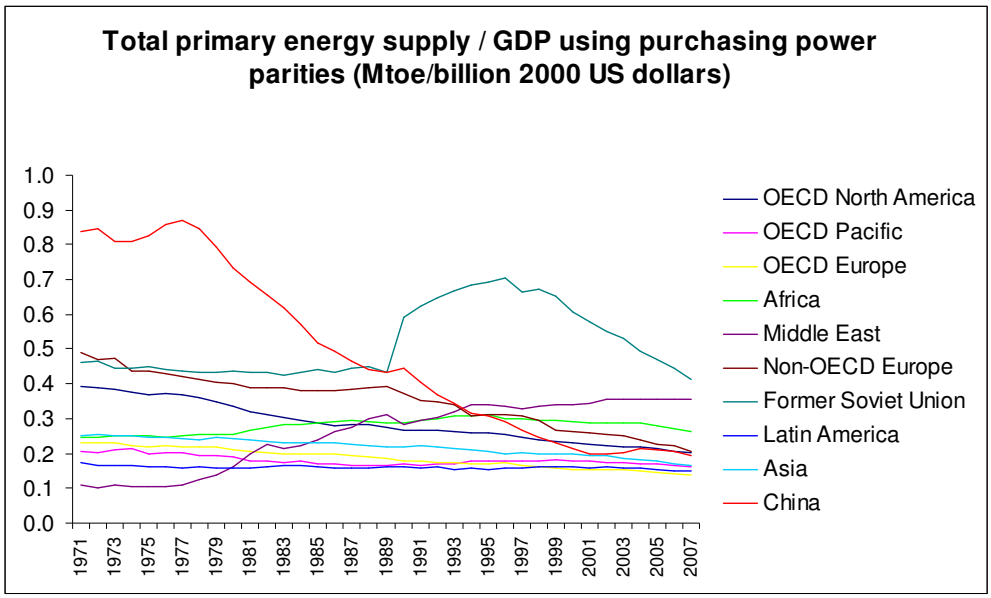
The total energy supply is computed by IEA as the sum of energy production and net imports minus international aviation and marine bunkers and changes in stocks. GDP data are converted at purchasing power parities by the World Bank to reflect differences in general price levels. This improves the comparability of energy intensities between regions with different levels of economic development. Primary energy intensity measures the quantity of energy which is required to generate one unit of GDP.

Energy efficiency measures are recognised to be one of the most cost-effective means of reducing GHG emissions. While carbon taxes and emission trading systems address mainly energy-intensive industries, initiatives to improve energy efficiency can play a crucial role in reducing carbon emissions in all the other sectors (e.g. building, appliances, transport, public sector, etc.). An indication of results achieved towards a more sustainable economic development is given by the **carbon intensity** indicator, which relates the carbon emissions of the geographical region or country to its GDP. Carbon emissions, as computed by IEA, refer to CO_2 emissions from fuel combustion in the energy sector (accounting for around 60% of global emissions).

Enhancing energy efficiency and reducing the carbon intensity of a supply largely dependent on fossil fuels are important steps toward a global low-carbon energy system.

The other indicators which are presented in the following section are expressed in per capita terms (**GDP/per capita, carbon emissions per capita and energy intensity per capita**) to enhance comparison of levels of economic development, energy consumption and emissions across countries.

Figure 1: Energy intensity



Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

The graph in Fig. 1 shows energy intensity in each geographic area. Energy intensity has decreased since the early seventies in most regions, including OECD.

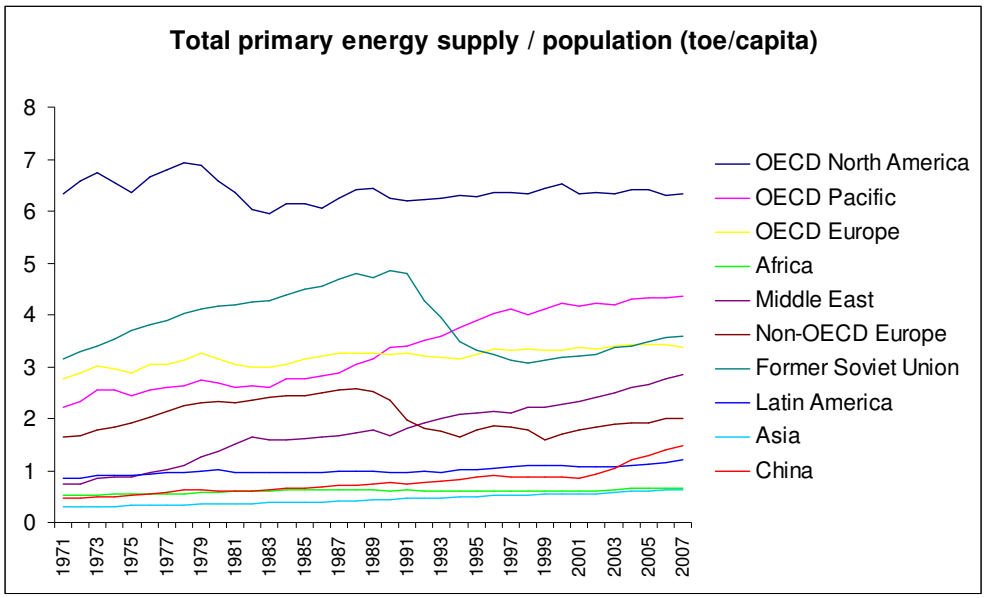
The most notable trend is a substantial increase in energy efficiency in China, leading to a decoupling between GDP growth and energy intensity.

Non-OECD Europe and North America energy intensity more than halved or halved during the same period.

The former Soviet Union is also on a path towards improving energy efficiency after a negative trend in the nineties due to the economic collapse. Even so, it remains well above world average.

In contrast to the rest of the world, energy intensity in the Middle East has been increasing substantially since the early nineties, demonstrating that economic growth is not decoupled from energy consumption.

Figure 2: Primary energy per capita



Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

The graph in Fig. 2 shows per capita primary energy consumption by geographic area.

There is a general trend towards increased per capita primary energy consumption in most areas, including those that started from a low consumption basis.

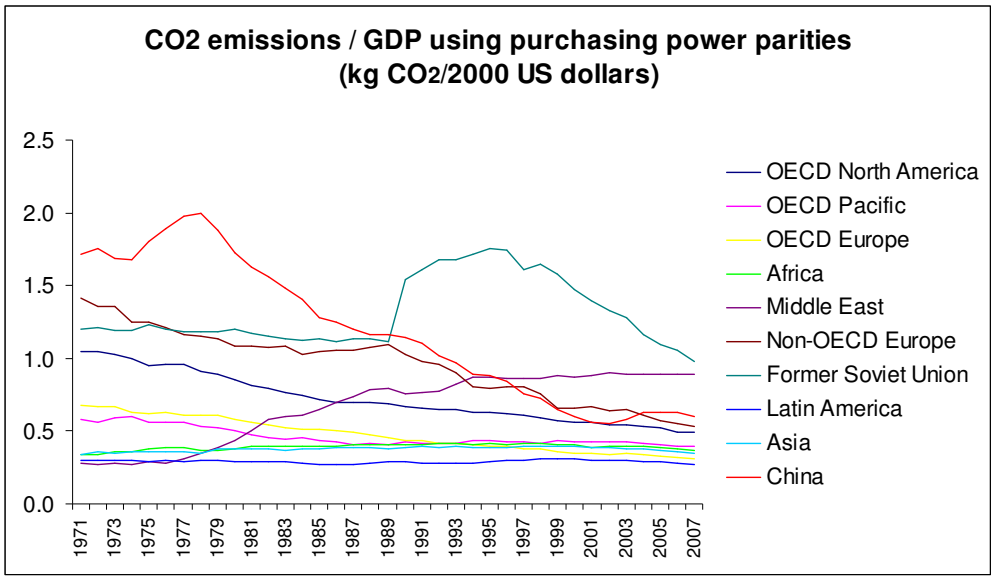
One of the sharpest increases is found in China since 2000, albeit consumption started from a very low baseline.

Both the Former Soviet Union and Non-OECD Europe show a marked dip in consumption between 1991 and 1997, marking the economic slump that affected the region, and a trend towards increased consumption since the late nineties.

There is a marked increase in energy consumption in the OECD Pacific region and in the Middle East, and a moderate increase in the European OECD Countries.

Per capita energy consumption in North America is the highest in the world, but has remained relatively stable since the eighties.

Figure 3: Carbon intensity



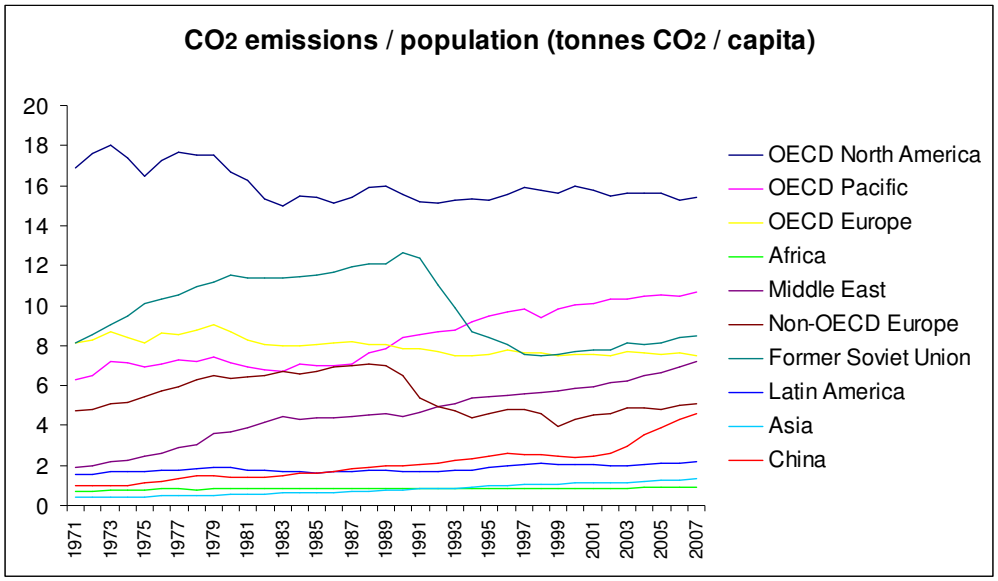
Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

The graph in Fig. 3 shows carbon intensity per geographic area.

Not surprisingly, carbon intensity shows trends comparable to energy intensity in most regions.

With the exception of the Middle East, carbon intensity is stable or decreasing, which indicates a decoupling of economic growth and carbon intensity. The most marked decreases have been taking place in China and the Former Soviet Union. However, it is to be noted that China was the most carbon intensive economy in the world in the early seventies. The decrease shown for the Former Soviet Union follows a massive increase in intensity in the nineties. Carbon intensity has decreased dramatically in North America, albeit from a high rate in the early seventies. Decreases are also shown less markedly but constantly in the European OECD Countries and the OECD Pacific Region.

Figure 4: Energy related CO_2 emissions per capita

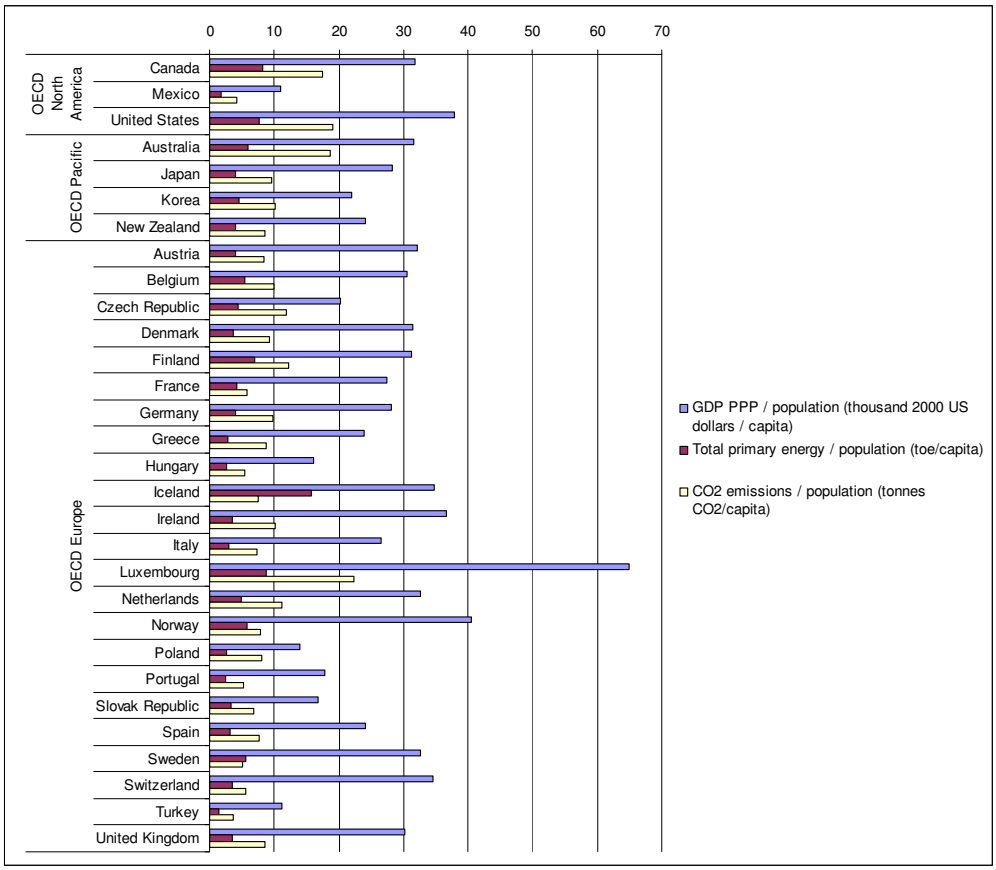


Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

The graph in Fig. 4 shows per capita CO_2 emissions.

With the exception of North America and the European OECD Countries, where per capita CO_2 emissions seems to have stabilised or slightly decreased since the late nineties, there is a general increasing trend in most regions. The most marked increases are taking place in China, the Middle East and in the OECD Pacific region.

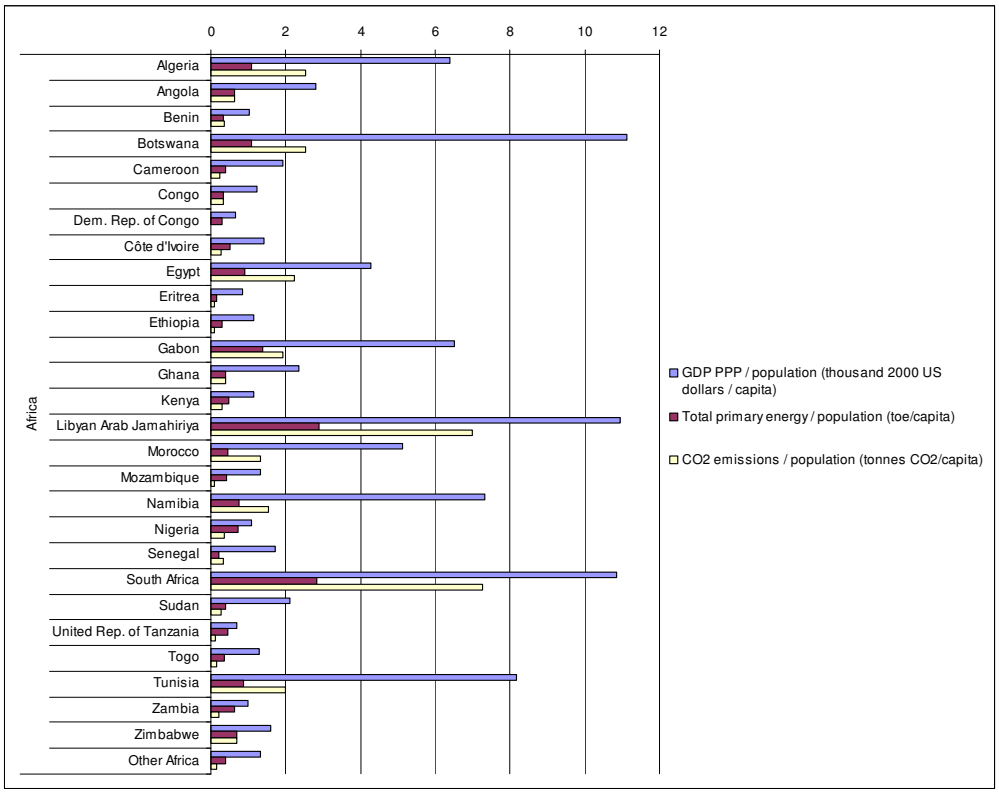
Figure 5: OECD: GDP per capita, CO_2 Emissions per capita and Primary Energy per capita (2007)



Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

In most OECD countries there has been a remarkable decoupling between GDP growth and per capita primary energy consumption. The same however cannot be said in relation to CO_2 emissions. GDP and emissions per capita either go hand-in-hand (e.g. in the US, Canada and Australia) or show a strong positive correlation. There are some notable exceptions (e.g. the UK, France, Norway, Mexico, New Zealand and Japan). The reasons behind the more substantial de-coupling in the latter group vary from country to country, from massive increases in energy efficiency in Japan, to widespread use of nuclear energy in France and a shift towards a service-based economy in the UK.

Figure 6: AFRICA: GDP per capita, CO_2 Emissions per capita and Primary Energy per capita (2007)

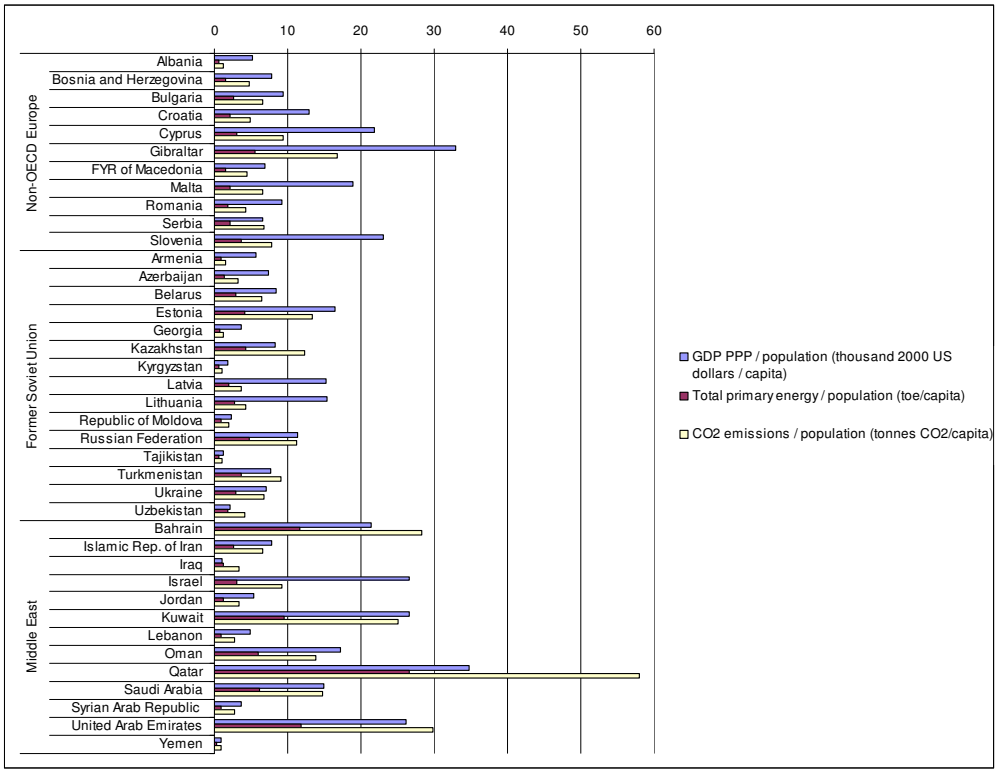


Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

Like in most OECD countries, the most advanced African economies (e.g. South Africa, Botswana, Libya, Morocco and Algeria), show decoupling between GDP growth and per capita primary energy consumption. In some cases (e.g. Algeria, Tunisia, Botswana), there is also a remarkable de-coupling between GDP growth and per capita emissions. This trend however does not apply to South Africa, the major economy of the continent, and Libya.

It should be noted, however, that even in the most advanced countries, per capita GDP and emissions are substantially lower than in OECD regions.

Figure 7: Non OECD EUROPE, Former SOVIET UNION, MIDDLE EAST: GDP per capita, CO_2 Emissions per capita and Primary Energy per capita (2007)

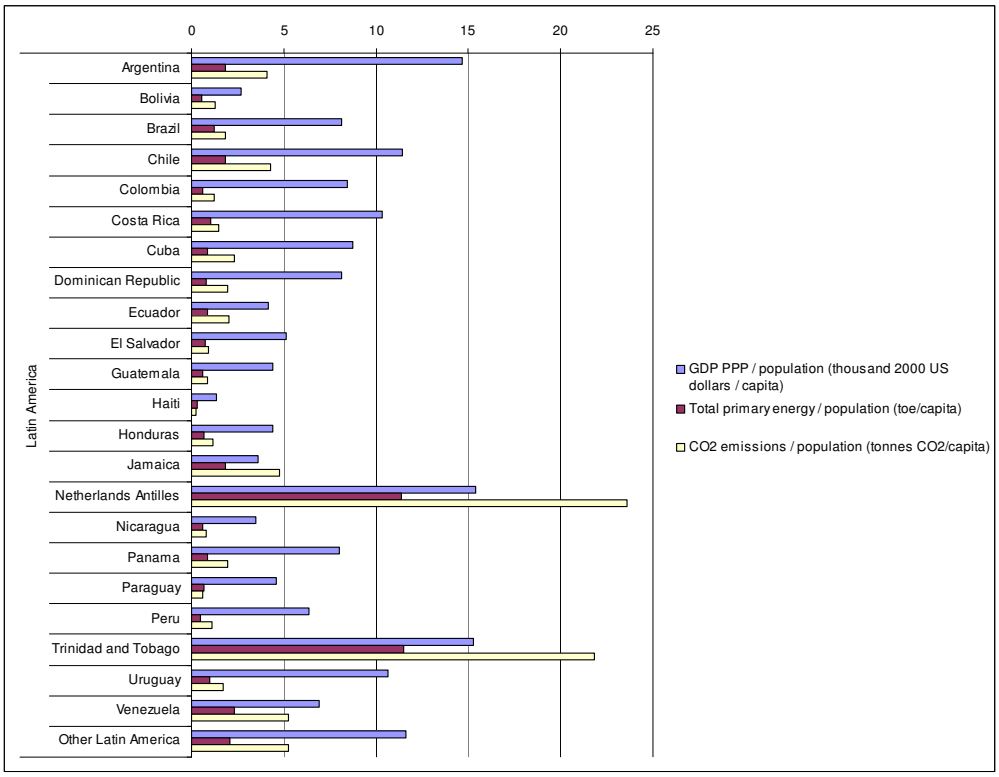


Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

With few exceptions, the Middle East region is characterised by high economic growth coupled with a marked increase in CO_2 emissions. In some of the major economies however (e.g. Israel, Iran and Saudi Arabia), GDP per capita is not matched with a proportional increase in per capita primary energy consumption, which indicates gains in energy efficiency.

A similar situation can be seen in the Former Soviet Union. The Russian Federation in particular shows a marked increase both in GDP and emissions following the collapse of its economy in 1991, but substantial energy efficiency gains. The picture is quite different in non-OECD Europe. Some of the most advanced countries (Slovenia, Croatia, Romania and Malta) have managed some substantial de-coupling both in terms of primary energy consumption and carbon emissions. The decoupling is particularly marked in Albania, a small country characterised by an impressive economic growth over the past decade, but much less so in Bulgaria.

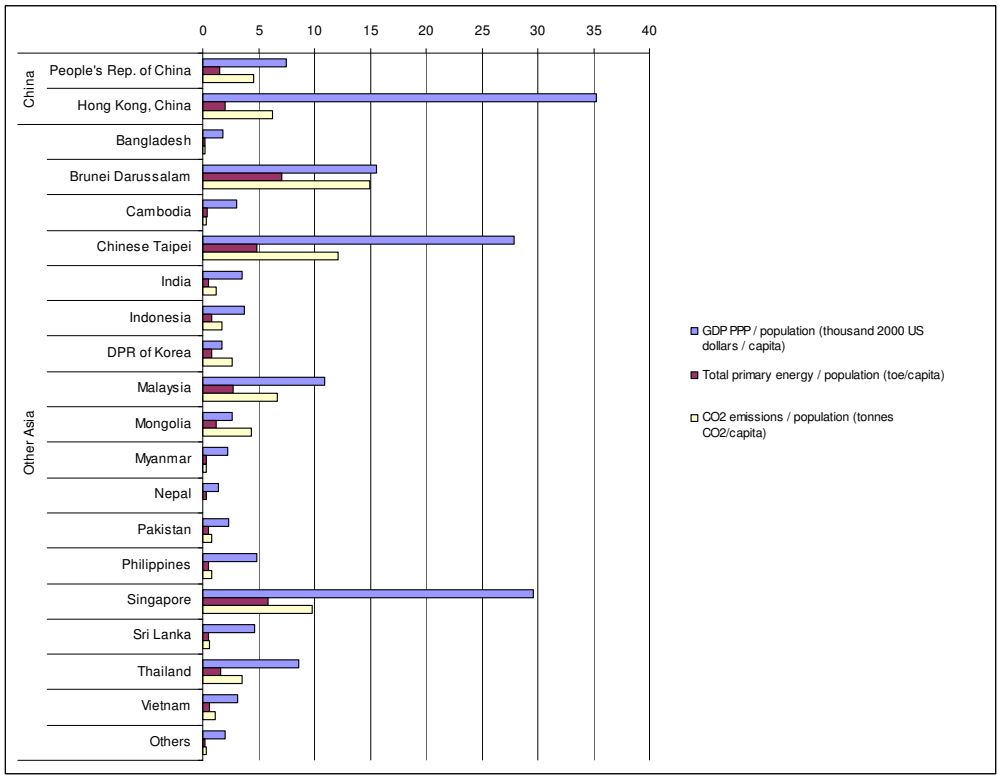
Figure 8: LATIN AMERICA: GDP per capita, CO_2 Emissions per capita and Primary Energy per capita (2007)



Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

The major economies in Latin America (e.g. Brazil, Argentina, Chile, Peru) have achieved a substantial de-coupling between economic growth, per capita primary energy consumption and CO_2 emissions. An exception is Venezuela, which has seen a marked increase in emissions. This is probably due to the relative weight of the oil industry in the economy. Some of the smaller countries (e.g. Netherland Antilles and Trinidad and Tobago) have the highest GDP per capita but also the highest primary energy consumption and emissions in the region.

Figure 9: ASIA: GDP per capita, CO_2 Emissions per capita and Primary Energy per capita (2007)



Source: ICER elaboration on the basis of data tables published in the report: CO_2 emissions from fuel-combustion (2009 Edition, IEA, Paris)

Some of the major economies in Asia (excluding China), for example, Singapore, Taipei, Malaysia, Indonesia and Thailand, seem to be on a positive path of decoupling growth from per capita primary energy consumption and, to a lesser extent, CO_2 emissions.

India is in a different situation: GDP per capita has increased exponentially over the past couple of decades, but per capita energy consumption and emissions have grown less than proportionally, and are still very low if compared to GDP.

The main reason seems to lie in the great social and economic disparities still existing in the country, where more than two thirds of the population have still extremely low per capita GDP, energy consumption and emissions, as well as in a substantial drive towards energy efficiency.

Mainland China has witnessed impressive per capita GDP growth over the past three decades, although this is concentrated in the coastal regions and some urban areas.

Per capita energy consumption has remained relatively low compared to GDP, which shows the remarkable energy efficiency achievements of the past decades.

Per capita emissions have instead been growing at a more sustained pace, albeit less than

proportionally relative to GDP growth. The comparison between mainland China and Hong Kong is quite telling. Although GDP per capita is nearly five times that of mainland China, per capita energy consumption and emissions are only slightly higher. This is the result of an economy highly focused on services rather than manufacturing, coupled with a strong energy efficiency drive.

4 Overview of energy efficiency support schemes

The objective of this chapter is to give a general description of policy measures and instruments put in place to encourage energy efficiency.

For the purpose of this report, these measures have been divided into the following categories: legal or regulatory instruments, financial measures, market oriented mechanisms such as white certificates, voluntary agreements, energy audits, energy efficiency programmes in the public sector, smart metering, regulation of billing and other initiatives for providing information to consumers, commercial offering, entailing services to reduce energy consumption, and Demand Side Management programmes.

Each of them is discussed in turn below.

4.1 Legal or regulatory instruments

Governments can set legal requirements on power companies, industry and households with financial penalties for non-compliance. Examples include appliance, vehicle and building standards (on energy use or emissions), land and other resources management codes and standards for technology.

Many legal or regulatory instruments are product specific. For example, “Minimum Efficiency Standards” consist of mandatory or voluntary regulations governing the fulfilment of minimum efficiency or maximum consumption requirements by products brought onto the market. “Product Prohibition” place legal bans on putting certain (particularly inefficient) products on the market. “Labelling Requirements” mandate the provision of accurate and comprehensible information to consumers regarding the energy consumption of household appliances.

Standards affecting the building sector can be either prescriptive (for example, prescribing the maximum heat transmission through walls) or performance based (giving requirements for the overall energy performance of the building without prescribing specific measures). In addition, Governments can introduce specific certification systems for new and/or existing buildings.

Standardisation is an instrument that is widely used also in industry, in order to ensure product quality and product and process safety. A common approach consists in prescribing minimum energy efficiency standards (or maximum energy levels) for horizontal technologies, especially for motors and drives.

4.2 Financial measures

Financial measures aim to encourage investment in energy-efficient equipment and processes operate either by reducing the costs associated with energy efficiency investments or by increasing the costs associated with energy use.

Main examples of policies reducing costs associated with increasing efficiency are grants and subsidies for investments in energy efficiency, subsidised audits, low-interest loans (including both public loans and innovative loan funds), tax relief for the purchase of energy-efficient equipment and tax relief as an element of a larger energy or greenhouse gases emission tax or

negotiated agreement scheme.

Grants and subsidies are public funds given directly to the party implementing an energy efficiency project, while subsidised audits are aimed at promoting the assessment of the energy efficiency of a facility and the provision of technical and financial information about measures that can be taken with regard to energy, including reducing energy consumption, fuel switching, and load management.

Public, or soft loans, are loans subsidised by public funding that are offered at interest rates below market interest rates for investments in energy efficiency. Often these loans are combined with innovative funds which involve banks and the private capital in addition to the public sector.

Other fiscal measures include tax relief which can be provided either through programmes that grant special treatment for the purchase of specified technologies (accelerated depreciation, deduction from annual profits, exemption from customs taxes, etc.) or through programmes that allow tax rebates to industries that meet specific targets.

Taxes and levies associated with energy use or with the emissions that result from consumption of energy are imposed on users with the goal of creating incentives to reduce wasteful energy consumption practices or of creating public programmes and funds for encouraging energy efficiency. These policies can include energy or energy-related CO_2 taxes (environmental taxes), pollution levies (e.g. disposal of hazardous waste) and public benefit charges (programmes to promote energy efficiency and assistance to low-income households usually funded by fees imposed on all distributed electricity).
In addition to individual measures, Governments have also implemented integrated policies that combine a variety of financial policies along with other energy efficiency mechanisms, such as voluntary agreements into a national-level energy efficiency or greenhouse gas emissions mitigation program.

4.3 Tradable Certificates / saving obligations on energy utilities

Energy efficiency tradable certificates systems are one of the new key instruments to support energy efficiency improvements, and aim to achieve existing or newly formulated efficiency targets in a cost-effective way. As a representative of a set of market-based instruments in the European internal market, they build upon experiences with similar types of schemes such as the EU ETS and renewable certificate schemes.

Tradable certificates have up to now been used in combination with an obligation scheme. Market actors (usually retail energy suppliers or distributors) are obliged to reach a certain amount of energy savings.

Target compliance requires submission of a number of certificates commensurate with the energy saving target. Certificates can be created from projects that result in energy savings beyond business as usual, by obliged market actors or by third parties, such as Energy Services Companies (ESCOs).

Operators receive certificates reflecting the savings achieved, which can be used for their own target compliance or can be sold to (other) obliged parties.

It should be noted that the fixing of saving obligations does not necessarily imply the introduction of certificates, nor of certificate trading. Energy savings certificates known as "white

certificates" rely instead on the creation of a market for trading.

More generally, whenever certificates are issued to demonstrate the achievement of energy savings, four systems are possible:

- imposition of energy saving obligations and verification of compliance via certification of savings;
- imposition of energy saving obligations and trade of obligation or certified savings;
- introduction of savings certification to demonstrate eligibility for tax relief or exemptions, and subsidies or carbon offset programs;
- a wider definition: scheme involving an obligation that can be met by improved energy efficiency and in which energy saving certificates can be created and traded within a larger allowance, certificates or project credit trading regime.

4.4 Tenders

An alternative market-based measure to promote energy efficiency initiatives consists of designing a tender mechanism for the selection of the most effective measures. The main purpose is to promote competition in the implementation of energy efficiency measures, thus reducing the input price.

Typically the mechanism involves a request for proposal to have an external party provide needed services or equipment. The process can also involve the sale of assets or licenses by the party issuing the announcement.

The rules of the tender mechanism, defined ex-ante, specify the process of selection of the measures, based on a technical and economical benefit-cost analysis. The procedures, the eligible agents that can participate in the tender process and implement the measures, the timetable applied and the monitoring and verification procedures must also be defined in the rules.

The tender process, the measures selection, and the monitoring and verification are implemented by an independent authority, in most cases by the energy regulator.

4.5 Voluntary agreements

Voluntary agreements are commitments to improve energy efficiency or reduce usage undertaken by market players, power producers or industries, in consultation or negotiation with a public authority, and usually recognised by that agency. Such commitments are supposed to deliver Government policy objectives faster or more cost-effectively than mandatory requirements.

Even though voluntary agreements can take different forms, most of them are between policy makers and industry. They can consist of the fixing of a non-binding target for energy efficiency improvements or emission limits, and can be introduced in exchange for regulatory forbearance. Voluntary agreements are almost always supported by performance indicators and exchanges of good practice between participants.

Some forms of incentives may be necessary to encourage the industry to enter into voluntary agreements. Such incentives usually include reimbursement of certain energy and environmental taxes, promises not to increase energy taxes for industries that enter the agreement and meet their targets and subsidised energy audits.

Voluntary agreements can also involve other decision makers, such as final consumers. In this case, the realisation of any expected behavioural change would need to be backed up by targeted incentives, such as rebates in shops.

4.6 Energy audits

Energy audit allows a systematic approach for decision-making in the area of energy management and represents an effective tool in defining and pursuing comprehensive energy management programme. Audits are scalable, and can be applied to large and small users, domestic and business

Audits consists of the verification, monitoring and analysis of energy use, including submission of technical reports containing recommendations for improving energy efficiency, based on a cost-benefit analysis, and an action plan to operatively implement them. The audit is aimed at identifying all of the energy streams present in a facility and quantifying energy usage according to its discrete functions. The audit facilitates subsequent measures that can be undertaken, including the reduction of energy consumption, fuel switching, and load management.

Energy audits exist both in a voluntary and in a mandatory form, and are more common within the building sector. Mandatory requirements for energy audits range from an obligation to carry out audits, if a threshold of energy consumption is passed, to mandatory reporting and implementation of certain types of measures and compliance with standards.

Energy audits, promoted by the Government or by public utilities, can be partially subsidised or provided entirely free of charge to industry, reducing the transaction costs associated with implementation of new energy-efficient technologies. Subsidised audits are usually provided to companies based on size, amount of energy consumed or number of employees, or to target specific consumers.

The importance of this instrument is derived from the fact that it does not merely create awareness amongst those who are functionally involved in the management of energy, but also exposes the need for the adoption of energy efficiency activities.

4.7 Energy end-use efficiency in the public (Government) sector

The public sector can contribute to promoting and consolidating a market for energy efficient equipment and services by playing an exemplary role, leading to the development of policies in other sectors. Such positive impacts can consist of the development of the ESCOs market, as well as in the public procurement of energy efficient equipment, hence developing the market for energy efficient products and services.

Energy efficiency programmes in the public sector involve both the principal beneficiary, the public administration - i.e. national, local and regional governments, as well as programmes involving services of general interest. The first category of programmes includes efficiency in Government office buildings, procurement for Government offices and efficiency in Government

vehicle fleets. The second category includes public infrastructure that is publicly owned and/or regulated (roads, public lighting, waste removal, water supply and treatment, electricity, heat and natural gas distribution, public housing, etc.) and facilities for public services (schools, hospitals, other social and healthcare establishments, cultural and sport facilities, etc.).

4.8 Regulation of billing and other information provided to consumers regarding their consumption

Energy utilities are generally required to provide information to their existing and potential customers in order to increase their awareness of energy consumption.

Such information can include the level of consumption, articulated among different aggregations of hours - in some cases compared with historic consumption -, the contemporaneous level of prices or tariffs, and other aspects such as the quantum of greenhouse gases emissions caused by a specific level of energy consumption. This kind of information can be provided to consumers primarily through three channels: in bills, in displays associated with smart meters and through on-line data access.

Other information provided to consumers could address issues related to the energy supplier, such as its energy sources mix and the related environmental impact of those sources.

Providing information to consumers not only increases market transparency, but also enables consumers to make informed choices about suppliers, supporting the development of a secure and sustainable energy system.

4.9 Other initiatives for providing information to consumers

Consumers' awareness and interest in energy saving is commonly recognised as a key factor in achieving greater energy efficiency and stimulating demand for related products and services.

For this reason, there is a general interest in major marketing programs to educate the public about what they can do to save energy. Such an initiative is generally backed by the Government, with industry stakeholders working together, and can be implemented at a local, regional or national level.

Information campaigns, either general or targeted to specific classes of consumers, are commonly used to drive a change of behavior in all main operators in the energy sectors, which should commit to adopt patterns of energy production and consumption based on renewable sources and rational use of energy.

A central role in the dissemination of information related to energy efficiency can be given to Local and regional Energy Agencies (LEAs) that support the introduction of good energy-management practices, advocate the concept of sustainability, provide information and guidance and offer a number of other local services based on specific local energy needs, operating on both energy demand and supply issues.

In addition to general policies for information dissemination, ad hoc initiatives can be aimed at informing and training professionals in the energy sector.

A particular form of information provided to consumers relates to certification/labeling mechanisms that allows a public recognition to initiatives aimed at increasing energy efficiency. The emphasis, in this context, is on mechanisms to promote energy efficiency based on a voluntary certification/labeling system that is not prescribed by law or regulations.

4.10 Commercial offers entailing services to reduce energy consumption

Energy utilities can propose to their existing or potential customers commercial offers that bundle the supply of energy with the provision of energy efficiency services, such as energy audits and rebates for the purchase of efficient equipments and appliances. This allows energy utilities to differentiate their offers from competitors, while customers can benefit from a reduction in energy consumption.

These initiatives are substantially different from offerings proposed by energy utilities to meet an obligation in terms of energy efficiency, which are purely voluntary initiatives.

4.11 Smart metering

The smart meter as interface between customer and other market participants plays a key role in all market processes and therefore impacts on the overall functioning of an energy market.

Smart meter, in particular, is a generic term for:

- Automated Meter Management (AMM) or Automated Metering Infrastructure (AMI): two-way system, enabling data communication between customers, suppliers and distribution network operators.

Electronic meters are more accurate than electromechanical meters, have lower energy consumption, and can be easily combined with digital displays providing the consumer with more accurate information regarding his or her energy consumption.

Customers are able to monitor the volume of energy used during different periods of the day (peak or off-peak hours), as well as their electricity consumption, enabling consumption behavior changes.

In addition, smart meters potentially allow more accurate billing, since bills can be consistently based on actual rather than estimated consumption; moreover, the use of standardised load profiles for small customers in the clearing and settlement process could be replaced or improved on by individual customer load profiles.

Concerning the supply-side, smart metering allows energy utilities to offer customized contracts and added-value services. Retailers and network operators, in particular, may offer multi index tariffs (peak, off-peak, mobile peak…) and thereby, at least to some extent, encourage customers to move consumption away from time periods with potential capacity problems. A more sophisticated solution than multi-index tariffs consists in offering prices that vary according to the wholesale market variations, through hourly metering.

Typically, large industrial enterprises are more likely to find it cost efficient to employ personnel to monitor price signals and take appropriate actions. For residential end-users, the savings may be too small to justify the cost of continuously manually monitoring prices.

4.12 Demand Side Management

Demand Side Management (DSM) programmes refer to actions taken on the customer's side of the meter to change the amount or timing of energy consumption.

Demand Response (DR) is a subset of Demand Side Management. It usually refers to a set of activities to reduce or shift electricity use to improve electric grid reliability, manage electricity costs, and ensure that customers receive signals that encourage load reduction during times when the electricity grid is near its capacity. The two main drivers for widespread demand responsiveness programmes are the prevention of future electricity crises and the reduction of electricity prices. Additional goals for price responsiveness include equity through cost of service pricing, and customer control of electricity usage and bills.

Emergency Load Response programs are interventions aimed at avoiding shortfalls in energy supply. Usually, the Transmission System Operator (TSO) offers a remuneration to particular categories of consumers amenable to planned and unplanned interruptions to their energy supply in order to prevent critical situations in network operations. Such consumers are generally industrial and large commercial operators, whose supply is interrupted when resources supplied by the TSO on the dispatching services market are insufficient to maintain the safe operation of the system.

Demand Side Bidding (DSB) is a mechanism that enables consumers, either directly or through a broker, to participate in the electricity market or in the operation of the system through offers that cause changes in their normal consumption profile.

This mechanism enables consumers to actively participate in the market and enables final consumers to have price signals that, by reflecting of actual costs, would result in a higher efficiency of the energy system. I successfully implemented, this mechanism should lead to lower utilisation of inefficient power plants during demand peaks or lower utilisation of plants consuming fossil fuels for system regulation.

The most commonly used forms of demand participation in the electricity market, are:

- Offers in organised markets or pools: active demand participation leads to a more efficient functioning of markets, as resulting prices derives directly from interaction between supply and demand side forces. It is important to notice that the positions of consumers will generally be of purchasers of energy in the markets, even though a consumer who purchased energy through a bilateral contract before the organised market session, could also act in that market as a seller, to balance its position. If a consumer obtains economic advantages by selling energy instead of consuming it when prices are higher, some other customers will also benefit from this, since prices won't rise as much as they will without demand reduction. In addition, economic benefits are obtained as a consequence of the mitigation of the potential market power of generators.
- Supply of specific additional services: similarly to generators, certain consumers provide additional services like congestion management, tertiary reserve, tension control, management of problems linked to shortages and disruptions. These services include interruption mechanisms, adopted directly by large consumers or by traders, which act as aggregators of domestic and industrial consumers demand.

5 Description of existing energy efficiency support schemes in regions/countries

The aim of the chapter is to describe regulatory practices in energy efficiency around the world. All the policies and measures have been grouped by type of instrument as described in Chapter 4 in order to facilitate sharing of good examples. Comprehensive programmes, which include energy efficiency measures but which may also address other objectives, such as the promotion of renewable energy sources or coping with fuel poverty, have been included in the sub-chapter *5.14 Other measures*.

The sources of information for the policies and measures described in this chapter are the following:

- Data collected by means of an ad hoc questionnaire (ICER questionnaire) circulated to Regional Regulatory Associations and National Energy Regulators.
- Data and documents provided by Regional Associations:
    - Status Review of Renewable and Energy Efficiency Support Schemes in EU, December 2008 – Council of European Energy Regulators.
    - Status Review on Regulatory Aspects of Smart Metering (Electricity and Gas) as of May 2009 – European Regulators Group for Electricity & Gas.
    - Pros and Cons of support mechanisms to promote RES and CHP, September 2008 – Ad hoc Group on Environment, RES and Energy Efficiency, MEDREG.
    - Effects of the introduction of successful mechanisms to promote Energy Efficiency in non-EU countries, May 2010 – Ad hoc Group on Environment, RES and Energy Efficiency, MEDREG.

- Data and documents publicly available:
    - International Energy Agency database on energy efficiency policies and measures.
    - Implementing Energy Efficiency Policies, Are IEA member countries on track?, 2009 – International Energy Agency.
    - Synthesis of the complete assessment of all 27 National Energy Efficiency Plans as required by Directive 2006/32/EC on energy end-use efficiency and energy services, June 2009 - European Commission Staff Working Document.
    - Odyssee-Mure project coordinated by ADEME (French Environment and Energy Management Agency) – National Reports.
- Data and documents provided by External Organisations:
    - China Climate Change programme, National Development and Reform Commission.

- People's Republic of China, June 2007.
- China's Policies and Actions for Addressing Climate Change, Information Office of the State Council of the People's Republic of China, 2008.
- The Action Plan for energy efficiency, Bureau of energy efficiency, India, 2009.
- Energy Policies of IEA Countries, Japan 2008 Review, IEA, 2008.

More details are included in the bibliography which provide also for additional information on relevant web sites and documents.

Table 1 – Sources of information on energy efficiency measures and policies

Country	Questionnaire ICER	Material provided by Regional Associations	Public sources	Material provided by External Organisations
Algeria	X	X		
Armenia	X			
Australia	X			
Austria	X	X	X	
Belgium		X	X	
Brazil	X			
Bulgaria		X	X	
Canada	X			
China				X
Croatia	X	X		
Cyprus		X	X	
Czech Republic	X	X	X	
Denmark		X	X	
Egypt	X	X		
Estonia		X	X	
Finland		X	X	
France	X	X	X	
Germany		X	X	
Greece		X	X	
Hungary	X	X	X	
India				X
Ireland		X	X	
Israel		X		
Italy	X	X	X	
Japan				X
Jordan	X	X		
Latvia		X	X	
Lithuania		X	X	

Table 2– Sources of information on energy efficiency measures and policies - *continuing*

Country	Questionnaire ICER	Material provided by Regional Associations	Public sources	Material provided by External Organisations
Luxembourg	X	X	X	
Macedonia	X			
Malta		X	X	
Mexico	X			
Morocco		X		
Netherlands		X	X	
Norway		X	X	
Poland	X	X	X	
Portugal	X	X	X	
Romania	X	X	X	
Russian Fed.	X			
Saudi Arabia	X			
Slovak Republic		X	X	
Slovenia		X	X	
South Africa				X
Spain	X	X	X	
Sweden		X	X	
Togo	X	X		
Tunisia		X		
Ukraine	X			
United Kingdom	X	X	X	
Uruguay	X			
USA	X			

5.1 Legal or regulatory instruments

Africa and Middle East

In Africa and Middle East, a relatively small number of countries has set legal requirements and technical standards to improve the energy efficiency of buildings, electrical appliances and vehicles. Moreover, the enforcement of existing rules represents a critical issue also in countries that have established energy efficiency standards.

With regard to regulation for buildings, existing standards often only apply to non-residential buildings. Labelling and efficiency standards for electrical appliances are often based on the experience of other countries where their effectiveness has been already proven: for example, the European label has been used as a model in Tunisia and Iran.

In **Algeria**, the energy efficiency law n.99-09 of July 1999 defines the general rules concerning the energy efficiency of appliances operating on electricity, gas and petroleum products, establishing, for example, obligations in terms of mandatory audits in building, transport and industry sectors (with thresholds respectively equal to 500 toe, 1.000 toe and 2.000 toe); labelling requirement for refrigerators and air conditioners and lighting appliances (although not yet implemented).

Efficiency requirements are also in place in **Egypt**, **Tunisia** and **Morocco** for water boilers, refrigerators and lighting, as well as energy efficiency building codes exist for residential and commercial building. Regarding Egypt, energy labels have been approved by the Egyptian Organisation Standards (EOS) for refrigerators, freezers, washing machines and air conditioners.

A more comprehensive set of legal and regulatory standards is in place in **Israel**. The Standards Institution of Israel (SII) is the official body for the preparation and publication of Israeli standards. According to the “Standards Law of 1953", the purpose of SII is to prepare standards as well as to ensure the quality of products which are produced locally or imported. Today SII incorporates standardisation, testing, certification and training activities and has laboratories in almost all technological areas, providing testing and inspection services to industry and commerce, as well as regulatory services to government. Minimum efficiency standards exist for steam boilers, electric heaters, refrigerators and freezers, air conditioners and other residential appliances, as well as for pumping systems and for electric motors in the commercial and industrial sectors. Technical standards exist also for thermal insulation of building in all sectors. SII defined in 1994 a standard for ecological labelling, known as the Green Label, granted when a product meets environmental criteria, including energy savings.

In **Saudi Arabia**, a new building code has been introduced in 2010 including energy efficiency standards for new buildings. Moreover, the Saudi Arabia Standards Organisation (SASO) has recently established new efficiency requirements for electrical appliances and equipments; the fulfilment of new obligations is guaranteed through labels indicating the level of energy use.

The **South African** Bureau of Standards is currently working on standards for labelling for appliances. The motor industry does include specifications on fuel consumption for cars for sale.

North America

Canada

In *Ontario*, the *Green Energy and Green Economy Act, 2009*, (the "Green Energy Act") establishes important responsibilities for the Ontario Energy Board and other entities in achieving the objectives of conservation. The Ontario Energy Board is currently working with the Ontario's Ministry of Energy and Infrastructure and the Ontario Power Authority (OPA) to develop conservation targets and a reporting process for electricity distributors. Conservation targets will be made a mandatory condition of license for electricity distributors over a four year period, beginning January 1, 2011.

Prior to the Green Energy Act, electric utilities in Ontario were also involved in implementation conservation programs but it was a voluntary initiative. For these programs, the Ontario Energy Board had developed Guidelines for Electricity Distributor Conservation and Demand Management in order to provide comprehensive information on the policies relating to CDM activities undertaken in Ontario. The policies are intended to guide distributors in designing program proposals, applying to the Ontario Energy Board for funding through distribution rates, and implementing their programs. Going forward and with the implementation of conservation targets, the Ontario Energy Board will develop a CDM Code that will outline the rules and requirements for utilities to follow in meeting their mandatory targets and preparing their annual reports on their progress toward their targets.

Demand side management programs are also offered by the two major gas utilities in Ontario, Enbridge Gas Distribution and Union Gas Inc. In the Ontario Energy Board's decision dealing with Enbridge Gas's 2006 rates, the Ontario Energy Board announced its intention to convene a generic proceeding for the two major gas utilities in Ontario, Enbridge Gas and Union Gas, to address a number of current and common issues related to Demand Side Management activities for natural gas utilities. The first Demand Side Management plan had a three year term from 2007 – 2009. Due to uncertainties relating to the Green Energy Act, the Generic Demand Side Management Framework has been extended and Enbridge Gas and Union Gas have been filing one year plans in the interim.

In *British Columbia* (BC), the Utilities Commission Act includes sections which require the BC Utilities Commission to consider the "government's energy objectives" when accepting utilities proposed plans or expenditures. The definition of the government's energy objectives, is defined in the Utilities Commission Act. The definition is linked to the BC Energy Plan which contains discussion of the government's objectives for energy conservation and efficiency. Thus, when evaluating projects for approval, the BC Utilities Commission. must consider demand-side measures under the Utilities Commission Act and energy efficiency measures under the BC Energy Plan. As well, the Utilities Commission Act requires the utilities to report on their Demand Side Management (including energy efficiency programs) to the BC Utilities Commission.

Quebec's focus is on sustainable development, the Agence de l'efficacité énergétique's mission is to promote energy efficiency and the development of new technologies for all forms of energy in every sector of activity, for the greater good of all regions throughout Québec. This agency promotes sustainable driving, building energy efficient homes, encouraging cutting edge technology that reduces green house gas emissions and creating programs that reduce green house gas emissions in the commercial sector.

Within *Nova Scotia*, the provincial government is in the process of establishing an independent

agency known as Efficiency Nova Scotia Corporation. This agency will be responsible for promoting and administering energy efficiency and conservation measures within all sectors of the economy. At the present time, the provincial electrical utility, as an interim administrator, is responsible for demand-side management initiatives. Other efficiency and conservation programs are administered by the government department known as Conserve Nova Scotia. The new agency, Efficiency Nova Scotia Corporation will assume responsibility for all efficiency and conversation measures currently administered by Conserve Nova Scotia and the Demand Side Management programs administered by Nova Scotia Power.

Conserve Nova Scotia is responsible for the planning, development, and co-ordination of policies and programs for energy efficiency and conservation, including public education and behavioural change. This agency serves as a focal point for all forms of energy efficiency and conservation measures through partnerships with federal, provincial, municipal, private sector and not-for-profit agencies. Some other provinces have internal entities that are engaged in energy efficiency measurement and program development. For example, The New Bruinswick Energy and Utilities Board in conjunction with Efficiency New Brunswick administer various Energy Management solutions. There are energy solutions for communities, Industry, commercial multi-use buildings and residential buildings. Programs such as: providing financial incentives to make municipal buildings more energy efficient, retrofitting existing commercial buildings for energy efficiency and providing specialised solutions for industrial users.

United States of America

Energy efficiency programs in the United States are typically overseen by the individual state's public utility commission. The programs themselves may be carried out by the retail electricity utility or by a third-party provider designated by the public utility commission or state legislature. Some state energy efficiency schemes focus on removing natural disincentives for efficiency, some focus on mandating efficiency and some use a hybrid approach. Common strategies among the varied state regulatory instruments include systems benefits funds, energy audits and performance benchmarking, establishing of energy efficiency codes and building standards, considering efficiency in integrated resource planning, establishing efficiency portfolio standards or efficiency targets that providers must meet, and decoupling a utility's revenue from electricity sales to remove disincentives to deploying energy efficiency measures.

California

The California Public Utility Commission (CPUC) oversees the programs and expenditures for energy efficiency programs provided by the state's investor-owned utilities. In addition to the adoption of decoupling rules, California has instituted a risk/reward incentive mechanism that rewards utilities for meeting efficiency targets and imposes penalties when performance falls considerably short of these targets. In addition, innovative program approaches are sought through competitive bidding, with new programs delivered by non-utility administrators.

In addition to active deployment of efficiency programs overseen by the CPUC, energy efficiency building codes and appliance standards have been established by the California Energy Commission.

Maine

The authority and obligation to plan and administer electricity and gas efficiency programs in Maine is held by the Efficiency Maine Trust, whose authority derives from Maine statute. The Efficiency Maine Trust is a quasi-state agency overseen by a nine-member board and charged with the responsibility for planning and managing all aspects of state energy efficiency programs.

Massachusetts

Energy efficiency programs are offered through Program Administrators to residential, low income, and commercial and industrial customers. The Program Administrators include the four electric Investor Owned Utilities and a governmental aggregator called the Cape Light Compact that administers the energy efficiency programs on Cape Cod and Martha's Vineyard. The Program Administrators (PAs) implement energy efficiency programs and use competitively-procured services to implement many of the energy efficiency programs.

The PAs are required to implement all energy efficiency that is cost-effective as determined by the Total Resource Cost Test. Incentives to install the energy efficiency measures are primarily rebate-based. Electric energy efficiency programs are funded through four mechanisms:

1. a system benefit charge,
2. proceeds from the Regional Greenhouse Gas Initiative ("RGGI"),
3. proceeds from the competitive capacity market ("Forward Capacity Market" or "FCM"), and
4. an additional kilowatt-hour charge as approved by the DPU.

There is one funding mechanism for gas energy efficiency programs: the system benefit charge. In 2008, the Department of Public Utilities issued an order that began the process of decoupling for investor owned utilities.

Minnesota

In Minnesota energy efficiency programs are run by the utilities, with oversight and reporting requirements to the Public Utilities Commission. The state approaches energy efficiency on several fronts including a portfolio standard, incentives to increase energy efficiency, and decoupling mechanisms. The portfolio standard requires utilities to invest 1.5% of retail sales in conservation programs, and applies to all utilities: investor owned, municipal and cooperative. The state has initiated a pilot program for a decoupling mechanism for the largest gas utility, and has authority to approve other decoupling pilot programs.

Energy efficiency laws cover all sectors with extremely wide statutory authority. The Minnesota Office of Energy Security administers the Energy Conservation Improvement Program, which requires utilities to invest a portion of revenues in programs aimed at achieving designated energy efficiency goals. Further, the Minnesota Public Utilities Commission may set rates so as to encourage utility energy conservation programs through the Shared Savings Incentive. Utilities are required to periodically file integrated resource plans with the PUC, with customer energy conservation to be considered a resource option.

New York

The New York Public Service Commission has instituted an Energy Efficiency Portfolio Standard Proceeding with the goal of reducing electric usage in New York State by 15% from

projected levels by 2015. A similar effort for reducing natural gas usage has also been undertaken by the Public Service Commission. The effort to reach the electric reduction targets involves efforts by a number of state agencies; the Governor's Office has been actively involved in coordination of this effort. The state's utilities are now actively involved in delivering energy efficiency programs as well. Revenue decoupling has been a part of recent rate cases and is now in place for most utilities.

Oregon

Oregon has set up several regulatory instruments to foster energy efficiency, including obligations on suppliers or distributors paid for by customers, including: technical standards, third-party delivery of energy efficiency services, performance benchmarking, certification/labeling, least-cost planning, Lost Revenue Adjustment, decoupling, Rate of Return Enhancement, etc.

In the Planning of Energy Efficiency Acquisitions, the investor owned utilities are required, through Integrated Resource Planning (IRP) (also known as least cost/least risk planning) to identify the maximum achievable cost-effective energy efficiency available, by year, over the IRP planning horizon. Acquisition of this energy efficiency is a least cost requirement.

Commission IRP guidelines also call for the assessment of energy efficiency potential, by the utility, across its service territory.

The Energy Trust of Oregon (ETO), a non-profit organization funded through public purpose charges (also known as systems benefit charge) and related collections from utility customers, contracts the Conservation Potential Study, and coordinates the creation of annual deployment plans with utility partners (the four utilities that are required to outsource their energy efficiency efforts) through the ETO.

Weatherization and technical efficiency improvements: The Oregon State Energy Efficiency Design (SEED) program directs state agencies to work with the Oregon Department of Energy (Energy) to ensure cost-effective energy conservation measures are included in new and renovated public buildings. The SEED program requires that all state facilities constructed on or after June 30, 2001 exceed the energy conservation provisions of the Oregon State building code by 20 percent or more.

Third Party Energy Efficiency Delivery Services: four out of the six investor owned utilities in the State of Oregon are required to acquire energy efficiency resources through third party energy efficiency suppliers. Three entities provide energy efficiency outreach and program delivery:

a) Community Action Agencies (CAAs) are multi-county based non-profits providing direct install weatherisation programs for low income homes,

b) School Districts manage school energy efficiency projects, with technical assistance and certification of eligibility from the Oregon Department of Energy, and

c) the Energy Trust of Oregon, a Commission sponsored non-profit provides energy efficiency outreach, marketing and incentive programs for investor owned utilities (electric and natural gas) service territories across the residential, commercial and industrial sectors, including incentives for weatherisation of structures, rebates for efficient appliances, heating and ventilation equipment, efficient water heating (including solar thermal heating as an efficiency investment) and custom projects to improve the efficiency of industrial processes

In addition, an investor owned utility, Portland General Electric, under modified decoupling

agreements, has both a Sales Normalization Adjustment (for residential and non-residential customers with loads less than 1 aMW) and a Lost Revenue Recovery Adjustment for customers with loads greater than 1 aMW. The Lost Revenue Recovery Adjustment uses savings claimed by the Energy Trust of Oregon as input to this adjustment mechanism.

Texas

Electric utilities are required to provide energy efficiency programs, through market-based standard offer programs or limited, targeted, market-transformation programs, for residential and commercial customers. [8]

The goal for 2009 is 20% of the utility's annual growth in demand of residential and commercial customers. The Public Utility Commission of Texas (PUCT) provides oversight, has adopted rules to establish an energy efficiency cost recovery factor to ensure timely and reasonable cost recovery, and has established an incentive to reward utilities that exceed the goal.

The PUCT rule implementing this statutory directive provides all customers with choices to energy efficiency alternatives allowing each customer to reduce energy consumption, peak demand, or energy costs[9].

Regulated transmission and distribution utilities provide incentives to third-party energy efficiency service providers (ESCOs) and Retail Electric Providers (REPs) to fulfill the statutory obligations. Utilities are not allowed to provide energy efficiency services, with the exception of program administration, except that certain utilities in non-competitive areas outside of Electric Reliability Council of Texas (ERCOT) are exempt from this prohibition, and a utility may petition the Commission to provide a competitive energy service that is not widely available to customers in an area. The energy efficiency program applies to investor-owned transmission and distribution utilities in the ERCOT region and to investor-owned electric utilities (integrated utilities) outside of the ERCOT region.

The PUCT currently has an open rulemaking project to examine increasing the goals. In addition, the Texas State Energy Conservation Office (SECO) serves as the State's energy office, and SECO partners with Texas consumers, businesses, educators and local governments to reduce energy costs and maximise efficiency.

Vermont

Vermont utilises a third party Energy Efficiency Utility (EEU) that implements efficiency programs available to all sectors.

The budget, policy goals, and performance goals are established by the Public Service Board (PSB) but the EEU has significant discretion in determining how to meet those goals. The goals include specific targets for the amount of energy, capacity, and total resource benefits that must be achieved. The EEU is reimbursed for the cost of providing services and is eligible for performance payments only if it meets the goals set by the PSB. This mechanism creates the incentive for the EEU to effectively market and deploy its efficiency programs.

Under Vermont law, resource selection is governed by least cost requirements. In other words,

[8] See PURA §39.905, Goal for Energy Efficiency at http://www.puc.state.tx.us/rules/statutes/index.cfm

[9] See P.U.C. SUBST. R. 25.181 available at http://www.puc.state.tx.us/rules/subrules/electric/index.cfm

if a transmission or distribution constraint can best be met through implementation of energy efficiency (possibly combined with distributed generation) beyond those provided by the EEU, rather than through construction of infrastructure such as higher capacity transformers and/or lines, then the utility is required to implement those efficiency measures. In such a case, utilities may issue a request for proposals to procure the necessary efficiency.

Wisconsin

Wisconsin established Focus on Energy, a statewide energy efficiency and renewable resource program. Focus on energy is a public/private partnership and is administered by a third party Program Administrator.

It works with eligible Wisconsin residents and businesses to install cost effective electric and natural gas energy efficiency and renewable energy projects.

Its information, technical assistance and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled.

Under 2005 Wisconsin Act 141 (Act 141), oversight of Focus on Energy transferred to the Public Service Commission on July 1, 2007. Act 141 requires investor-owned electric and natural-gas utilities to spend 1.2 percent of their annual gross operating revenues on energy efficiency and renewable resource programs. Act 141 also requires municipal and retail electric cooperative utilities to collect an average of $8 per meter to fund energy efficiency programs. Municipal and retail electric cooperative utilities can collect the dollars and participate in the Focus on Energy program or can elect to operate their own Commitment to Community programs. Act 141 requires the energy utilities to contract with one or more program administrators to develop and run programs, soliciting for program administrators on a competitive basis. To fulfill their responsibilities under Act 141, the utilities formed a non-profit entity called the Statewide Energy Efficiency and Renewable Administration (SEERA).

In August 2009, the Public Service Commission approved a decoupling pilot in the Wisconsin Public Service Corporation (WPSC) utility territory. In exchange for approval of the decoupling pilot, WPSC agreed to provide additional funding for the Focus on Energy programs in its service territory, increasing its contribution from 1.2 percent of operating revenues to 2 percent in 2009, 2.5 percent in 2010, 3 percent in 2011, and 3.5 percent in 2012 for those customers included in the decoupling pilot. Also, WPSC and the Citizens Utility Board (CUB), a private, non-profit ratepayer advocacy group, agreed to jointly develop and implement up to three community based pilot programs in its service territory to improve innovative rate designs, develop and test methods to obtain customer participation through information and education, and evaluate customer response to the innovative rates.

Mexico

The main legal instrument is the Law for the Sustainable Use of Energy (Ley para el Aprovechamiento Sustentable de la Energía- LASE). Its purpose is to promote a sustainable use of energy through its optimal use in all processes and activities from storage to consumption. The Regulation of The Law for the Sustainable Use of Energy states that the Ministry of Energy through the Commission will formulate the National Program for Sustainable Use of Energy 2009-2012, ensuring consistency with the National Development Plan.

The National Program for the Sustainable Use of Energy 2009-2012 (Programa Nacional para

el Aprovechamiento Sustentable de la Energía 2009-2012) focuses on seven cost-effective areas expected to increase energy efficiency and reduce energy consumption in the medium and long term. Specific areas of focus are: transport, lighting, cogeneration, buildings, equipment and appliances, industrial motors and water pumps. Long term actions were identified in each category, including the implementation of international best practices. The Program includes strategies, objectives, actions and goals, aimed at developing guidelines for the public sector and end user programs.

South America

Brazil

Brazil has set up a number of programmes[10].

1) PROCEL – Programa Nacional de Conservação de Energia Elétrica

The PROCEL Program is the Brazilian Electricity Conservation Program and the sectors affected by it are: residential; industrial, public/governmental, commercial, lighting, sanitation and education/schools. PROCEL was created on 18th July 1991, by a Presidential Decree. PROCEL is implemented by Eletrobras, the national electricity company.

2) CONPET – Programa Nacional de Racionalização do Uso de Derivados de Petróleo

The CONPET Program aims to promote the reduction of the oil products consumption in Brazil and focuses on agricultural, industrial, commercial, transportation (focusing on diesel consumption) and residential sectors (focusing on LPG consumption), besides education. CONPET was created on 18th July 1991, by Presidential Decree. CONPET is implemented by Petrobras, the national oil company.

3) PBE – Programa Brasileiro de Etiquetagem

The PBE is the National Labeling Program and focuses on promoting the developing of more efficient products and technologies, from the energy consumption point of view. The more efficient products receive a label that reflects its efficiency and varies from “E” (the worst one) to “A” (the best one). This program is implemented by INMETRO – Instituto Nacional de Metrologia – that is bound to the Industry and Commerce Ministry.

The energy rating labels enable the consumers to compare the energy efficiency of appliances, and they are also an incentive for manufacturers to improve the energy performance of their products. It is important to mention that the legislation which creates the Energy Efficiency Brazilian Programs, also defines the responsible entities that must implement the suitable measures.

4) ANEEL Research and Development Program:

All Brazilian electricity distribution companies must invest at least, 0,5% of their net operational revenue in projects directly related to the electricity sector. These projects must conform to federal rules set by ANEEL. Qualifying projects include research in the fields of energy efficiency, environment and climate change. ANEEL is responsible for the approval and supervision of these projects.

[10] See bibliography for refereneces to existing legislation.

5) ANEEL Energy Efficiency Program

All electricity distribution companies that operate in Brazil must invest, at least, 0,5% of their net operational revenue in energy efficiency projects. These projects must conform to rules set by ANEEL and the energy regulator is also responsible for the approval and supervision of the projects. The eligible projects are in the following fields: residential, industrial, agricultural, public, training & education, demand side management (co-generation, for example) commercial and services sectors, energy management of the cities, etc.

6) ANP Research and Development Program

The oil companies obliged to pay this levy must invest at least 1% of the gross revenue of the qualifying oil fields, in projects in any field that is directly related to the oil and natural gas sector. These projects must conform to the federal regulation and the research can focus on energy efficiency, environment and climate change. ANP is responsible for the approval and supervision of these projects.

Uruguay

Uruguay has developed national energy efficiency programs affecting the industrial, public, residential, commercial, lighting, sanitation sectors as well as and education/schools[11].

Asia

China

China has rolled out an impressive array of measures covering all sectors of its economy in the 11th Five-year Plan for National Economic and Social Development (2006-2010). The Plan sets a binding energy efficiency target whereby energy consumption per unit of GDP in 2010 should be 20% below 2005 levels.

The plan sets energy efficiency targets for:

- several industrial sectors, such as power generation, iron and steel, non-ferrous metals, cement and oil and petrochemicals and mandates closure of inefficient plants;
- vehicles, including agricultural machinery, domestic and lighting appliances;
- buildings (including on temperature controls).

Many of the measures highlighted above are being implemented through the “10 Key Energy Conservation Priority Programmes in the Medium-and-Long-Term Energy Conservation Plan. It is estimated that, the Programmes will save an estimated 240 Mtce during the 11th five-year plan period[12].

[11] See bibliography for overview of existing legislation.

[12] The 10 key priorities are: Upgrading of Low-efficiency Coal-fired Industrial Boiler (Kiln), District Heat and Power Cogeneration, Recovery of Residual Heat and Pressure, Oil Saving and Substitution, Energy Conservation of Motor System, Optimization of Energy System, Energy Conservation in Buildings, Green Lighting, Energy Conservation in Government Agencies, Building the Energy Conservation Monitoring, and Technological Support System.

India

The Energy Conservation Act 2001 is the legal framework at Central and State level to foster energy efficiency in India. The Act empowers the Central Government and in some instances the State Governments to notify energy intensive industries, other establishments and commercial buildings as designated consumers and establish and prescribe energy consumption norms and standards for them. Designated consumers must:

- Designate a certified energy manager.
- Carry out regular energy audits conducted by an accredited energy auditor manner and intervals of time.
- Provide information with regards to energy consumed and action taken following the recommendations of the accredited energy auditor to the designated agency.
- Comply with energy consumption norms and standards, and if when in breach, prepare and implement schemes for efficient use of energy and its conservation.
- Meet energy conservation standards (codes) for efficient use of energy and its conservation in commercial buildings.
- State Governments to amend the energy standards in building to suit regional and local climatic conditions.
- Owners or occupiers of commercial buildings to comply with the provisions of energy conservation building codes.
- Direct mandatory display of label on notified equipment and appliances.
- Specify energy consumption standards for notified equipment and appliance.
- Prohibit manufacture, sale, purchase and import of notified equipment and appliances not conforming to standards.

The Acts established the Bureau of Energy Efficiency (BEE). The Bureau must develop and advise the Central and State Governments on appropriate strategies to foster energy efficiency, coordinate their implementation, plan and implement the energy conservation programmes set out in the Act, establish systems and procedures to monitor and verify energy efficiency conservation measures. BEE has a specific mandate to foster the development of market-based instruments and public-private partnerships. The Act requires State Governments to appoint State Designated Agencies (SDAs) responsible for the implementation of the Act at State level in cooperation with BEE. These have regulatory and enforcements functions at State level. 21 SDA had been notified by end 2009.

The 11th Indian Five Year plan, which sets out key economic development objectives for the country for the period 2007-2012, sets a mandatory energy efficiency target of 5% by 2012 below business as usual levels. To this aim, BEE has developed energy efficiency programmes in a number of areas:

1) Bachat Lamp Yojana, to promote energy efficient and high quality CFLs as replacement for incandescent bulbs in households. One of the most innovative aspects of the scheme is that it is partially funded through the UNFCCC Clean Development Mechanism.
2) Standards and labelling scheme: The programme targets high energy end-use

equipments and appliances to lay down minimum energy performance standards.

3) The Energy Conservation Building Code (ECBC) sets minimum energy standards for new commercial buildings having a connected load of 500 kW or contract demand of 600 KVA and is presently enforced on a voluntary basis.
4) Agricultural Demand Side Management (DSM) targeting the replacement of inefficient pump sets, street lighting, etc., especially through the establishment of public-private partnerships.
5) Energy Efficiency in Small and Medium Enterprises (SMEs) Scheme. The proposal seeks to promote Energy Efficiency in SMEs during the XI plan. Many energy-intensive SMEs clusters located in various states of the country have large potential for energy savings.
6) Promotion of energy efficiency measures through ESCOs.

In addition, four new initiatives are being discussed in the framework of the National Mission for Enhanced Energy Efficiency (NMEE), one of the pillars of the 2008 National Action Plan on Climate Change.

1) Perform, Achieve and Trade (PAT), a tradable energy efficiency certificate system for large energy-intensive industries
2) Market Transformation for Energy Efficiency (MTEE), a programme designed to accelerate the shift to efficient appliances by making more affordable
3) Energy Efficiency Financing Platform, i.e. a set of DSM measures
4) Framework for Energy Efficient Economic Development (FEEED), a set of fiscal instruments.

Japan[13]

Japan's energy efficiency policy is based on the 2002 Basic Act on Energy Policy and the Basic Energy Plan and the New National Energy Strategy. The Basic Act on Energy Policy sets the goals for Japan's future energy policy. Its main goals are: securing stable supply, environmental suitability and utilisation of market mechanisms.

The Basic Energy Plan, which was revised in 2007, provides more details with regard to the implementation of the overarching energy efficiency goals set by the Basic Act. In terms of energy efficiency, the Plan aims to improve the efficiency of energy consumption at least by an additional 30% by 2030. Most of the regulatory measures are included in the 1979 Act on the Rational Use of Energy, which has been amended several times to include actions to comply with the requirements of the Kyoto Protocol and energy conservation measures for household, commercial and other sectors. Key measures included in the Act are:

- The Top Runner programme, which was established in 1998 and has since become the centrepiece of Japan's efficiency programme. The programme sets energy efficiency performance targets for categories of machinery and equipment, including imported and

[13] This section is an abstract from Energy Policies of IEA Countries, Japan 2008 Review, IEA, 2008.

domestically manufactured vehicles on the basis the level of the most energy-efficient products on the market at the time of the value-setting process. Each type of equipment is divided into several subgroups, which is assigned an energy efficiency target. Development is evaluated for each group of products. Manufacturers of a product category covered by the programme are deemed to have met the future energy efficiency performance standard if the sales-weighted average energy efficiency performance of their products meets or exceeds the target level in the target year. The Ministry for Economy, Trade and Industry (METI) can disclose the names of unsuccessful companies, as well as issue recommendations, and impose fines if targets are not reached. The Top Runner programme has consistently extended its coverage of products.

- Energy efficiency requirements for large scale factories. Factories and other workplaces with high energy consumption (i.e an annual fuel use greater than or equal to 3 000 kl of crude oil equivalent) are required to appoint energy managers, prepare and submit mid- and long-term energy plans and periodical reports on energy use. Similarly, factories and other workplaces with medium energy consumption (greater than or equal to 1 500 kl crude oil equivalent) are required to submit periodic reports on energy consumption and appoint a qualified person for energy management.
- A mandatory scheme for the reporting of energy efficiency measures for residential and non-residential buildings of over 2 000 square metres (m_2) at the time of their construction or renovation. Additional requirements for buildings are set in the Housing qualification Assurance Law of 2000, which set a comprehensive assessment system for building environmental efficiency (CASBEE) and a voluntary housing performance indication system.
- Information on energy efficiency levels of appliances must be provided by manufacturers and importers, although it is not compulsory to complement this information through labels.
- A system for the assessment of energy-efficient product retailers, which identifies outlets that excel at promoting energy-efficient products. Such outlets are authorised to carry a special logo.
- A requirement to make vending machine operators indirectly responsible for paying the electricity bill of the machines, thus providing an incentive to produce more efficient machines.

Australia

In Australia a range of legal, regulatory and financial instruments for the promotion of energy efficiency have been introduced by State, Territory and Federal governments. An overarching national framework for policy development by individual governments in respect of energy efficiency – the National Framework on Energy Efficiency (NFEE) - has been in place since 2004 following agreement at the Ministerial Council on Energy (MCE)[14]. In 2008, the Council of

[14] The MCE is the national policy and governance body for the Australian energy market, including for electricity and gas. The MCE was established by the Council of Australian Governments (COAG) in 2001.

Australian Governments (COAG)[15] agreed to develop a National Strategy for Energy Efficiency, building on and providing $88m in additional funding to support policy initiatives being progressed under the nine strands of the NFEE. The 2008 COAG agreement was motivated in part by the perceived role of energy efficiency in supporting households and businesses in the context of the planned implementation of an emissions trading scheme (ETS). The measures anticipated in the national strategy include assistance to businesses and households, more consistent and stringent efficiency standards, reduction of barriers to demand response, and further assessment of vehicle efficiency. The National Strategy was endorsed and given further practical impetus by COAG in July 2009 through the National Partnership Agreement on Energy Efficiency. These national strategies provide an overarching direction for energy efficiency policy in Australia, and build on initiatives put in place by State and Territory governments, as well as policies previously implemented at the Federal level.

The Prime Minister's Task Group on Energy Efficiency was established in late 2009 to provide advice on options for improving Australia's energy efficiency by 2020. The Task Group is scheduled to provide recommendations to Ministers by mid 2010. In general, the focus of the State and Territory Governments is on fulfilling their obligations under the various national strategies.

The Appliance Energy Rating is a joint initiative of the Federal, State and Territory governments, building on schemes first introduced in New South Wales and Victoria in 1986. In particular, it makes mandatory for all appliances in specified categories (e.g. televisions, refrigeration) for sale in Australia to carry an approved Energy Rating Label including:- (i) an energy efficiency rating (on a scale of 1-6 stars), and (ii) KWh consumption. The initiative is delivered through a network of approved testing agencies.

Mandatory Energy Performance Standards (MEPS) were introduced for a range of good manufactured in or imported into Australia. They are a component part of the Australian Standards regime, given effect through state-level legislation. Standards range covers refrigerators and freezers, air conditioners and electric storage water heaters. This is also the vehicle through which the phase-out of incandescent light bulbs is being delivered by 2015.

The phase out of electric hot water systems is a joint initiative of Federal and State and Territory governments to replace greenhouse intensive systems. The phase-out will be implemented in two stages and will apply in all states and territories except Tasmania.

In the first stage, commencing during 2010, energy intensive electric hot water systems will be phased out for new and existing homes where such requirements do not currently exist (some States already mandate the installation of energy efficient hot water systems in new dwellings). During 2012, the phase-out will be extended so that greenhouse intensive electric hot water systems will no longer be able to be installed in:

- any existing detached, terraced, town house or hostel; or
- any new flats and apartments with access to piped gas, except where an exemption applies.

[15] COAG is the peak intergovernmental forum in Australia. COAG comprises the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association. The MCE is therefore sub-ordinate to COAG.

Phase out of electric resistance hot water systems in new apartments without reticulated gas supply will occur between 2012 and 2015, pursuant to further investigation of the feasibility of low-emission water heating options. Rebates are available for eligible households to install solar hot water or heat pump systems in association with the phase out.

The Federal, State and Territory Governments have committed, under the auspices of the National Strategy on Energy Efficiency, to the establishment of a National Buildings Framework, which will aim for consistency on how buildings are assessed and rated for energy efficiency and set out a pathway for increasing minimum performance standards over time. Measures under the National Buildings Framework will be implemented through the Building Code of Australia where they affect new building work. The final framework is expected to be agreed by governments by the end of 2010. The framework will, amongst other things, set increasingly strong minimum performance standards over time for new buildings and major renovations.

Mandatory energy efficiency performance requirements were introduced into the Building Code of Australia (BCA) as part of a Federal Government initiative announced in 2000. On 30 April 2009, the Council of Australian Governments (COAG) announced that it would request the Australian Building Codes Board (ABCB) to increase the energy efficiency provisions in the 2010 edition of the BCA. The revised provisions require

- a 6 star energy rating, or equivalent, for new residential buildings; and
- a significant increase in the energy efficiency requirements for all new commercial buildings.

These initiatives are to include energy efficiency requirements for hot water in new houses and lighting in new houses and apartments. All jurisdictions will adopt the revised provisions in 2011.

The Building Sustainability Index (BASIX) was introduced in 2004 by the New South Wales Government as a means of ensuring that new residential buildings (including multi-unit buildings) and homes undergoing alterations and additions met energy and water efficiency standards. BASIX is an on-line program that assesses a house or unit design, and compares it against energy and water reduction targets. A BASIX certificate must accompany any development application for a new home.

Among other relevant regulatory and legal initiatives, Energy Efficiency Opportunities (EEO) is a Federal government program designed to encourage large energy-using businesses to improve their energy efficiency. EEO requires businesses using more than 0.5 PJ annually to identify, evaluate and report publicly on cost effective energy savings opportunities. The program was established in July 2006, and encompasses approximately 220 corporations (incorporating 1200 subsidiaries) across all sectors of the economy.

Europe and the Russian Federation

Legal and regulatory measures in Europe address mainly the building and appliances sectors through codes and standards.

Energy consumption for buildings-related services accounts for approximately one third of total EU energy consumption.

Against this background, Directive 2002/91/EC on energy performance of building established a common methodology for calculating the integrated energy performance of buildings and

defined minimum standards on the energy performance of new buildings and existing buildings that are subject to major renovation.

Besides, the abovementioned Directive states that Energy performance certificates should be made available when buildings are constructed, sold or rented out and must be less than ten years old. In addition, regular inspection of boilers and central air-conditioning systems in buildings and an assessment of heating installations in which the boilers are more than 15 years old were also envisaged.

Some European countries (namely Austria, Denmark, France and Sweden) require stricter provisions than those of Directive 2002/91/EC.

On 18 May 2010 a recast of Directive 2002/91/EC was adopted in order to strengthen the energy performance requirements and to clarify and streamline some of its provisions.

Table 3 - Energy performance of buildings

Country	National legislation	Directive 2002/91/EC
Austria	• Mandatory minimum requirements for the overall energy efficiency in major renovation, irrespective of the usable area	• Art. 6 Existing buildings: 1,000 m^2 threshold for renovation requirements
Denmark	• Shorter validity of energy performance certificates (5 years) • Mandating cost-effective requirements in certificates	• Art. 7.1 Energy Performance Certificate: the validity of the certificate shall not exceed 10 years
France	• Mandatory minimum requirements for the overall energy efficiency in major renovation, irrespective of the usable area • Mandating cost-effective requirements in certificates	• Art. 7.2 Energy Performance Certificate: the certificate shall be accompanied by recommendations for the cost-effective improvement of the energy performance
Sweden	• Mandating cost-effective requirements in certificates (for all multiple-unit buildings)	

Other important dispositions are included in Directive 2005/32/EC establishing a framework for the setting of ecodesign requirements for energy-using products while mandatory requirements for specific products are being added through implementing measures.

With regard to lighting some countries adopted measures to phase-out incandescent light bulbs. *France* is expected to ban them in 2010 while Italy in 2011, the *United Kingdom* by 2011 in the household sector, where an efficient alternative exists (see also under sub-chapter *5.5 Voluntary Agreements*).

Ireland and *Portugal* have introduced a levy on incandescent lamps. *Germany* combines the financial support for household appliances with the return of old inefficient ones to get them off the market. *Spain* has a measure to exchange obsolete lightning systems with energy efficient ones. Financial support is provided for and public buildings are expected to play an exemplary role in this respect. For example, in some 600 municipalities traffic lights will be replaced with

LED technology affecting a quarter of all traffic lights in the country. The annual electricity savings are estimated at 90 GWh.

As example of good practices some detailed experiences on legal or regulatory instruments are given below for single European countries.

Denmark

The country has very substantial energy efficiency policies for buildings. The Danish building code is among the strictest in the world. In April 2009 the government presented a strategy for the further reduction of energy use in buildings. The aim is to substantially reduce the energy use in existing as well as new buildings, including a further tightening of the thermal building code (by 25% to 30% first in 2010, then again in 2015 and 2020), further specifications of requirements on the use of components for renovations, more effective use of the energy labelling of buildings, and others.

Denmark highly prioritizes setting ambitious energy efficiency requirements for energy using products for a vast number of household and industrial products. To ensure that the requirements are ambitious the Danish government closely follows and actively participates in the Eco-design legislation process. Energy efficiency requirements have already been adopted for eight product groups (e.g. TV, lighting, refrigerators and freezers, standby consumption, electrical motors etc.), and many more are underway.

France

A fifth thermal building code has been in force since September 2006 applicable to both households and services This new thermal building code should bring an average incremental energy savings of 15%, compared to the standards that came into force in 2001, which had already effected a 15% improvement in efficiency over the previous regulation of 1989 for dwellings (40% for service sector buildings).

Labels on electrical households appliances have been in place since 1995. Other measures relate to minimum efficiency standards for hot water boilers, refrigerators and freezers, periodic mandatory inspection of boilers and heating/ventilation systems, and limits to the internal temperature of houses or dwellings.

Germany

Energy requirements in German building codes are set at the national level. Germany adopted a Energy Savings Ordinance in 2002 and revised it in 2007 and in 2009.

The new target is to reduce the energy requirements of new buildings by an average of 30 % compared with the former standard from 2002. In a second step, a further tightening of the standard by another 30% is aimed at for 2012.

In the tertiary sector, mainly the same measures are valid as in the household sector (e. g. building regulations).

These measures are mainly directed at enhancing the energy efficiency of existing and new buildings.

Once these improvements are achieved, it is expected that Germany's building code energy

requirements will be close to the optimum of a 30-year least life-cycle cost[16]. At the same time, Germany has different policies to support passive and other highly-efficient new buildings.

Greece

The country implemented a new innovative measure concerning the subsidised replacement and recycling of old energy intensive domestic air conditioners. It was implemented by the Ministry of Development and is part-financed by the European Regional Development Fund (ERDF) and by National Resources. It took place in the framework of National Strategic Reference Framework (NSRF) 2007-2013, via the Operational Programme "Competitiveness and Entrepreneruship 2007-2013" (EPAN II)[17] under the Greek Ministry of Development and the Regional Operational Programs that include Regions of Transient Support. The total budget amounted to 45,000,000 €. The programme took effect on June 5, 2009 and was completed on August 22, 2009. In this period about 134,000 air conditioners were replaced by new, more efficient units with inverters and meeting class A and A++ standards.

The energy saving is estimated in 49.56 GWh/year and the reduction of CO_2 emissions is 43.61 thousands tones/year.

The programme was aimed at households and small business consumers using old domestic appliances and air conditioners who wished to replace them. Each consumer could replace up to two appliances with new technology with inverters and high energy efficiency appliances. The subsidy was 35% of the retail price of each new appliance, up to a maximum of 500 € in subsidy. All retired appliances are recycled. The measure was introduced on a state-wide basis.

Netherlands

Various directives from the European Union on energy labelling of appliances have been incorporated into national regulations. Pursuant to these regulations retailers must ensure that energy labels are shown for domestic refrigerators and freezers, washing machines and electric tumble dryers, combined washers and tumble dryers, dishwashers, lighting and stoves. It is expected that labels for other equipment such as boilers and hot water equipment will also become obligatory. Information that must be shown on the label must include the logo and name of manufacturer, the type number, the energy efficiency class (A-G) with different colours and energy consumption. Other information that may be shown includes noise level and recycling potential. The purpose of energy labels is to increase the awareness of consumers respecting the energy consumption of domestic electrical appliances. They allow the customer to make informed purchasing decisions on the basis of the energy consumption and running costs.

The introduction of energy labels took place at nearly the same time as the REB (Regulatory Energy Tax) was introduced. It was concluded that it is not possible to separate the influence of REB and labels, so the results show the combined effects. The combined effects in 2000 were

[16] According to IEA energy efficiency recommendations presented to Energy Ministers at the 2007 IEA Ministerial meeting, energy efficiency standards for new buildings should be set by national or state governments and should aim to minimise total cost over a 30-year lifetime.

[17] http://en.antagonistikotita.gr/epan/site/Press/InfoMaterial/t_docpage?doc=/docs/PressOffice/InformationKits/ENTYPA/EPAN%20II

600 kt of avoided CO_2 emissions and 3 to 4 PJ of avoided energy consumption.

The success of the measure is obvious for large household appliances: 95% now have an A label. Apparently people are willing to buy energy efficient appliances when the information is readily available. Now that almost all of these appliances have an A label, A+ and A++ labels have been introduced to facilitate even more discriminating purchases.

Specific energy saving standards for in-house equipment and insulation standards for roofs, facades, windows and floors have been part of the building decree for years now. In 1996 this decree was expanded with a general Energy Performance Standard (EPN). This standard is based on a method to calculate the energy performance of buildings and express it in an Energy Performance Coefficient (EPC). In 1996 newly built dwellings had to have an EPC of less than 1.4. This standard has been strengthened several times since, and the maximum is now put at 0.8. Many other measures, such as the energy premiums, are supportive to this decree.

Spain

In Spain, the minimum energy efficiency requirements for buildings are included in Royal Decree 314/2006 (Technical Building Code) Royal Decree 47/2007 (Building Energy Certification) and Royal Decree 1027/2007 (Regulations on Building Heating Installations - RITE). These regulations are mandatory. Additional improvements are in some case granted through several economic support lines managed by IDAE[18] and the Autonomous Regions governments.

In December 2007, the Spanish government announced that it would provide EUR 1 billion worth of subsidies for the refurbishment of existing residential buildings between 2008 and 2012, together with EUR 2 billion in credit for energy efficiency improvements to homes. Additionally, the government said it would provide EUR 200 million for energy efficiency improvements to schools and public buildings in large towns and cities.

The E4 Action Plan 2008-2012 includes actions in relation to residential equipment and office automation, even if the latter does not just relate to the residential sector.

As regards the residential sector, it is envisaged that equipment energy efficiency is to be improved by means of the Renove Plan for electrical household appliances, which is intended for the following electrical appliances: fridges, freezers, washing machines and dishwashers.

This measure seeks the annual replacement of 2.5 million electrical appliances with more efficient ones, classes A and B, which is equivalent to a final energy saving of 1,500 ktoe in the period 2008-2012.

The implementation of this measure takes place along with the necessary training, information, and awareness campaigns addressed to both buyers and sellers. So as to encourage the replacement of electrical appliances, the measure relies on public aid amounting to M€ 523.5, expected to mobilise investments worth M€ 1,992.

United Kingdom

In the household sector, there are building regulations in place to strengthen energy efficiency

[18] IDAE means Institute for Diversification and Saving of Energy; it is a state-owned business entity that reports to the Ministry of Industry, Tourism and Trade through the State Secretary for Energy.

standards with the aim that all new homes are zero carbon by 2016. There is also a *Code for Sustainable Homes* for sustainable design and construction of new homes.

The *Market Transformation Programme* supports the development and implementation of government policy on sustainable products and the *Warm Front Grant* tackles fuel poverty by installing energy efficiency measures.

The Energy Performance Certificates provide information on the energy efficiency of homes which is required for all homes to be sold or rented.

The *Carbon Emissions Reduction Target* (CERT) is an obligation on suppliers to deliver energy efficiency improvement measures to residential customers (see under sub-chapter *5.3 Tradable certificates and saving obligations on energy utilities*). Finally, the Community Energy Saving Programme (CESP) is a new obligation on energy suppliers and electricity generators to deliver an estimated £350 million of energy efficiency measures to the most vulnerable domestic consumers (around 90,000). Companies obligated by the CESP will have to achieve their share of the overall target by promoting carbon-reduction measures to domestic energy users.

In the business and public sectors, the EU Emission Trading Scheme is in place and the *Carbon Reduction Commitment* (CRC) is a mandatory emissions trading scheme which covers large non energy-intensive business and public sector organisations. The CRC will cover electricity use and direct energy use outside of the EU ETS and Climate Change Agreements (see under sub-chapter *5.5 Voluntary agreements)* and the first phase will begin in 2010. In addition, the *Environmental Transformation Fund* focuses on demonstration and deployment phases of bringing low carbon technologies to market by funding emerging technologies.

The *Market Transformation Programme and Product Standards* support development and implementation of government policy on sustainable products and *Energy Performance Certificates* and *Display Energy Certificates* were required at the point of sale for all non-domestic buildings by the end of 2008.

The UK has rolled out mandatory A-G labels on appliances, homes and new vehicles, the Energy Saving Trust‘s 'Energy Saving Recommended' labelling for appliances, the ACT ON CO_2 advice line led by the Energy Saving Trust, offering free expert advice, the Trust‘s free home energy checks, and an online carbon calculator.

Russian Federation

Goods manufactured in the territory or imported into the Russian Federation for circulation in the territory of the Russian Federation (including household appliances, computers, other computing electronic devices and office equipment) are required to have information on the class of their energy efficiency in technical documents attached to such goods, on their marks and labels.

Determination of the class of energy efficiency of a commodity is done by the producer/importer in accordance with the rules set by an authorised federal executive power body in accordance with the dispositions of the Government of the Russian Federation.

From January 1, 2011, electric incandescent lamps 100 Watt and more, which can be used in AC circuits for lighting purposes, will not be allowed to circulate in the territory of the Russian Federation. Besides, from January 1, 2011, it is prohibited at the municipal level to place orders for delivery of electric incandescent lamps for state municipal needs. For the purpose of

consistent implementation of requirements on reduction of circulation of electric incandescent lamps, from January 1, 2013, prohibition might be introduced for circulation in the territory of the Russian Federation of electric incandescent lamps 75 Watt and more and from January 1, 2014, of electric incandescent lamps 25 Watt and more.

With reference to the industrial sector there are rules in place for introducing systems for efficient industrial lighting, systems for efficient steam supply, efficient electric engines and streamlining of systems of electric engines, model technical measures at typical general industrial equipment, reduction of the rate of losses.

Central governing bodies, local self-governments, owners of buildings, constructions facilities and other items, lodging houses, country side or orchard houses, owners of premises in apartment blocks, developers are subject to mandatory accounting using metering devices for generated, transmitted and consumed energy resources.

Buildings, constructions, facilities have to comply with requirements of energy efficiency (referring to the architectural, functional – technological design and engineering aspects), set by the authorised federal executive power body in accordance with the rules approved by the Government of the Russian Federation. The Government of the Russian Federation has the right to establish, in these rules, priority requirements related to energy efficiency.

The person responsible for maintenance of the apartment block or in case of direct management of the apartment block, owners of premises in the apartment block have to take measures aimed at improving energy efficiency and cover related expenses. For the purpose of reducing expenses on taking the aforementioned measures, owners of premises in apartment blocks have the right to request from the person responsible for maintenance of the apartment block to take actions aimed at reducing the volume of energy resources used in the apartment block and/or to request this person to conclude an energy service agreement (contract) that would ensure reduction of the volume of energy resources used in the apartment block.

The Ministry of Energy, the Ministry of Regional Development and heat supply organisations should ensure coordinated development of district heating systems, cogeneration and tri-generation plants by means of control over district heating systems of localities through a single heat dispatcher and by introducing methods for evaluating investment projects in the heat supply field, on the basis of integrated regional energy efficiency frameworks.

5. 2 Financial measures

Africa and Middle East

Financing tools to promote energy efficiency differ significantly among Africa and Middle East States. Some countries have not yet established support schemes for energy efficiency, while others have defined relatively more precise and focused financial mechanisms to promote reductions in energy consumption.

Support mechanisms often take the form of funds, grants and subsidies given directly to the party implementing energy efficiency projects. In a few cases soft loans are also provided to beneficiaries. Generally, all sectors are eligible for financial support, although some countries have also established programs tailored to and limited to specific sectors or categories of beneficiaries.

In **Algeria**, a National Fund for Energy Conservation (FNME) was established in 2000, financed by duties levied on major consumers of conventional energy, to support renewable energy and energy efficiency projects, particularly under the framework of the National Program of Energy Conservation (PNME). All sectors are eligible for subsidies.

Algeria is also committed to the promotion of energy efficiency in the residential sector. The ECO-Lighting Program, coordinated by the Government Agency for Energy Conservation (APRUE), was established in 2008 and it provides a 50% subsidy on the price of fluo-compact lightbulbs (FCL) to enhance the replacement of the less efficient incandescent lightbulbs. The Government hopes to increase the subsidy to facilitate the purchase of efficient lightbulbs, in pursuit of its target of having five million FCL installed in the residential sector. Further, in the context of the National Program for Energy Management (PNME), a pilot project has been established to build 600 homes with High Energy Performance.

In the context of its Energy Efficiency Improvement & Greenhouse Gas Reduction (EEIGGR) Project, **Egypt** has established two financial measures designed to support energy efficiency.

The Loan Guarantee Program offers soft loans to ESCOs to promote the adoption of energy efficiency technologies. An agreement has been signed between the Egyptian Electricity Holding Company and the Credit Guarantee Company to provide financial guarantees to an approved list of projects. The Small Grants Program assists seven NGOs in financing energy efficiency lighting programs.

To promote energy savings, **Tunisia** has implemented an innovative financing mechanism through the Fond National de Maîtrise de l'Energie (FNME) to subsidise:

- 20 % of all investments in energy efficiency undertaken by corporations;
- 50 % of energy audit costs;
- 20 % of all solar energy investments;
- 50 % of investments in demonstration initiatives promoting renewable sources and energy efficiency.

Funding mechanisms are executed through investments funds, specific credit lines, interest rebates and loan guarantee funds. In addition, gas prices are supported to promote the use of

gas in all sectors and throughout the country. In the residential sector a successful policy has been carried out to boost solar water heating. The PROSOL project started in 2005 and worked through an innovative mechanism combining investment subsidies and interest rebates, with loans from the banking sector.

In **Togo**, the Global Environmental Facility (GEF) and World Bank provide financial support for energy efficiency in the context of the Emergency Infrastructure and Electricity Rehabilitation Project (PURISE). A project has been recently carried out in the city of Lomé to provide 400.000 efficient light bulbs to households.

In **South Africa** there are proposed tax incentives for industry introducing energy efficiency measures in their operations. The proposed tax incentives move from a technology focus to one where rebates are given based on energy efficiency improvements in production processes. Rebates are offered to households that install Solar Water Heaters in their homes via ESKOM, the most important electricity public utility of the country. Various donors are active within this arena through funds available for a range of energy efficiency interventions (e.g. development banks such as the French Development Agency).

North America

Canada

On a Federal level, Natural Resources Canada offers financial incentives for two types of assessments through the EcoENERGY for Industry program: the EcoEnergy Retrofit program and the EcoEnergy for Industry Assessment incentives program. The incentives help industrial companies perform assessments of their operations to optimise their processes, reduce operating costs, become more competitive and reduce greenhouse gases and air pollution – all by using energy more efficiently.

Natural Resources Canada's EcoENERGY Retrofit program provides financial support to implement energy-saving projects. Projects such as; installing qualified energy star condensing gas boilers and replacing your existing space and domestic water heating equipment with an integrated mechanical system (IMS) that has an overall thermal performance factor of 0.90 or higher. There are different application forms for homes, commercial and institutional buildings and industrial facilities.

There are a variety of programs offered at the Provincial levels as well. For instance, Ontario also offers various incentive programs to enable the uptake of more energy efficient processes and technologies. Some include:

- The Government of *Ontario* solar energy systems rebate program - The Solar Energy Systems Rebate returns the Retail Sales Tax (“RST”) paid on solar energy systems to homeowners or builders, who install the energy systems into residential premises, including multi-residential premises, or who expand or upgrade an existing solar energy system.
- Home energy savings program - The Ontario Home Energy Savings Program will help pay for a Home Energy Audit that will find your home’s energy leaks and identify renovations you can make to lower your energy bills.
- The Ontario Power Authority (OPA) has created province wide programs such as; peak saver, cool savings initiative and several demand response programs.

Specific electric utilities in Ontario also offer some energy efficiency programs of their own. One example is Toronto Hydro who have introduced the TAPS program, deployed Smart Meters within its service territory and offers a load displacement program.

In *Nova Scotia*, Demand Side Management (DSM) programs currently administered by Nova Scotia Power cover the residential, commercial, and industrial sectors. Various initiatives were introduced in 2008 and have been expanded during 2009 and 2010. Some of the initiatives are delivered in conjunction with Conserve Nova Scotia and other organisations. Costs for these programs are allocated to participating customer classes and recovered through Nova Scotia Power tariffs.

Quebec administers the Technoclimat program. The purpose of the program is to finance demonstration projects of innovative technologies and procedures that have strong potential for reducing greenhouse gas emissions in Québec. Financial assistance can reach $3M per project. In the case of eligible expenses of $500,000 or less, financial support takes on the form of non-refundable aid. Financial aid may cover up to 50% of eligible expenses. In the case of eligible expenses of more than $500,000, financial aid can be either refundable or non-refundable and will cover no more than 40% of eligible expenses.

In *Manitoba*, Hydro Manitoba administers a commercial kitchen appliance program for the energy intensive food services industry. Customers get incentives for upgrading to an Energy Star qualified commercial fryer and steamer. Customers get rebates of $1250 per upgraded fryer and $2,500 per upgraded steamer.

In *New Brunswick*, Efficiency New Brunswick offers The New Homes Program provides financial assistance to first owners of new homes that meet options 1, 2 or 3 as listed above. The New Homes Program also encourages the use of high efficiency non-electric central heating options such as natural gas, oil, geothermal, and/or wood systems. There are three levels of financial incentive available to first owners of new homes:

- Basic Grant: $1,000 for homes that have 1) an EnerGuide rating of 80 or higher; or 2) are R-2000 certified homes, or 3) have all the Mandatory Specifications* OR;
- Central Heating, Electric: $2,000 for homes that have 1) an EnerGuide rating of 80 or higher; or 2) are R-2000 certified homes; or 3) have all the Mandatory Specifications* and have an ENERGY STAR rated central heating system, such as an electric boiler or air source heat pump OR;
- Central Heating, Non-Electric: $3,000 for homes that have 1) an EnerGuide rating of 80 or higher; or 2) are R-2000 certified homes; or 3) have all the Mandatory Specifications* and that have an ENERGY STAR rated central heating system using a nonelectric fuel source such as natural gas, oil or a geothermal heat pump, or an EPA rated wood furnace.

United States

A common method of financing efficiency measures in states with active efficiency programs is the provision of subsidies or grants to individuals or companies that install efficiency measures. These subsidies are often funded through the imposition of a systems benefit charge on customers' bills and the efficiency programs are administered by either electric retail utilities or independent third-party efficiency providers.

Participants in such efficiency programs may be eligible for either prescriptive or custom measures. Prescriptive measures include incentives for efficient products such as compact fluorescent bulbs or efficient home appliances while custom measures are targeted to the particular energy efficiency needs of a particular customer – typically a larger commercial or industrial customer – and may involve incentives to install efficient machinery or alter a manufacturing process to achieve greater efficiency.

California

Efficiency programs conducted by investor owned utilities (IOU) are primarily funded through a systems benefit charge and utilities are obligated to commit additional funds in an effort to obtain all energy efficiency potential. For the California Energy Commission (CEC), their operating budget comes from a surcharge on all California electric bills.

The IOU EE programs are funded from a fixed amount of Public Goods Charge funding (about $300 million/year for mainstream efficiency) and additional funds for Low Income EE programs. The remainder of IOU EE funding comes from a portion of ratepayer charges that otherwise would have been used for energy procurement. The IOUs also offer or will be offering about $50 million during 2010-12 in "on bill financing" (OBF) to non-residential customers that undertake efficiency projects. For the two largest utilities the funds are obtained via the previously described EE budgets, while for two other utilities the funds for the revolving efficiency loan pool are obtained outside of the EE portfolio funding.

During 2009-2012 the CEC will be committing about $300 millions of federal economic stimulus dollars in additional EE programs. For the same period, another $300 million or so in additional federal energy efficiency/renewable programmatic grants will be paid directly to local governments for their allocation.

Maine

Utilities are assessed a system benefit charge to cover efficiency program costs, which assessment is passed on to ratepayers. Additional funds are provided through the sale of CO_2 allowances in the Regional Greenhouse Gas Initiative (RGGI) auctions, various federal grants, and participation in the Forward Capacity Market administered by the Independent System Operator of New England Forward.

The Independent System Operator of New England operates a Forward Capacity Market, in which generators and efficiency providers are able to submit bids to offer capacity.

Any entity that has a bid is accepted must provide that capacity to the Independent System Operator or face penalties. Some efficiency providers are required to use the payments received for submitting efficiency into the Forward Capacity Market to fund additional efficiency measures.

Ten states in the North-eastern United States participate in the Regional Greenhouse Gas Initiative, a CO_2 cap and trade program. The majority of the ten states use proceeds from the sale of CO_2 allowances to fund energy efficiency and renewable energy programs.

Massachusetts

Program Administrators (PA) implement energy efficiency programs, but the PAs use competitively-procured services to implement many of the energy efficiency programs.

There are four funding mechanisms for electric energy efficiency programs: (1) a system benefit charge, (2) proceeds from the Regional Green House Gas Initiative (RGGI), (3) proceeds from the FCM, and (4) an additional kilowatt-hour charge as approved by the Department of Public Utilities (DPU); there is one funding mechanism for gas energy efficiency programs, the system benefit charge; the four electric Investor Owned Utilities (IOUs), that are regulated by the DPU, are implementing Pay-As-You-Save programs; and RGGI inherently requires electricity generators (Massachusetts is a competitive generation market so the IOUs do not own generation) to include the price of carbon in the cost to generate electricity.

Minnesota

Tax relief, tax incentives and federal funds are available.

The Minnesota Office of Energy Security also provides funding in a number of areas, including: economic stimulus funds, grants and loans, rebates and credits, and at times requests for proposals[19].

New York

New York has a system benefits charge on both electric and natural gas consumption that is used to support energy efficiency programs and energy research and development. New York has a separate renewable portfolio charge. In addition, New York is an active participant in the Regional Green House Gas Initiative. As part of its system benefits charge offerings, the New York State Energy Research and Development Authority (NYSERDA) includes a loan fund program which buys down the cost of loans for those participating in some of its energy efficiency programs. Over the years, New York State has offered various tax credits designed to reduce to energy usage.

Oregon

The two largest electric utilities in Oregon are required by statute to collect a public purpose charge (PPC) to fund energy efficiency savings.

This public purpose charge collects 2.5% of revenues from all customer classes for energy efficiency investments.

An electric utility may also submit tariffs designed to collect incremental energy efficiency funding (IEE) from residential and commercial customers to fund the energy efficiency resource acquisition planned in its IRPs. In 2010, these two tariffs (PPC and IEE) call for 3.81% of Portland General Electric (PGE) and 4.42% of PacifiCorp-Oregon (PP) residential and commercial customer bills to be distributed to the Energy Trust of Oregon (ETO), 0.5% of revenues to be distributed to low income weatherisation programs, and 0.3% of revenues to be distributed to school energy efficiency programs, for a total of 5.08% of customer bill for PGE and 5.17% of customer bill for PP. Under decoupling agreements, two of three natural gas utilities submit tariffs to fund energy efficiency acquisitions in support of their Integrated Resource Plans and to fund low income weatherisation. In 2010, Northwest Natural Gas's public purpose charge will collect 4.16% of Oregon residential and commercial customer bill;

[19] Please see the following link: http://www.state.mn.us/portal/mn/jsp/content.do?id=-536893811&agency=Energy)

Cascade Natural Gas will collect 1.425% of Oregon revenues for energy efficiency investments.

Ongoing collections are diverted to Low Income Bill Assistance and are not included in these numbers. Idaho Power Company is exempted from public purpose charge obligations but must make least cost investments in energy efficiency pursuant to Integrated Resource Plan requirements.

Industrial customers are exempted from incremental energy efficiency collections and from the benefits of these collections.

Additionally, industrial customers may choose to self-direct their obligations under PPC legislation. Energy efficiency projects, certified by the Oregon Department of Energy (ODOE), may be self-funded by large electric consumers with site loads of 1 MW or greater. Expenditures carry over as a credit against future obligations of the public purpose charge. ODOE may certify that no additional energy efficiency projects are prudent at the industrial site, exempting the site from further obligations under the public purpose charge.

Customers of both electric Investor Owned Utilities (IOU's) and Consumer Owned Utilities are eligible for tax credits for energy efficiency investments. These tax credits are based on the full price of the energy efficiency investments (not reduced for energy efficiency incentives received). Oregon state tax credit amounts are 25% of price, for measures certified as sufficiently energy efficient (by ODOE) up to a maximum value (also determined by ODOE). In 2010, Federal Tax credits are 30% of price, for measures certified as sufficiently energy efficient by the U.S. Department of Energy, up to $1500 per year. This funding is available to non-profits and governmental entities through allowable "selling" of tax credits to organisations with tax liability.

Texas

A Public Utility Commission of Texas (PUCT) rule provides for an energy efficiency cost recovery factor to cover all of the utility's energy efficiency program costs which is collected from the utility's end-use customers, and it is updated annually. Utilities exceeding their demand reduction goal within cost limits are awarded a performance bonus to receive a share of the net benefits.

The rule sets the standard bonus level for a utility exceeding 100% of its goal equal to 1% of the net benefits for every 2% that the goal has been exceeded, with a maximum of 20% of the utility's program costs, and if the utility exceeds 120% of the goal with at least 10% of savings achieved through hard-to-reach programs, it is entitled to an additional bonus equal to 10% of the standard bonus.

Also, the Texas State Energy Conservation Office oversees several grants and other funding opportunities[20].

Vermont

The Energy Efficiency Utility (EEU) is funded through a volumetric energy efficiency (systems benefit) charge paid by all ratepayers. Customers in all sectors may receive financial incentives from the EEU to install efficiency measures, including access to low-interest loans. In addition

[20] A list of these grants and funding opportunities can be found at:

http://www.seco.cpa.state.tx.us/funding/.

to the financial incentives, the EEU provides technical support to customers in all sectors, although the support is more specialized for industrial and large commercial customers that receive less benefit from prescriptive measures (such as installation of compact florescent bulbs) than residential and small commercial customers.

Washington

The Washington Utilities and Transportation Commission (UTC) approves volumetric based conservation tariffs for each gas and electric utility that funds the administrative cost of conservation programs run by the utility and the cost of incentive payments paid to customers for installing energy efficiency measures. The incentive payments are only for appliances that are above government code, above standard market products or for retro fit measures such as building shell insulation. The utility's conservation program must pass a cost-effectiveness test that matches the total dollar savings of all the energy efficiency resources with the total program costs. Under the utility conservation programs utilities provide technical assistance over the phone to residential customers and in person technical assistance for larger commercial customers. The UTC has a lost sales recovery mechanism (decoupling mechanism) that allows several of its jurisdictional utilities to collect margins lost due to the decline in sales from utility sponsored conservation programs. State government, through the Department of Commerce provides conservation funding for low income housing using a combination of federal, state and utilities funding. An influx of additional funding for both low income housing, mid income housing, commercial and industrial conservation has been funded by federal Recovery Act funding. This will increase conservation activities for 2010-2012. Local government has also received direct grants from the federal government to increase conservation activities. The Washington Department of Commerce[21] management of funds, grants and subsidies, and loans and the Washington Department of Revenue manages tax impacts.

Wisconsin

The Focus on Energy[22] program as described in part a above, is funded through ratepayer dollars and provides incentives (cash-back rewards or grants) for residential and business (commercial, industrial, agribusiness and schools and government) customers to implement energy efficiency measures.

Focus on Energy partially funds a non-profit organisation that provides funding in the form of equity and loans up to $350,000 for businesses that are trying to: commercialise energy-saving technologies; find markets in Wisconsin for their energy-saving technology; or adopt and implement energy-saving technologies in its manufacturing facility in Wisconsin.

South America

Brazil

PROESCO is a program of the National Developing Bank (BNDES) which promotes and support energy efficiency projects. The costumers of PROESCO are final energy users, energy generation, transmission and distribution companies and ESCOs.

[21] http://www.commerce.wa.gov/site/974/default.aspx

[22] http://www.focusonenergy.com

Asia

China

Under the "Ten Key Projects" program, 200-250 Remimbi (RMB) per tce of energy savings is awarded to firms implementing qualified projects. A fund launched in 2007 totalled 42bn RMB in 2008. A government subsidy is ensuring the distribution of about 200 million energy saving lamps to households all over the country by 2010.

India[23]

The State Energy Conservation Fund (SECF) is a 70 crore Rupees fund launched in 2009 under the framework of the 2001 Energy Conservation Act. The Fund finances the activities of the Bureau of Energy Efficiency (BEE) and energy efficiency projects.

Japan[24]

The government has adopted a range of tax and subsidy schemes to promote energy efficiency across sectors. In the industrial sector, Japan has implemented a tax system for energy supply/demand structure reform and investment promotion for the industrial and commercial sectors. This system allows individuals and corporations to claim a tax credit or a special depreciation upon introduction of eligible equipment. Three Sectors can also access a range of subsidy programmes for promoting energy-efficient technologies.

In addition, the government has established several fiscal schemes to assist SMEs in reducing their CO_2 emissions that include subsidies for the introduction of energy-efficient equipment and government loans.

Australia

In Australia different energy efficiency support schemes have been introduced, most of which form part of general policies aimed at reducing the impact on environment.

The Australian Government has introduced a household Renewable Energy Bonus Scheme which will offer rebates of $1,000 for the installation of solar hot water systems, and $600 for heat pump hot water systems.

The program has been introduced in recognition of the fact that electric water heating is generally the single largest component of household energy bills and the largest source of household greenhouse gas emissions.

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[23] This and the following sections on India are based on „The Action Plan for Energy Efficiency", Bureau of Energy Efficiency, Ministry of Power, India, 2009 as well as on data provided by REEP.

[24] This section and the following sections on Japan are an abstract from Energy Policies of IEA Countries, Japan 2008 Review, IEA, 2008.

The Green Building Fund, established by the Federal Government as part of the Clean Business Australia initiative, aims to reduce the impact of Australia's built environment on greenhouse gas emissions, by reducing the energy consumed in the operation of existing commercial office buildings. The program will provide $90 million in grants across five years, from 2008-09 to 2012-13, targeted at:

- support for owners of existing buildings to reduce energy consumption through retro-fitting and retro-commissioning; and
- a limited number of grants to develop the knowledge, skills or capability of those involved in the operation of commercial office buildings, to improve energy efficiency and reduce emissions.

The Australian Carbon Trust (ACT) is another Federal Government initiative, aimed at supporting individual action by households and businesses, with the Government committing $75.8 million over 5 years to 2013-14. The ACT will manage two key initiatives:

- A $50 million (over two years) Energy Efficiency Trust to promote private sector engagement in energy efficiency activities. Upfront investment will be repaid when energy cost savings are realised, creating a revolving fund for further investment.
- Funding of $25.8 million over five years for an Energy Efficiency Savings Pledge Fund designed to encourage voluntary reductions in greenhouse gas emissions. Households and small businesses will be able to calculate the potential dollar savings from their energy efficiency actions and make tax deductible donations to the Energy Efficiency Savings Pledge Fund. The ACT intends to use these donations to purchase and retire Australian emissions units or purchase carbon offsets.

National Solar Schools offers Federal Government grants of up to $50,000 to schools for the installation of solar and other renewable power systems, solar hot water systems, rainwater tanks and a range of energy efficiency measures. More than 1,800 schools have been approved for funding. The program was established in July 2008 and will run until 30 June 2015. Applications for 2009/2010 have been fully subscribed.

At the level of single States, the New South Wales Government established the five year, $700 million Climate Change Fund in July 2007 to provide funding for a range of programs designed to help business, households, schools, communities and government save energy, water and reduce greenhouse gas emissions. Programs funded through the fund encompass household rebates, energy efficiency initiatives for homes and businesses and water harvesting, recycling and efficiency projects. Current programs under the fund include:

- $170 million New South Wales Home Saver Rebates providing rebates for hot water systems, hot water circulators, rainwater tanks, dual flush toilets and washing machines
- $30 million Public Facilities program
- $20 million School Energy Efficiency program
- $20 million Rainwater Tanks in Schools program
- $150 million program under the Energy Efficiency Strategy.

Through the Building Innovation Fund, the South Australian Government is providing $2 million in grants to owners of office buildings for initiatives that demonstrate new and leading edge

approaches to retrofitting existing buildings and which significantly reduce building energy use and greenhouse gas emissions.

Grants are available to support:

- implementation of projects that demonstrate leading edge approaches to retrofitting commercial office buildings; and

the completion of feasibility or case studies that demonstrate methods for implementing leading edge approaches to retrofitting commercial office buildings

Europe and the Russian Federation

A number of financing tools to promote energy efficiency have been introduced in most European countries. The measures target all end-use sectors, in particular: building, appliances, lighting and transport. Traditional financing tools, ranging from grants and soft loans to tax rebates and other allowances, are in place in many countries but there are also a number of good examples of innovative measures and schemes.

Table 4 - Financial tools in EU countries

End-use sector	Grants and subsidies	Soft loans	Tax incentives	Taxes
Existing building	Austria, Cyprus, Finland, Luxembourg, Poland, Slovenia	Belgium, France, Germany, Greece, Portugal, Slovak Rep., Slovenia and United Kingdom	Austria, Belgium, Finland, France, Greece, Italy, Netherlands, Portugal, Romania, Spain, United Kingdom	
New building (passive or low-energy houses)	Austria, Belgium, Czech Rep., Ireland, Luxembourg, Slovenia, United Kingdom	Germany, France	France	
Appliances, heating, cooling and lighting	Austria, Belgium, Germany, Hungary, Luxembourg, Malta, Portugal, Romania, Slovak Rep., Slovenia, Spain		Austria, Cyprus, France, Germany, Italy, Portugal, Slovenia, Spain	Ireland
Transport			Belgium, Cyprus, France, Greece, Hungary, Ireland, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovak Rep., Spain, Sweden, United Kingdom	

Industry			Portugal, Slovenia, Sweden, United Kingdom	

Some promising experiences at national level are described below.

Belgium

Since 2007, the Brussels Capital region has provided specific incentives for the construction of passive energy houses or buildings, or renovations that result in the building meeting low-energy house standards. A passive house consumes a maximum of 15kWh of heating per m2 per year, while a low-energy house consumes a maximum of 60kWh/m2/year.

A subsidy of up to EUR 100/m2 of surface area to be heated up to 150m2, and EUR 50/m2 beyond 150m2, is awarded to both individual and collective housing applicants.

Applicants are required to conduct an on-site visit, and for passive house construction a blower door leakage test is also required, financed by the region.

The tertiary sector will be eligible to benefit from subsidies for passive building construction or low-energy renovation from the second half of 2009 onwards, in the amount of EUR 50/m2. Moreover, the Region has set up a specific service of support by experts, aimed at applicants for passive and low-energy house subsidies. The aim of this service is to provide advice and assistance by telephone or e-mail. Applicants also have the possibility of scheduling meetings with experts.

In addition, the country has established an innovative scheme to finance the refurbishment of federal buildings through Fedesco, a federal-owned company which was created in late 2005 (see sub-chapter *5.7 Energy end-use efficiency in the public (government) sector)*.

Czech Republic

Currently the most important program is the Green Savings programme which is administered by the State Environmental Fund of the Czech Republic.

This programme focuses on support for heating installations utilizing renewable energy sources but also investment in energy savings in reconstructions and new buildings. The programme support quality insulation of family houses and non-panel multiple-dwelling houses, the replacement of environment unfriendly heating for low-emission biomass-fired boilers and efficient heat pumps, installations of these sources in new low-energy buildings, as well as construction of new houses in the passive energy standard.

The overall anticipated programme allocation is up to 25 billion Czech crowns.

The Green Savings support has been set up so that the funds can be used throughout the period from the programme's launch in 2009 until 31 December 2012. Applications for subsidies will be admitted until 30 June 2012 or until the programme funds are drawn down. A subsidy may be applied for before or after implementing the measure, but support for measures completed before the programme's launch cannot be granted. The support is granted for equipment installed in residential houses, not buildings intended for individual recreation or industrial buildings, even if the applicant has their permanent residence there.

Secondly, there exists the State Housing Development Fund (SHDF) - Programme NOVY PANEL.

SHDF is subordinate to The Ministry for Regional Development. An income of the Fund is created mainly from the European Structural Funds, the state budget and own incomes (e.g. installments from provided loan).

NOVY PANEL is focused on support of reconstruction or renovation of housing stock (the family houses are excluded).

The eligible activity is also renovation of heating systems including utilisation of RES as well as insulation of buildings. The support is provided in the form of security (max 80% of principal sum) and contribution to interest (max 4%). Every owner of building can ask for a grant and the maximal level of overall support is 35% of investment (depending on his business scale).

A new programme “Green Light for Savings” was announced in April 2009. The programme supports full or partial insulation of family and collective living houses, replacements of non-ecological boilers with low-emission biomass boilers, heat pumps and solar systems and also construction of new buildings in passive energy standard. The programme is financed from pay-offs of sales of CO_2 emission permits. The expected financial allocation of the programme amounts to 25 milliards CZK (approximately 1 G€) and the programme will last till 31 December 2012.

France

In France various forms of soft loans and tax incentives are in place for building refurbishment. In 2009 measures were also introduced to provide financial support to new buildings.

The country has had innovative financing products for the residential sector since 2007, when in partnership with banks, low-interest loans for residential energy conservation projects were offered and financed through a tax-free savings account.

The low-interest loans are based on a previous tax-free savings account known as the CODEVI (Compte pour le Développement Industriel).

This savings product allowed banks to finance the development of small- and medium-sized enterprises (SMEs). The CODEVI as of 1 January 2007 has been renamed the LDD (Livret de Développement Durable), and banks must use a portion of these funds to offer preferential loans for domestic energy conservation projects. While the CODEVI was capped at EUR 4600 per person, the LDD cap has been raised to EUR 6000 per person to raise additional funds for these loans. As of 2009 the account pays tax-free interest of 2.5% a year. In 2008, banks had to dedicate 2% of the funds to energy conservation loans, rising to 5% in 2009 and 10% thereafter. Preferential loans can be awarded to individuals, co-properties and entrepreneurs for the purchase and installation of: energy efficient boilers; thermal insulation (walls, windows, shutters); thermal regulation equipment; equipment producing energy from renewable sources; space and water heating equipment using wood or other biomass; heat pumps.

Applicants must provide the bank with documents from the equipment installer, certifying that the equipment and installation meets the required energy efficiency criteria. This financial measure is complementary to the 2005 tax credit scheme. The acquisition of domestic energy efficient equipment entitles the buyer to a price reduction (tax credit scheme) and a low-interest loan at the same time (LDD measure).

The 2005 tax credit scheme was extended to 31 December 2012 (from end of 2009). To be

eligible for the tax credits the building in which the equipment is used must be a primary residence and at least two years old; for renewable energy equipment the building can be new or old. The tax credits are as follows:

- 5% for purchases of low-temperature boilers (until 31 December 2008)
- 25% for purchases of condensation boilers, thermal insulation and heating regulation devices.

This amount increases to 40% if: a) the material and equipment is installed in a home constructed both before 1 January 1977 and this installation occurs before the 31 December of the second year of the home's acquisition by its present owners; b) the material was purchased after 1 January 2006.

Since 2009, the installation costs for thermal insulation of walls, floors, roofs and ceilings are also covered by the tax credit.

- 40% for energy production equipment using renewable energy and heat pumps devoted primarily to heat production; Increased to 50% for renewable energy used for heating as of 1 January 2006. However the credit for heat pumps decreases to 40% in 2009 and 25% in 2010 for biomass or wood boilers, and heat pumps. It remains at 40% if the material and equipment is installed in a home constructed both before 1 January 1977 and that this installation occurs before the 31 December of the second year of the home's acquisition by its present owners. Air-air heat pumps are excluded as of 1 January 2009.
- 50% for obtaining an energy audit, when not required by law (as of 1 January 2009, limited to one audit every 5 years);
- 25% for the purchase of equipment and heating systems drawing the majority of their power from cogeneration or renewable energy sources (as of 1 January 2006);

The tax credit is limited to EUR 8000 per person, EUR 16 000 for a couple and EUR 400 for each additional dependent.

Besides, the 2009 Finance Law contains various provisions to increase financing for energy efficiency investments:

- Zero-interest loans for house purchase; it's a programme for those purchasing a home for the first time (either new or existing construction); the loan amount is increased by EUR 20 000 if the building meets standards beyond those required under current building regulations. In general, this covers low-energy or positive-energy buildings (known respectively as BBC - bâtiments basse consummation, and BEPOS - bâtiments à énergie positive).
- Eco (or green) -loan for renovation activities: it's a 0% loan for energy-efficient renovation; the aim is for energy savings to allow repayment of the loan. Activities that can be covered under the loan include: thermal insulation for roofs, exterior walls, and exterior glass surfaces; installation, regulation or replacement of heating or hot water systems; installation of heating or hot water systems using renewable energy. The loan amount is limited to EUR 30 000. Therefore, the Minister of environment signed on February 26 2009 with banks, building and real estate professionals, and ADEME (French Energy and Environment Management agency), an agreement detailing the

practical implementation of the green loan or eco. The beneficiaries, without any condition of resources, are occupying owners or non occupying owners. The buildings concerned must have been completed before January 1, 1990 and a household can only have one green loan.

Italy

Italy provides numerous large tax incentives for building refurbishment, including replacement of building equipment through an income tax deduction corresponding to up to 55% of the investment cost. On the basis of preliminary data in the period 2007-2009 around 600,000 initiatives were implemented for total investment costs (prior to tax deduction) of 8 billion euros which resulted in energy savings for 4.4 TWh.

Portugal

The Portuguese National Energy Efficiency Action Plan comprises a set of measures aiming at an increase in energy efficiency equivalent to about 10% of the final energy consumption by 2015. More recently, in November 2009, the EU Energy Services Directive was transposed into national law establishing energy savings goals of 9% up to 2016.

The Plan includes a few innovative financing measures:

- Encouraging reduced electricity consumption - providing an incentive for major consumers to reduce consumption - by providing bonuses to those who consume less, and establishing an Energy Efficiency Fund;
- Efficiency cheque: providing an "efficiency cheque" for two years, worth 10% or 20% of annual electricity costs to consumers with verified energy reductions of, respectively, 10% or 20% following investments in energy efficiency;
- A reduction of 2.5% in the electricity tariff to those with lower energy consumption, and creating pricing schemes in favour of efficiency.
- The creation of a subsidised low-interest personal line of credit, in the amount of EUR 250 million per year, for investments in energy efficiency measures, with an emphasis on urban rehabilitation. Interest rate reduction of 4% provided for credit, up to 8% without guarantees.

Spain

As part of Spain's "Plan E" economic stimulus package, and in line with Spain's 2008-12 tourism plan which seeks to establish a competitive and sustainable tourism sector by 2020, the Renove Tourism Plan aims to help rebuild Spain's tourism sector along more sustainable lines.

The Plan offers low-interest loans in partnership with Spain's Official Credit Institute (ICO) for tourism sector companies to undertake renovation and improvement, including measures that improve energy savings or the implementation of environmental quality management systems.

Up to 90% of investment costs will be financed, to a maximum of EUR 1 million (varies according to amortisation period chosen), and with a fixed interest rate of 1.5%.

In February 2009, the initial EUR 400 million earmarked for the plan was exhausted, and an additional EUR 600 million allocated.

United Kingdom

In addition to various traditional financial tools the country established two interesting and innovative financing tools: a revolving loan scheme in the public sector and two financing schemes for the rolling out of smart meters in every house.

They are described under the sub-chapters, respectively, *5.7 Energy end-use efficiency in the public (government) sector* and *5.9 Smart Metering.*

Russian Federation

When the state supports investment activities in the field of energy savings and improvement of energy efficiency, costs related to payment of interest on credits and loans received to implement investment projects in the field of energy savings and improvement of energy efficiency are compensated.

5. 3 Tradable Certificates / saving obligations on energy utilities

North America

Canada

In *British Columbia*, each of the Utilities has a demand-side management department/program(s) to promote and reward energy efficiency in each of the sectors they serve. The British Columbia Government, in addition, had a province-wide energy efficiency reward program, "Livesmart" which operated until August 2009. The program was successful but ran out of funding. Plans are to reinstate the program once funding is secured.

As well, the provincial government has created the British Columbia Partnership for Energy Conservation and Efficiency which brings the utilities and government together to coordinate efficiency actions. From their webpage:

"Since the release of the British Columbia Energy Plan, provincial goals have been enshrined in legislation. These include:

- Reduction of greenhouse gas emissions by 6% by 2012;
- Reduction of greenhouse gas emissions by 18% by 2016;
- Reduction of greenhouse gas emissions by 33% by 2020;
- Reduction of greenhouse gas emissions by 80% 2050; and
- To achieve 50% of BC Hydro's incremental resource needs through conservation by 2020. "

The achievement of 50% of British Columbia Hydro's incremental resource needs through conservation will require energy efficiency measures but these specific measures have not been mandated or laid out.

Mexico

The Law of the Sustainable Use of Energy on its 26th Article establishes that the Commission will develop a program to promote process, products and services certifications, as well as supervision of them. In furtherance of these, the Commission will:

- Develop a methodology for certifications of process, products and services .
- Establish an accreditation system governing official auditors and/or officials. This aspect of the programme is designed to ensure that the individuals empowered to authorise activities pursuant to the Federal Metrology and Standardisation Law are appropriately trained and familiar with its requirements.
- Develop training programs for auditors and other officials in the energy sector.
- Implement a registry to allow the identification of the firms that have certified their processes, products and services.
- Promote the creation of supportive regional centers for small and medium firms, with the purpose of facilitating the certification of processes, products and services.
- Make provision for the certification of processes, products and services.

According to the Law Respecting the Sustainable Use of Energy, this programme must be

published no later than September 11, 2010. In addition, energy efficiency in the industrial sector can be promoted through recommendations for major energy consumers, as provided for in the Law and its ordinance.

United States of America

White certificates are not yet widely used in the United States. Although several states have established efficiency targets, none of the states surveyed indicated that a certificate trading scheme has been authorised.

Asia

China[25]

China has adopted innovative pricing reforms, which link the prices that large industrial consumers pay for electricity to the efficiency of their production.

The first "differential electricity price" policy was implemented in a provincial pilot in June 2004 and was extended to the rest of the country in 2005.

The program applies to eight industries that are among the largest energy consumers in the country: electrolytic aluminum, ferroalloy, calcium carbide, caustic soda, cement, steel, and, included in 2007, phosphorous and zinc producers. It assigns designations to the users, based on their relative energy efficiency: those enterprises that are to be encouraged, permitted, restricted, or eliminated. Electricity prices vary for the four categories and are designed to encourage the closing-down of the least efficient enterprises.

Enterprises in the well-performing "encouraged" and "permitted" categories pay the standard regional prices for electricity without penalty.

Consumers in the poor performance classes, "restricted" and "eliminated", originally paid surcharges of 2 fen and 5 fen per kWh, respectively ($0.0025/kWh and $0.0063/kWh).

Those surcharges have been gradually ratcheted up according to a public schedule of planned price increases, and today pay 5 fen and 20 fen per kWh ($0.0063/kWh and $0.025/kWh). Advance notice of the planned increases is an especially effective feature because it gives industry time to plan and invest in better equipment and processes.

India

Please see section *5.1 Legal or regulatory instruments*.

[25] This section is an abstract of China's Climate Change Initiatives: „Do new policies adopted in China offer any guidance for the transformation of the US power sector in a carbon-constrained world?" Frederick Weston, Rebecca A. Schultz, David Moskovitz, and Max Dupuy, November 2009.

Japan

Please see section *5.1 Legal or regulatory instruments*.

Australia

Relevant examples of market-oriented mechanisms are operative in three Australian States.

The New South Wales Energy Savings Scheme (ESS) was established on 1 July 2009 as part of the State Energy Efficiency Strategy. The ESS imposes an energy efficiency target on electricity retailers, starting with a headline target of 1 per cent of electricity use in 2009, rising to 5 per cent by 2014. The ESS provides clear financial incentives for electricity retailers and other businesses to provide energy efficiency services to consumers by developing creative, cost effective programs to cut energy use.

The ESS will operate until 2020 unless it is replaced by a national energy efficiency scheme. It is designed so that it can be transitioned into a national scheme, should the Federal Government decide to establish one. By 2020, the Scheme is expected to deliver 22,000 gigawatt hours of electricity savings, 615 megawatts of peak demand reduction, and provide up to $1 billion of incentives for energy efficiency projects.

The Victorian Energy Efficiency Target (VEET) (promoted as *Energy Saver Incentive*) scheme places legislative requirements on energy retailers in Victoria designed primarily to encourage the uptake of energy efficient technology. Under the Scheme, relevant entities (predominantly energy retailers with more than 5,000 customers) create Victorian Energy Efficiency Certificates (VEECs) through prescribed energy efficiency and greenhouse abatement activities, which are then surrendered to the jurisdictional regulator and credited against their energy efficiency obligations. The VEET scheme operates in three-year phases, with the setting of new regulations at each phase change. The Victorian Energy Efficiency Target Regulations 2008 (VEET Regulations) sets out the prescribed activities for the first phase of the VEET scheme, i.e. 1 January 2009 to 31 December 2011.

The South Australian Government introduced the Residential Energy Efficiency Scheme (REES) on 1 January 2009.

The REES places obligations on energy retailers with over 5,000 residential customers to offer customers incentives to improve the energy efficiency of their homes. Energy providers are able to choose from energy saving measures prescribed by the Government. Retailers operating in South Australia are obliged to participate in the REES as a condition of the licence issued to the retailer by the Essential Services Commission. Initial targets are set for a three year period ending 2011.

Europe and the Russian Federation

A consolidated intervention for the promotion of energy efficiency in Europe is achieved through the introduction of energy saving obligations placed on energy utilities.

In France and Italy and in the United Kingdom the introduction of such obligations has entailed the release of certificates demonstrating the implementation of activities promoting energy efficiency. At the end of a compliance period parties are required to submit certificates corresponding to their obligation. Utilities can either document actions resulting in savings to

meet their energy saving target or buy certificates on the market to make up the difference.

While in the United Kingdom the possibility to trade obligations and savings is limited by regulation, only existing among the obliged parties and through bilateral contracts, white certificates are freely tradable in Italy, where trading is possible both via bilateral contract and on a spot market, and in France, where certificates can be traded via bilateral contracts.

Other countries introduced energy savings obligations without allowing the tradability of certificates; the most relevant case is that of Belgium (Flanders).

France

The law n° 2005-781, adopted the 13th of July 2005, introduced the new instrument of white certificates in France within the framework of energy demand management policy.

This was an acknowledgement of the need to make these instruments available to the residential and tertiary sectors, which are broadly based, energy intensive user classes. This led to the development of a national policy based on energy efficiency certificates, complementing other existing instruments, such as tax credits, etc, and which could be based on encouraging the market parties to optimise demand and supply, without subsidies.

The mandatory target for the first three years, from 1 July 2006 to 30 June 2009, was equivalent to 54 TWh, cumulatively, actualised with a 4% discount rate over the life of the energy efficiency actions (depending on the considered measure). Within the three year period there are no annual deadlines or milestones, as targets were to be verified only at the end of June 2009.

The overall target was originally shared among different energy sources, then among parties who had been specially obligated, depending on their market share. The decree of 26 September 2006, in particular, decided the following allocation among energy suppliers:

- electricity : 31 TWh;
- natural gas : 14 TWh;
- fuel : 6.8 TWh;
- LGP : 1.5 TWh;
- cooling and heating: 0.7 TWh.

As a rule, total energy savings targets are shared among energy suppliers with annual sales beyond a fixed threshold.

The threshold for the suppliers of electricity, natural gas and heating or cooling was fixed at 0.4 TWh, for the suppliers of LPG at 0.1 TWh, while for domestic fuel suppliers, the obligation arises “from the first litre”, according to a specific request of the professional organisation.

As a result, 2,500 firms are obliged by the decree to realise energy savings, a few dozen large companies operating in the electricity, gas, LPG and heating/cooling sectors and a large number of small and medium size heating oil suppliers.

The obligation is distributed among the obliged parties using a formula that takes into account sales in the residential and tertiary markets in 2004 (75%) and 2003-05 average energy prices (25%).

Eligible energy saving measures involve all sectors and all types of fuels, as long as they are not already covered by the Emission Trading Scheme. Obligated parties are free to choose how

to meet the obligations in terms of targeted energy type, consumer segment, technology and measure.

The savings can be achieved using predefined standardised measures or other through other activities. 170 standardised and specified activities were introduced, with predetermined saving targets. These standardised measures are relevant for the following sectors: residential, tertiary, transport, industrial, heating, cooling and public lighting. Training and use of renewable energy sources are included among standard operations.

At the same time, standardised methodologies, based on straightforward user-friendly procedures, have been set up for calculating energy savings. A standardised evaluation of energy savings is established for each action, expressed in kWh of final energy and cumulated over the life of the product.

The minimum size required to file a request for a certificate is 3 GWh ”cumac” which is the energy saved over the duration of the technical lifetime corrected with the discount factor. To achieve the minimum size it is permitted to pool savings from similar actions.

Energy savings certificates, which are valid for at least 10 years, are attributed after the achievement of the action. They can be freely traded through bilateral contracts.

White certificates can be issued to three types of actors:

- obligated energy suppliers;
- public collectives (state, region, department, commune or their “grouping”);
- non-obligated parties, provided that energy efficiency is not their main business activity. These are mainly industrial and commercial enterprises undertaking energy efficiency improvements of their own premises.

Companies that have energy efficiency as their main business (ESCOs) are excluded deliberately.

The intention is to push energy suppliers to encourage the consumers to make energy efficiency improvements. Energy suppliers, however, may contract with ESCOs to carry out energy efficiency activities on their behalf.

The penalty for obligated parties that don’t meet their obligation by the end of the three year period was fixed at 20 €/MWh. The payment of the penalty entails the cancellation of the deficit for non-compliant suppliers, while the penalty will double in the next period if the obligated parties can’t prove that they were unable to obtain certificates.

With respect to the institutional design of the scheme, the ministry in charge of energy sets the rules and the obligations, attributes the energy savings certificates and controls the projects. ATEE (Association Technique Energie Environnement) manages a platform gathering economical actors involved in the energy savings market (energy suppliers, manufacturers, retailer, etc.) and makes proposals to the ministry for new standardised actions.

ADEME (Agence de l’Environnement et de la Maîtrise de l’Energie) acts as a kind of «back office» of the ministry, carrying out technical analyses and evaluations and warranting information to public bodies and companies.

Every three years the functioning of the white certificate system is to be analysed and the whole complex of transactions described and published in a report.

At the end of the three year period, the cumulated energy saving target was fully achieved. By 30 June 2009 certified energy savings amounted to 65.2 TWh. Savings were mainly achieved in the residential sector (86.7%), followed by industry (7.4%) and tertiary buildings (4.3%). Most used standardised measured involved heating systems (45.1%), heat pumps (10.9%), roof insulation (5.8%) and windows insulation (4.6%).

The mechanism has been confirmed for the second period (2010-2013), with a cumulated target fixed at 345 TWh.

Italy

The Italian mechanism entered into force in January 2005. So far national targets have been set by the Government till the year 2012 included.

Table 5 – Initial national energy saving targets (Mtoe/year)

Year	Electricity distribution sector	Natural gas distribution sector
2005	0.1	0.1
2006	0.2	0.2
2007	0.4	0.4
2008	1.2	1.0
2009	1.8	1.4
2010	2.4	1.9
2011	3.1	2.2
2012	3.5	2.5

The Government has designed the core elements of the scheme (e.g. target, obligated and eligible parties, eligible projects, trading options, general enforcement and cost-recovery criteria; some evaluation rules).

AEEG (i.e. the electricity and natural gas regulator) is in charge of:

- designing the technical and economic regulation governing the scheme;
- its administration and enforcement;
- the monitoring of its results;
- the proposals to the Government in order to enhance its effectiveness.

The Electricity Market Operator is in charge of issuing White Certificates upon AEEG authorisation, of administering the White Certificates Registry and the trading platform (spot market).

Annual primary energy saving targets are apportioned among major electricity and natural gas

distributors according to their share of the market served by the obliged parties.

In the first three years of implementation only distributors with more than 100.000 customers had to comply with energy savings obligations; from 2008 this threshold has been lowered to 50.000 customers.

For 2009, 14 electricity distributors and 61 natural gas distributors had savings obligations. The scheme covers all end-use sectors plus small photovoltaic (PV) plants and some intermediate natural gas uses.

Only hard measures (energy efficiency technology changes) are eligible. In the initial phase the obligation was banded: each year at least 50% of each individual target had to be delivered via electricity/natural gas savings in case of electricity/natural gas obligated distributors respectively.

Eligible parties include all electricity and natural gas distributors, companies controlled by electricity and natural gas distributors, energy service providers and big energy users provided they have an energy manager i.e. a person in charge of promoting end-use energy efficiency.

Energy savings are accredited only after they have been actually delivered, and for a conventional lifetime of five year (with the exception of heating and air conditioning projects whose crediting lifetime is set at eight years). This significantly increases the stringency of the target when compared to other national schemes.

The general guidelines for the measurement and verification of energy savings developed by AEEG include three M&V approaches: a) deemed savings; b) a so-called engineering method, where an evaluation algorithm is defined, with pre-defined values for some parameters while other parameters have to be measured on a case-by-case basis; c) a complete energy monitoring plan approach based on the comparison of measured consumption before and after the project, with adjustments made for conditions that impact on energy consumption other than the implemented project.

A strict additionality rule is applied by AEEG, whereby only savings delivered over and above legislative requirements and market averages are eligible for the issuing of White Certificates. Both deemed savings and engineering methods are regularly up-dated in order to ensure this additionality against market and legislative developments.

Minimum product and project qualitative requirements also apply.

The verification and certification of the energy savings delivered by each project is made by AEEG through a thorough monitoring of the reporting documentation. Inspections at the project site(s) are also carried out on a regular basis. Since 2006 Enea (the national Energy Agency) supports AEEG in the evaluation of the projects submitted within the scheme.

Certificates can be traded on the spot market or bilaterally. Trading is a central part of the scheme: no authorisation is needed to trade certificates; a dedicated Registry and market platform is in place and specific rules and procedures have been defined and are up-dated when needed in order to promote market transparency and liquidity as well secure market deals. Four types of certificates are issues: electricity (type I), natural gas (type II), transport-uses (type IV) and other fuels (type III). Banking of certificates is allowed throughout the 2005-2012 period in order to limit price volatility.

The policy package include a regulated cost-recovery mechanism financed via a small surcharge raised on electricity and gas rates: a standard unit “allowed” cost is set and up-dated

every year by AEEG according to a pre-defined formula; the unit "allowed" cost is flat and technology-neutral (€/toe saved) and it is paid for every White Certificate redeemed by obligated distributors in order to proof compliance with their individual annual target (including purchased White Certificates); types IV White Certificates i.e. certificates attesting energy savings on transport uses are not eligible. The unitary allowed cost was set at 100 €/toe until 2008, at 88.92 €/toe in 2009 and at 92.22 €/MWh in 2010. The up-dating formula links its level to the avoided energy cost.

Financial penalties apply in case of non-compliance with the annual target. A one year grace period applies provided that at least 60% of the annual target has been met. If this is not the case, then the penalty does not cancel the obligation to compensate the non-compliance in the following year.

So far the annual targets have always been met and exceeded. Since the beginning of the scheme and up to 31 December 2009, 5.2 million toe of energy savings were certified. Most energy savings were related to electricity consumption (75%) and were delivered through deemed saving projects (84%).

Energy service providers were the primary deliverers of eligible energy saving measures, implementing measures covering the 83.2% of total energy savings, followed by obligated electricity suppliers (8.7%) and by obligated natural gas suppliers (7.6%).

Almost 60% of certified savings were delivered via programs related to electricity uses in the residential and tertiary sectors. The individual measure yielding the largest results was the substitution of traditional lamps with high-efficiency fluorescent lamps in the residential sector.

The mechanism has proved to be economically efficient, with costs for the country as a whole - measured in terms of the economic contribution granted to distributors under regulatory obligations – that were largely below the public and private benefits associated with the pursuit of certified savings[26].

[26] Detailed documentation on the system is available at:

http://www.autorita.energia.it/it/operatori/operatori_ee.htm, including *Interim* as well as *Annual Report on the results achieved* at http://www.autorita.energia.it/it/pubblicazioni_ee.htm .)

Table 6 – Main measures implemented in the Italian White Certificates Market

Interventions	Nr. Of approved interventions			Certified savings(A) (toe)	% of certified savings on total
	by DSOs	by ESCOs	total		
Substitution of incandescent lamps with CFLs	111	636	747	2,965,580	66.5%
Low flow showerheads in households	91	151	242	746,034	16.7%
Faucet aerators in households	70	167	237	241,824	5.4%
Replacement of mercury vapour lamps with high pressure sodium lamps for public lighting	72	170	242	153,411	3.4%
Use of solar water heaters	27	337	364	100,465	2.3%
Others	178	724	902	250,951	5.7%
Total	**549**	**2,185**	**2,734**	**4,458,265**	**100.0%**

(A): Certified savings up to 31 December 2009 and based on standard formulas and engineering approach (86% of total certified energy savings).

To sum up: so far the system has worked well in delivering energy savings, in a cost effective way, mainly via “mass market” measures and technologies that are already cost-effective and via energy service providers.

Trading has been important not just to deliver the above energy savings: in mid-2007 price signals have been key to highlight market disequilibria and the need for corrective legislative and regulatory measures, that were introduced in December 2007, e.g.: higher targets for 2008 and 2009, new annual targets for the period 2010-2012; lower threshold for the obligation; new eligible parties on the supply side; full transparency of bilateral trading; removal of the 50% constraint; simplification and strengthening of the penalty system; updating of deemed savings and of the conversion factor toe/kWh.

Looking ahead, in order to make the mechanism effective in the achievement of the established targets and in the fulfilment of the commitments made at European level, longer term targets need to be defined in order to give security to investors as well as to promote the market diffusion of ‘structural’ i.e. long-life-time measures.

United Kingdom

In the United Kingdom energy saving obligation on energy suppliers were introduced in 2002, with the implementation of the first Energy Efficiency Commitment (EEC), operative till 2005.
A second EEC was in place from 2005 to 2008. The system was then replaced by the Carbon Emissions Reduction Target, operative from 2008 to end 2012

Under the first EEC, electricity and gas retail suppliers with customer base over 15,000 were

required to achieve targets for the promotion of improvements in household energy efficiency. The cumulated saving target for the period April 2002 - March 2005, in particular, was fixed at 62 TWh.
The EEC was aimed at contributing to the Climate Change Programme, by cutting greenhouse gas emissions, but also to the alleviation of fuel poverty. The EEC, in particular, required that half of all energy efficiency measures implemented to achieve a supplier's target had to be carried out amongst a Priority Group of customers consisting of those in receipt of means-tested or disability-related welfare benefits or credits.

Though obliged parties under the EEC were allowed to meet targets by claiming credits for measures carried out by third parties, ESCOs did not enter the energy efficiency market to any extent. This could be, at least in part, the consequence of the fact that there was no issuance of white certificates and no open access to credits and trading in credits for non-obligated parties and that energy savings measures related to industry were excluded from the program.

Suppliers were allowed to carry over to the second EEC all their excess savings from measures implemented during the first EEC.

The Electricity and Gas (Energy Efficiency Obligations) Order, which came into force in December 2004, set the target for the second phase of the EEC, from April 2005 to March 2008, at 130 fuel standard TWh. It obliges parties retail suppliers with domestic customer bases over 50,000. The second EEC encouraged consumers to make domestic energy efficiency improvements in products such as insulation, energy efficient boilers, micro CHP, appliances and light bulbs. It placed an obligation on the suppliers of gas and electricity to promote improvements in energy efficiency through measures provided to domestic consumers, including consumers of low income.

Standard energy savings for each measure were not only lifetime discounted but also fuel-standardised; fuel standardised multipliers were applied to energy savings according to the carbon content of the displaced energy carrier. Savings were also adjusted for estimated free riders for each activity, based on market statistics for each measure and historical sales information, as well as for the heat replacement effect, which accounted for space heating provided by inefficient appliances, and light bulbs that had to be replaced by another heat source.

At the end of the second EEC suppliers met, and exceeded, the overall target, achieving 187 TWh of savings against the overall target of 130 TWh.

Of this overall activity approximately 44% was in favor of the Priority Group of most vulnerable energy consumer, defined in the EEC Order as those households receiving some typologies of benefits (council tax benefit, housing benefit; income support; disability living allowance, etc.).

The Priority Group was targeted predominantly through the delivery of insulation measures. The range of measures delivered to the non-Priority Group is more diverse, but still dominated by insulation.

On the whole, nearly 60% of the energy savings achieved under the second EEC came from the installation of insulation measures.

The Carbon Emissions Reduction Target (CERT) - which came into effect on 1 April 2008 and will run until end 2012 - is an obligation on gas and electricity suppliers to achieve targets for promoting reductions in carbon emissions in the household sector. It marks a significant strengthening of efforts to reduce household carbon emissions - with a doubling of the level of

activity of its predecessor EEC, originally to deliver overall lifetime carbon dioxide savings of 154 $MtCO_2$.

In September 2008 the Government proposed to increase the CERT target by 20%, which is expected to boost supplier household energy efficiency investment by some GBP 560m by 2011 and increase the scheme's lifetime carbon savings to 293 $MtCO_2$, thereby making a significant contribution to environmental and social ambitions.

As well as in the second EEC, in CERT the threshold for the definition of obliges parties was set equal to 50,000 domestic customers. As a consequence, CERT involves only six suppliers. The obligations for individual energy suppliers are allocated by the energy regulator according to their market share of domestic customers.

Similarly to EEC, CERT allows the trading of obligations and savings only among the obliged parties and through bilateral contracts. Certificates' trading is only possible once the seller's target has been met; for trades to be effective a written agreement of the regulator is needed; these were probably the main causes of the operators' little interest in certificates trading.

In addition to the energy efficiency measures of the EEC, suppliers are able to promote microgeneration measures; biomass community heating and CHP; and other measures for reducing the consumption of supplied energy. The Department for Environment, Food and Rural Affairs (DEFRA) require suppliers to demonstrate clear additional value in each of the schemes they carry out - for instance, schemes must go beyond building regulations or involve the installation of appliances better than the market average.

CERT maintains a focus on vulnerable consumers and includes new approaches to innovation and flexibility. Suppliers must direct at least 40% of carbon savings to a Priority Group of low-income and elderly consumers. Extending the priority group to include the over 70s seeks to ensure that a large number of fuel poor households, who are not eligible under the current criteria, become eligible for support. Moreover, the newly-launched "Act on CO_2" advice line will help customers take advantage of suppliers' offers under CERT.

In CERT the unit of measuring savings was changed from lifetime discounted fuel standardised TWh to lifetime un-discounted carbon savings; this significantly broadened the scope of measures allowed for achieving the target. The reason for this change is that climate change is driven by the concentration of CO_2 in the atmosphere, and that the total amount of CO_2 savings is more important than the annual carbon savings.

The mechanism is built around the use of standardised energy saving measures. The regulator produces a series of savings for these energy measures, reflecting the varying property type, construction and age, and these are used by the energy suppliers to claim their energy saving credits. Using standardised energy savings allows for an ex-ante approach to measuring savings carried out by obligated parties.

Despite the fact that within the ECC program an energy saving uplift was provided for obligated parties developing new standard measures, very few were developed. The CERT program, on the contrary, favored the development of new standard measures developed by obligated parties at households and community scale.

The approval of energy saving schemes and determining improvements in energy efficiency attained are based on an ex-ante approach, using the standards described in an illustrative mix.

Savings of a project are calculated and set when a project is submitted based on a standardised

estimate taking into consideration the technology used, weighted for fuel type and discounted over the lifetime of the measure. There is the option for energy suppliers to monitor and demonstrate the savings retrospectively instead of an ex-ante assessment, but this option has never been used.

The procedures for approving, notifying and calculating energy savings resulting from each measure are highly standardised. This reduces investment risks for obligated parties and minimises administrative costs for the regulator and the obligated parties.

The requirements for monitoring and verification are based on technical assessments, consumer satisfaction and consumer utilisation monitoring.

There is no monitoring requirement of the actual energy savings in relation to the ex-ante standardised savings for obligated parties.

In some cases ex-post savings are monitored in order to improve the accuracy of standardised savings, but not at the expense of the obligated party.

If standardised savings are amended for the next commitment period, the measures undertaken in previous commitment periods are not affected, although DEFRA revises their estimates of national energy and carbon saving retrospectively in the light of the new information.

Belgium

In Flanders, as a public service obligation, electricity grid operators are required to achieve in each year a stipulated percentage of energy savings on their clients' respective consumption. (1% per year for the high voltage consumers, 2.2% in 2006 and 2007, 1% since 2008 for the low voltage consumers). This is achieved, in particular, through premiums, which are financed through an increase in electricity prices.

Eligible customers are households and non-energy intensive industry and services. Energy companies are required to ensure that there are savings in low income households. This is achieved by ring fencing a portion of the energy saving target that has to be met by savings within the low income sector.

Grid operators submit to the Department of Natural Resources and Energy of the Ministry of Flanders, plans for actions to be implemented in the following year. These plans also include proposals for the calculation of energy savings. The Department then evaluates and approves or, in some cases, rejects, the proposal.

In addition, to encourage the production of CHP, the Flemish government established a system of CHP certificates. A CHP-certificate is issued per 1 MWh of energy saved in comparison with traditional electricity and heat production. Every electricity supplier has the obligation to buy a certain amount of CHP-certificates and is obligated to surrender these certificates on an annual basis to the Flemish Regulator. The number of certificates is determined based on a percentage the supplier's total production. If targets are not met, fines are levied, the proceeds of which go into a Renewable Energy Fund.

Network operators and power producers submit data monthly to the regulator (VREG), including net production and injection of electricity from CHP. This allows VREG to calculate the energy saved from CHP production compared to production in a reference boiler and facility. For CHP producers, it also allows VREG to provide them with a guarantee of origin certificate and provide CHP certificates to meet their obligations. CHP producers can sell CHP certificates to their distribution system operator for a regulated minimum price. They can, along with any other

entity possessing CHP certificates, such as network operators, also sell their certificates on the market to traders or suppliers, at a market-determined price.

5.4 Tenders

North America

United States of America

State public utility commissions often utilise requests for proposals to procure energy efficiency services.

California

The California Public Utilities Commission requires investor owned utilities to competitively bid a minimum of 20% of the utilities' energy efficiency portfolio budgets to non-utility entities that offer the most innovative program designs and/or propose mechanisms to deliver energy efficiency services to "hard to reach" market segments that are under-represented in utility program participation.

Maine

The Maine Public Utilities Commission (MPUC) is required by statute to periodically solicit standard offer service and long-term contract proposals for electricity supply for Maine consumers. In both instances, proposals for efficiency are requested.

Massachusetts

Program Administrators routinely use requests for proposals to secure subcontractors for energy efficiency activities.

New York

Two utilities in New York have received authorization to go forward with block bidding programs for energy efficiency projects as part of the Energy Efficiency Portfolio Standards effort. The programs, which will be funded by ratepayers, has not yet been implemented.

Oregon

Demand side management programs implemented by investor owned utilities include bid opportunities for customers to curtail on demand or voluntarily curtail during particular seasons.

Washington

Utilities issue requests for proposals for energy efficiency programs as a result of integrated resource planning as needed. [27]

[27] WAC 480-107-015 establishes the RFP process utilities must use and state that any provider of energy savings may submit bids in this process (effective 28/04/06).

http://apps.leg.wa.gov/WAC/default.aspx?cite=480-107-015

Wisconsin

The Focus on Energy program periodically solicits Requests for Proposals from manufacturers of energy efficiency technologies and contractors who sell and install energy efficient technologies in both the Residential and Business programs and in various sectors.

Europe and the Russian Federation

In Europe national tenders are carried out in Hungary by the Energy Centre (a not-for-profit public institution owned by the Ministry of Transport, Telecommunication and Energy) as part of the National Energy Saving Plan but the most comprehensive system is the tender mechanism adopted in Portugal.

Portugal

ERSE, the Portuguese energy services regulatory authority, has developed a mechanism for promoting efficiency in electricity consumption called PPEC (Promoting Efficiency in Electricity Consumption), with a budget of 23 million euros for 2011-2012.

PPEC consists of a tender mechanism, by which eligible parties (electricity suppliers; transmission and distribution network operators; consumer rights associations; energy efficiency agencies; municipal associations and investigation centres and educational institutions) submit proposals designed to improve electricity efficiency in consumption.

These measures are selected through technical and economical criteria publicly discussed and approved ex-ante. The annual budget is 11.5 million euro and, as provided for in the tariff code, that amount is supported through the Global Use of System Tariff, paid by all consumers.

Tender mechanisms are important instruments for the promotion of energy efficiency aimed at meeting international and national objectives for CO_2 emissions reduction.

According the Portuguese Energy Regulator PPEC is one of the best methods to encourage and provide the structure for the introduction and implementation of energy efficiency practices. Tender mechanisms have the advantage of being competitive mechanisms and as such, only the best measures with the highest benefit-cost ratio are selected for implementation.

PPEC involves two types of measures.

- Tangible – installation of equipment with a level of efficiency superior to standard equipment on the market, therefore producing measurable consumption reductions. The tangible measures are aimed at the residential, services or industrial segments.
- Intangible – disseminating information on energy efficient practices in order to promote a change in behaviour. Examples of this kind of measure are energy audits, information campaigns, seminars and conferences.

The measures are analysed and approved through a competitive process and they are ranked according to pre-established rules, underpinned with a cost-benefit analysis.

The benefits for the electricity sector and the environment are much higher than the correspondent costs, with a ratio of 7:1 in the residential segment; 7:1 in the services segment and 14:1 in the industrial segment. The expected cumulative avoided consumption for all the

past and present PPEC programs is around 4.3 TWh which corresponds approximately to 1.6 million tons of CO_2 avoided.

The unit costs of the avoided consumption (5.4 €/MWh avoided) are much lower than the costs resulting from the implementation of equivalent measures in the supply side in Portugal, such as the promotion of special regime generation (28.1€/MWh[28]).

5.5 Voluntary agreements

North America

Canada

The most prominent environmental labeling program in Canada is the Environmental Choice program.

Established in 1988, Environmental Choice has awarded labels to approximately 200 companies covering 2,000 products and services, under roughly 100 categories for products and services.

The Environmental Choice Program awards an EcoLogo to products and services that meet four major areas of focus - life cycle impacts, company compliance with relevant health, safety and environmental laws, minimisation of packaging and environmental performance requirements.

To obtain the EcoLogo a product or service must be made or offered in a way that either: improves energy efficiency, reduces hazardous by-products, uses recycled materials, is re-usable, or provides some other environmental benefit. In addition, certified products or services should meet or exceed any applicable industry-specific safety and performance standards. Companies and products from any country are eligible.

Originally established by the Canadian federal government, the management and delivery of the Environmental Choice Program was turned over to TerraChoice Environmental Services Inc., a Canadian consulting company, in September 1995. Since the involvement of TerraChoice, revenues and participation in the program have doubled.

Environmental Technology Verification Canada is the independent verification organisation which manages Canada's Environmental Technology Verification Program under a license agreement with Environment Canada. Environmental Technology Verification Canada offers a reliable assessment process for verifying the environmental performance claims associated with projects and programs, as well as technologies and technological processes. Environmental Technology Verification provides the marketplace with the assurance that environmental performance claims are valid, credible and supported by quality independent test data and information.

[28] Over cost of renewable generation in relation to the ordinary generation regime. "Prices and Tariffs for 2009", from December 2008 – ERSE. Document in ERSE's website, only in Portuguese.

Mexico

The Mexican Government engages through technical cooperation with other countries.

For example, Mexico has a bilateral arrangement with Germany through the German Technical Cooperation (GTZ) for the promotion of renewable energies and energy efficiency. Some of these arrangements focus on the improvement of sustainable use of energy.

United States of America

Maine

ESCO's and customers in Maine engage in efficiency voluntarily; however there is no specific or comprehensive information on these activities. Maine's large industrial customers have been particularly active in this area, for example, by providing demand response and interruptible load in the regional market.

Massachusetts

In Massachusetts any entity is free to implement energy efficiency on their own (outside of the energy efficiency programs delivered by Program Administrators, which are voluntary in nature), but there is no specific voluntary energy efficiency program.

Oregon

Any large electric customer with a load greater than 1 MW may install energy efficiency measures at its own cost.

Expenditures associated with such projects, if certified by the Oregon Department of Energy, may be credited against current and future public purpose charge obligations. Any customer that chooses pursues such an option is not eligible for incentives from the Energy Trust of Oregon during the time that the customer is exempt from public purpose charge payments.

Texas

Regulated transmission and distribution utilities, through third-party energy efficiency service providers (ESCOs) and Retail Electric Providers (REPs), offer residential and commercial customers a wide variety of products, including energy efficiency programs and services.

Wisconsin

In addition to the statewide energy efficiency program, utilities may also fund "voluntary energy efficiency programs."

Utilities can request funding over and above the 1.2% of utility revenue they are required to administer for their own energy efficiency programs. These voluntary programs need to be approved by the Wisconsin Public Utilities Commission and be coordinated with Focus on Energy program offerings. Three utilities operating in Wisconsin currently offer some type of voluntary program.

South America

In **Uruguay** a voluntary agreement between suppliers and retailers on heating water labelling

and traditional light bulbs has been set up. There is also a voluntary agreement committing the public sector to a minimum 5 % energy saving from 2009.

Asia

China

The Top 1000 Energy Consuming Enterprises Program is a voluntary tool that sets out requirements (including energy audit and Energy Conservation plan) and incentives to foster energy efficiency in 1008 participating enterprises. According to the action plan of the program, the top-1,000 enterprises shall establish energy conservation organisation, formulate energy efficiency goals, establish an energy utilisation reporting system, conduct energy auditing, formulate an energy conservation plan, invest in energy efficiency improving, adopt energy conservation incentives, and conduct training.

These enterprises are responsible for around a third of China's energy consumption and a similar fraction of carbon dioxide emissions. The affected industrial categories include iron and steel, petroleum and petrochemicals, chemicals, electric power generation, non-ferrous metals, coal mining, construction materials (including cement), textiles, and pulp and paper. The Top-1000 program is implemented through agreements that the government negotiates with the firms. China has been able to make these agreements mandatory, in part because the companies are closely connected to government (many of them were until recently state-owned). The program aims to save 100 million tce by 2010.

India

Please see under section *5.1 Legal or regulatory instruments.*

Japan

The Keidanren Voluntary Action Plan on the Environment to reduce CO_2 emissions established by Nippon Keidanren (Japan Business Federation) in 1997. The main goal of the plan is to reduce the CO_2 emissions in 2010 from industrial and energy-conversion sectors below their 1990 levels. The Keidanren plan covers 35 industries in the industrial and energy-conversion sectors accounting for about 40% of total emissions in Japan in 1990 and entails, albeit indirectly, energy efficiency measures.

Australia

Instruments based around voluntary agreements are not in widespread use in Australia; however a number of programs (outlined elsewhere in this report), particularly those aimed at addressing greenhouse gas emissions, incorporate voluntary elements. For example:

- The Energy Efficiency in Government Operations (EEGO) program includes voluntary improvement plans for buildings not subject to specific energy efficiency requirements.
- The Energy Efficiency Savings Pledge Fund, an initiative under the Australian Carbon Trust, is designed to encourage voluntary reductions in greenhouse gas emissions.

- The various energy and water audit programs operated by the State and Federal governments are predicated on voluntary participation by households, and the voluntary implementation of any recommended actions.

Europe and the Russian Federation

In the past, voluntary agreements were probably the dominating instrument to improve energy efficiency in the industrial sector.

Since its introduction in the beginning of 2005, however, the EU Emissions Trading System has become the most important policy measure in this sector. As a result, in some countries it has partly replaced voluntary agreements (e.g. in Germany) while in other countries it has reinforced them (e.g. in the Netherlands). There are also good examples of voluntary agreements introduced in other sectors like residential, commercial and transportation.

Voluntary agreements with industries are still a key policy instrument used in a number of European countries: some examples are given below.

Austria

One of the newest energy efficiency measures in the tertiary sector is the *Austrian GreenLight programme*.

Due to the success of the *European GreenLight programme*[29], which was carried out in the early 2000s, and the acceptance of the existing *GreenLight Label,* the Austrian Energy Agency decided to continue this programme at national level beyond 2005.

The objective of the *GreenLight programme* is to reduce the energy consumption associated with indoor and outdoor lighting, thus reducing polluting emissions and addressing global warming. The objective is also to improve the quality of lighting while saving money.

Participation in the programme is voluntary. If a partner cannot meet minimal space requirements or reductions in total lighting energy consumption, they may drop out of the programme without any prejudice to their rejoining the programme when their situation changes.

The programme is open to all sectors, but the main focus is in the area of indoor lighting.

Denmark

Since 1996, Denmark has used voluntary agreements on energy efficiency as an important part of its effort to improve the energy efficiency in industry. The voluntary agreement scheme is closely integrated with the Green Tax Package as companies, who enter an agreement receive a rebate on green taxes. The scheme was revised in 2002. It primarily targets companies with relatively high energy use and has two main objectives. First, to encourage energy-intensive companies to improve their energy efficiency. Second, to ensure that the international competitiveness of energy-intensive companies is retained.

[29] The European GreenLight is an on-going voluntary programme whereby private and public organisations commit towards the European Commission to reducing their lighting energy use, thus reducing polluting emissions. It was launched in February 2000.

The voluntary agreement system has three essential elements:

- implementation of a certified Energy Management System (EMS), in accordance with the Danish energy management standard DS 2403. This is designed to ensure that energy savings achieved in daily operations can be maintained and that action is taken to address inefficient operations. The standard also provides for the continuous evaluation of new possibilities for energy efficiency.
- implementation of an energy flow screening covering the most energy-intensive parts of the production process, replacing energy audits. The purpose of energy flow screening is not to identify profitable energy saving projects, but rather to identify areas or parts of the production process that should be subjected to further investigation and study.
- special investigations focusing on improving energy efficiency in the core processes of the company.

Reasonable estimates suggest that the voluntary agreements and subsidy schemes have achieved their joint target of reducing the Danish CO_2 emissions by 1.8% between 1996 and 2005. There is, however, no reliable data that support this estimate. By and large, the voluntary agreement scheme has engaged the companies it was expected to engage. For most of these companies the CO_2 tax rebate has made it economically attractive to sign a voluntary agreement. However, for some companies, green profiling has been the strongest driving force.

The Danish “A Club” is another form of voluntary agreement. It is funded by the Danish Electricity-Conserving Fund and consists of a network of private and public purchasers of energy consuming equipment and systems.

Finland

Despite the prevalence of highly energy-intensive industries such as basic metals processing, pulp and paper operations, in total output, Finland has achieved a significant decrease in total energy consumption and industrial energy intensity. This result is attributable to the extensive use of voluntary agreements, in which 80% of energy-intensive industries participate.

Some of the Finnish Government's voluntary energy conservation agreements expired at the end of 2007. In order to replace and update the expiring agreements under the governance of the Ministry of Trade and Industry, a third generation of voluntary energy efficiency agreements for the period 2008 to 2016 was prepared.

Three new agreements with industry and commerce, business organisations, municipalities and the oil industry were signed in December 2007.

The energy efficiency agreement for industry and commerce was signed by the Confederation of Finnish Industries and its eight member associations representing the following industries: the energy-intensive industries, the food and drink industries, chemical production, plastics, technology wood products, energy production, and energy services including transmission, distribution and retail of energy and district heating and cooling.

The energy efficiency agreements are a part of a package of measures created in 1992, together with investment subsidies and the Energy Audit Programme. By linking the measures together, signatories to the agreements get access to the necessary financing tools. Effective monitoring and evaluation is enhanced. Since 2009, an additional tool has been the provision of energy advice to industry.

As noted above, the new energy efficiency agreement scheme incorporates new branches of the economy not included in the former agreement scheme. Sectoral action plans are also available for commerce and the hospitality industry (hotels, spas, ski resorts, amusement parks and restaurants). In addition, a general action plan has been established for other sub-sectors, as well as for municipalities, housing, other real estate, public transport and goods transport. An energy programme for the agricultural sector will be launched shortly. Another agreement or programme is under consideration for the real estate of religious establishments.

By signing the agreement, a company undertakes to analyse its own energy consumption and to draw up an action plan on implementing cost-effective efficiency measures. Accordingly, municipalities adhering to the municipal sector agreement scheme, are committing themselves to similar measures. In the public sector, the emphasis will be on taking account of energy efficiency in awarding public procurement contracts. The Ministry of Trade and Industry provides support for energy audits, analyses and energy conservation investments eligible for subsidies and conducted by companies and communities adhering to the agreement.

While joint management boards of the agreement parties steer and monitor the implementation of the agreements, the state-owned company Motiva Oy, focusing in promoting energy conservation and renewable energy sources, will ensure reporting on the results and support and aid implementation through the development of practical tools in collaboration with the agreement parties.

Netherlands

The Netherlands have two important policy instruments targeting energy efficiency improvements in industry: long term agreements or so called multi year agreements, which have been in place since the beginning of the 1990s, and a benchmarking covenant which was agreed for energy intensive industries in 1999. Both policy instruments are based on a voluntary commitment of industry.

Long term agreements with industry associations and large energy consuming companies have been a successful policy instrument of the Dutch Government for 17 years. Since 1989, the Dutch Government has entered into long-term agreements (LTAs) on energy efficiency with energy intensive industries. In 1998 less energy intensive industries were addressed, as the energy intensity threshold for participating companies was lowered. Industries are required to implement all appropriate process efficiency measures with a payback period of five years and to implement energy management systems.

In 2001, a second generation of long-term agreements was launched, this time focusing not just on production processes but on the full life cycle of products. The new agreements (LTA 2), which will last until 2012, are targeted at medium-sized enterprises, represented by their trade associations.

LTA 3[30] for 2001-2020 has been signed on July 1st 2008 by the government, all provinces, some municipalities, trade organisations and participating companies. The goal has been set to an annual energy efficiency target of 2%, thereby resulting in 30% energy efficiency for the period 2005-2020. Taking into account the energy efficiency improvement of 15% that has already been realised in the period from 1998-2005, this means 45% for the period from 1998 to 2020.

[30] Details can be found on the web site of the Dutch Agency Senternovem.

On 6 July 1999, the Dutch Government concluded the Energy Efficiency Benchmarking Covenant with industry. In it, energy-intensive industry pledges to be among the world leaders in terms of energy efficiency for processing installations by no later than 2012. In exchange for this undertaking, the government has agreed not to impose any extra specific national measures governing energy conservation or CO_2 reduction on the participating companies.

The long-term agreement on Energy Efficiency for ETS enterprises (LEE), signed on July 1st 2008, targets enterprises subject to the ETS Directive. This sector accord requires firstly that all participating ETS enterprises must comply with a CO_2 reduction obligation because they are part of the system of CO_2 emission trade.

In the second place the Benchmarking Covenant of 6th July 1999 was amended so that the participating ETS enterprises assume a commitment obligation in the field of energy efficiency, aimed at achieving a substantial improvement of the energy efficiency in the period up to 2020. At the time of signing of this sector accord the Ministers did not intend to impose obligations regarding renewable energy on ETS enterprises that participate in the sector accord. Because the sector accord focuses on ETS enterprises, participation by non-ETS enterprises that have joined the Benchmarking Covenant is not continued in this sector accord. Those enterprises are encouraged to take part in LTA3.

As part of the "More with Less programme" (see also under section *5.14 Other measures*), the government signed voluntary agreements with key players within the Dutch housing, energy and construction sector, to reduce energy consumption in existing buildings by 100 PJ in 2020. The programme aims to reduce barriers for owners of buildings and to encourage their investments in energy saving measures, which should lead to over 200.000 buildings being refurbished annually. The programme uses the recently introduced energy performance certificates for buildings (a result of the EPBD directive), to identify saving potential and monitor progress.

Other voluntary sectoral or sub-sectoral agreements were made with services, major transport organisations and key players within the residential sector. These agreements aim at a continuous improvement in efficiency. Energy efficiency standards are in effect for most sectors to set a lower limit for efficiency. Innovators and frontrunners are financially supported.

Portugal

The Intensive Energy Consumption Management System (SGCIE) applies to all companies and facilities that have an annual consumption over 500 toe/year and imposes binding energy audits. Installations may also participate on a voluntarily basis, as can facilities with annual energy consumptions lower than 500 toe. Installations covered by the EU Emission Trading Scheme, are excluded.

The SGCIE applies to all companies and facilities that have an annual consumption over 500 toe/year. It imposes mandatory energy audits, with a 6-year periodicity, for energy-intensive facilities with consumption above 1000 toe/year. An 8-year periodicity for energy audits for facilities with energy consumption between 500 and 1000 toe/year is provided for.

The objective of this measure is to promote energy efficiency through the modification of production processes, the introduction of new technologies and behaviour changes.

Romania

With respect to the industrial sector, the government has introduced an innovative measure

called Long Term Agreements (LTA-s) with Industry, aimed at improving energy efficiency in industrial facilities through the management of energy demand, and the creation of energy balance sheets.

LTA-s are voluntary agreements aimed at the replacement of equipment with a view to reducing demand for energy and reaching optimal energy savings. According to estimates provided by other EU states that have implemented LTA`s, energy savings are expected to be approximately 10-20%.

In 2008-2009 the technical assistance program for LTA implementation was made available by the Dutch Government as part of a bilateral arrangement between Romanian Agency for Energy Conservation -ARCE and the agency SenterNovem (a department of the Dutch Ministry of Economic Affairs that implements government policy for sustainability, innovation, and international business and cooperation).

United Kingdom

In September 2007, the British government announced that the country would begin phasing out incandescent light bulbs in early 2008 in favour of low energy varieties. The aim of this voluntary agreement with major light bulb makers and retailers and energy utilities is to cut up to five million tonnes of carbon dioxide emissions a year by 2012 by cutting electricity demand.

Moreover the United Kingdom combines voluntary agreements and tax breaks in its Climate Change Agreements, introduced as part of the Climate Change Levy package.

The latter aims to stimulate energy efficiency across business. Climate Change Agreements (CCAs), in return for meeting energy efficiency targets, enable participants in energy intensive sectors to benefit from an 80% discount on the levy. Forty-two agreements are in place, involving 5,000 participants.

The eligibility criteria for the UK's Climate Change Agreements were extended to cover other energy intensive sectors of industry not originally included within the arrangements for CCAs. All businesses in sectors that meet or exceed a 12% threshold of energy intensity are now eligible to enter a CCA. Businesses in sectors that meet or exceed a 3% threshold but fall below the 12% threshold are eligible to enter an agreement only if they meet or exceed one of the following two international competitiveness tests:

- an import penetration ratio of 50% (this is the percentage ratio of imports to home demand, where home demand is defined as total manufacturers' sales plus imports minus exports); or
- an export to production ratio of 30% (this is the percentage ratio of exports to total manufacturers' sales).

Russian Federation

The state program for energy saving and improvement of energy efficiency for the period of up to 2020 envisages the conclusion of target agreements between the Government of the Russian Federation and the business community.

These target agreements will include:

- Coordination and setting of target levels of energy efficiency, reduction of hazardous

emissions and greenhouse gases;

- Elaboration of plans for enhancement of energy efficiency at the level of companies and/or target values;
- Formation of the process of reporting and monitoring of achievement of predetermined target values;
- Creation of tax schemes and promotion of plans and programs of activities related to energy efficiency in industry.

5.6 Energy audits

Africa and Middle East

Energy audits exist in either mandatory or voluntary iterations in several North African and Middle Eastern countries. They are more common in the building sector while in the transport sector they are at a very early stage and often limited to fleet owners, as for example, in Tunisia and Algeria.

In **Algeria**, mandatory audits have been established for the industrial, tertiary and transport sectors, requiring reporting, preparation of action plans and the appointment of energy managers. Participation is limited to large operators, specifically those consuming 2.000 toe in the industrial sector, 1.000 toe in transport and 500 toe in the tertiary sector.

Compulsory energy audits are also in place in **Tunisia**, with a 5 year cycle, for operations consuming more than 1.000 toe in industry and more than 500 in both the tertiary and transport sectors. The Agence Nationale pour la Maitrise de l'Energie (ANME) appoints expert auditors and provides subsidies covering 20-50% of total expenditure associated with the programme.

A voluntary energy audit program is in place in **Egypt** for 200 industrial and commercial facilities. These arrangements also contemplate the training of about 60 engineers.

South Africa is planning to introduce energy audits following the Japanese example.

North America

Canada

The Government of Canada's ecoENERGY Retrofit – Homes program helps homeowners make energy-efficiency improvements. Under ecoENERGY Retrofit – Homes, consumers can qualify for federal grants for home improvements that lower energy costs, improve comfort and reduce impacts on the environment. This program is available until March 31, 2011.

Similar programs may be offered at the various Provincial levels. For instance, In *Ontario*, the Ontario Home Energy Savings Program helps to pay for a Home Energy Audit that will find a home's energy leaks and identify renovations a consumer can make to lower their energy bills.

The audit report can suggest such things like replacing an old furnace, improving insulation, changing drafty windows and doors and completing other retrofits that (when combined with federal rebates) can allow a consumer to qualify for up to $10,000 in rebates.

The Government of Ontario is responsible for the implementation of the Home Energy Savings Program. The Ontario Energy Board has no direct role in ensuring the availability of these energy audit schemes.

In *Alberta*, the Alberta Utilities Commission ("AUC") does not regulate any of these schemes. In *British Columbia*, energy audit schemes are available through the Provincial government (Livesmart program) and the Federal government. The BCUC does not ensure the availability or otherwise regulate the audit schemes. The governments are responsible for their implementation. Energy audits in *Nova Scotia* are conducted by various organisations, many of which are linked to energy efficiency incentives available from the Federal government. The Province of Quebec through the Agence de l'efficacité énergétique has three programs: the Rénoclimat, Novoclimat and Éconologis. These programs assist home owners (new and existing) and tenants on ways to maximise the energy efficiency of their homes. In some cases, energy audits are done on homes to identify in-efficiencies and possible savings opportunities for home owners.

Mexico

The Commission is not currently mandated to require energy audits directly. It is however engaged in establishing an Energy Management System which would provide for the certification of processes, products and services. In addition an effort is being made to ensure that the appropriate educational infrastructure is in place to support the development of programmes leading to enhanced human resources for energy efficiency management..

United States of America

Most state efficiency programs offer energy efficiency audits, the major difference between states is the degree to which these audits are subsidised. Some states require that utilities provide free audits to customers, while other states have determined that the benefits received from such audits do not always outweigh the costs, and therefore do not provide subsidies.

California

California does not require utilities to offer energy audits; however, most utilities do provide audits if requested by a customer. For medium to large non-residential customers, customised, on-site audits will be conducted. Other customers may be provided standardised energy audits, where the customer provides information via phone or internet and the results of the audit are available by mail or on-line.

Maine

Energy audits are an important part of our energy conservation strategy in Maine. The Maine Public Utilities Commission provides reduced cost audits to businesses.

The types of audits vary from a simple walk-through audit to more comprehensive engineering analysis. Audits are also crucial in the residential program, although they are not subsidised, as free or deeply subsidized audits do not necessarily result in energy savings. The crucial challenge is to take the information obtained in the audit and use it to encourage investments in efficiency and otherwise change the behavior of the end-user.

Massachusetts

In Massachusetts the Program Administrators offer energy efficiency audits as part of their suite of program offerings.

In particular, Massachusetts established the Residential Conservation Services ("RCS") program to offer full energy assessments for residential customers and provides information on rebates, incentives, and financing available for energy efficient products and services.[31]

State law requires all electric and gas utilities in Massachusetts to offer on-site energy conservation and renewable energy resource services to their customers, thereby encouraging citizens to improve the energy efficiency of all residential buildings in Massachusetts[32].

Minnesota

Under the Minnesota Conservation Improvement Program (CIP), investor owned, Cooperative, and Municipal utilities offer energy audits to customers. The Minnesota Office of Energy Security (OES) implements the Conservation Improvement Program and provides information on where and how to get energy audits your homes or businesses. In addition, if the Minnesota Public Utilities Commission permits a utility to offer a competitive rate for a large customer, the Commission may also require that utility to provide the customer with an energy audit and assist in implementing energy efficiency improvements[33].

New York

Energy audits are a component of some of the energy efficiency programs within the state.

Audits for low income customers are provided at no cost to the participant with services coordinated by the New York State Energy Research and Development Authority (NYSERDA) or the Division of Housing and Community Renewal. Audits for residential customers (coordinated by NYSERDA or utilities) require payment, which is sometimes reimbursed if the customer goes forward with installation of energy efficiency measures. Audits for commercial/industrial customers take a variety of forms. Customers may be reimbursed for a portion of the costs of the audit as part of the energy efficiency program.

Oregon

All investor-owned electric utilities are required to offer energy audits.

In addition, free energy audits are proactively offered to electric and natural gas utility customers who heat with electricity or natural gas in the service territories of utilities served by the Energy Trust of Oregon, a non-profit charged with promoting energy efficiency investments and funded through a public purpose charge on participating utilities.

Residential customers using a space-heating fuel other than electricity or natural gas are able to

[31] Implementation of the National Energy Conservation Policy Act of 1978 by enacting St. 1980, c. 465, codified as G.L. c. 164 App., §§ 2-1 through 2-10.

[32] G.L. c. 164 App., § 2-2. The Department of Energy Resources ("DOER") works with the Program Administrators to design and implement these programs.

[33] Minn. Stat. 216B.162, i

receive an energy audit for a reasonable fee[34].

Low Income residents of the state of Oregon (those with incomes below 200% of the Federal Poverty Guidelines) are offered free energy audits through Community Action Agencies funded through a portion of the public purpose charge. However, waiting lists for these residents often exceed a year. Agencies do not carry out energy audits unless funding is available to complete direct installation of the measures identified in the energy audits.

Texas

Retail electric providers and energy service companies may offer energy audits to end-use customers. In addition, the Texas Public Utilities Commission sets the guidelines for the energy efficiency programs and oversees the utilities' administration of the programs.

Vermont

The Energy Efficiency Utility, the third party efficiency provider in Vermont, provides incentives for customers in all sectors to conduct energy audits. The incentives depend on the homeowner's income and whether the recommendations contained in the audit are carried out.

Washington

One investor owned Utility makes energy audits available to customers for a fee though they have federal grants to pay for a limited number of audits on a temporarily basis.. The Washington Department of Commerce also has some programs to implement energy audits across a broader audience.

Wisconsin

The Focus on Energy program works with customers to identify potential energy efficiency opportunities.

The program overall does not advertise that it carries out audits because it has found from experience that spending time and money on audits doesn't necessarily lead to the implementation of energy efficiency projects. Program offerings which may involve audits or assessments are tailored to particular customer groups, and therefore vary by sector. Residential customers pay to have assessments of their home conducted by private sector contractors who identify and present energy efficiency measures that can be implemented along with costs and saving information. There are several options for the private sector: Focus on Energy partners with the United States Department of Energy to conduct detailed audits of large industrial facilities; the industrial and commercial sectors do walk-through audits; schools and government program and the agriculture program does on-site audits.

South America

Brazil

Energy audit schemes are applied in Brazil as the first step in the implementation of energy efficiency projects regulated by ANEEL. They are used as the first diagnosis of the problems and possible opportunities. In addition, all the energy efficiency projects approved by ANEEL

[34] OAR 860-030-0005 (5)

are, after a short period, subject to metering and verification.

Uruguay

Audits are conducted by ESCOs, framed in the Fideicomiso de Eficiencia Energética (FEE) referred to in item 1)b). The Energy Efficiency Project finances ESCOs audits in the public sector that do not have access to Fideicomiso.

Asia

China

Energy audits are being carried out in the framework of the Top-1000 Enterprises Energy Conservation Action.

India

These schemes are mandatory for large energy consuming industries. The Bureau of Energy Efficiency (BEE) is responsible for implementation of energy efficiency programs in the country.

Japan

Since 2001 on-site energy audit investigations have been conducted since 2001 on energy-intensive factories based on a random sampling method. Investigations focus on cases where energy management is deemed insufficient by the Ministry for the Economy, Trade and Industry.

Australia

The federal Green Loans Program was introduced on 1 July 2009 to provide eligible households with free sustainability assessments and access to subsidised “green loans”. A total of 900,000 assessments will be undertaken over the life of the program by certified Home Sustainability Assessors. The program previously incorporated access to a subsidised loan to undertake the home improvements suggested in the assessment report. The Green Loans Subsidy was discontinued from 22 March 2010.

Free and subsidised energy audit programs have been implemented by a number of State and Territory governments with the aim of providing advice and installing small scale energy efficiency measures in residential dwellings. The programs are generally driven by the goal of reducing household energy bills.

The New South Wales Low Income Household Refit Program is a $63 million, 5 year initiative funded through the State Climate Change Fund. The scheme will offer free energy audits and energy saving kits to up to 220,000 low income households, with a state-wide rollout scheduled

to commence in April 2010.

The Australian Capital Territory Government established a subsidised home energy audit program - ACT Energy Wise - in 2004 targeted at houses and semi-detached houses in the ACT that were built before 1996. Homes built after 1996 were constructed to have a 4-star home energy rating and are not eligible for the ACT Energy Wise audit and rebate. Rebates on recommended items are also available.

The Climate Smart Home Service commenced in Queensland on 1 July 2009. The service offers households a number of subsidised energy efficiency measures, including an energy audit and the installation of compact fluorescent light bulbs and a wireless energy monitor.

Europe and the Russian Federation

Energy audit schemes are in place or are going to be introduced in most European countries. In some cases they are mandatory and in others they are based on voluntary agreements.

They are traditionally directed to the industrial sector but there are good examples of extension to other sectors. Energy audits within the public sector are covered under sub-chapter *5.7 Energy end-use efficiency in the public (government) sector.*

Table 7 - Energy audits

Bulgaria	Mandatory for appliances in households, tertiary sectors and for energy-intensive industries.
Czech Republic	Mandatory for energy facilities or buildings with a state subsidy or if the facilities are owned by the state, regions or municipalities, or owned by natural or legal persons with total high consumption.
Estonia	Voluntary for buildings but following legislative requirements; energy audits in apartment buildings can receive support from the state.
Finland	Voluntary for transport, for compressed air and for residential buildings.
France	Mandatory for buildings to be sold and leased.
Greece	Mandatory for power companies with installed power capacity greater than 75 kW, otherwise voluntary.
Latvia	State-supported energy audits.
Portugal	Mandatory for all companies and facilities that have an annual consumption over 500 toe/year; otherwise voluntary.
Slovakia	Mandatory for electricity producers, for non-industrial buildings, in industry and agricultural establishments.
Spain	Voluntary and state-supported.

Bulgaria

The current regulation provides for:

- mandatory energy efficiency control for boilers and air conditioning systems in households

and in the tertiary sector, every 2-4 years depending on the type of appliance;

- mandatory energy investigation & auditing for all producers of goods and services with overall annual energy consumption over 3 000 MWh. They are subject to energy auditing every 3 years.

Czech Republic

The Energy Management Act requires that energy facilities or buildings undergo an energy audit if a state subsidy within the National Program is obtained.

Energy audits are also obligatory under the Act if the facilities are owned by the state, regions or municipalities, or if they are owned by natural or legal persons whose total consumption meets a threshold established in the relevant regulations.

Estonia

Energy auditing is a private business, but those performing energy audits must follow the requirements appearing in the Building Act. The Ministry of Economic Affairs and Communication is finalising a project to harmonise energy audit practices in Estonia and to improve the quality of energy audits. Energy audits in apartment buildings can receive financial support from the state.

The Action Plan for implementation of the National Energy Efficiency Plan includes a measure for the development of an approved methodology for energy audits in industrial enterprises. This Plan has been partially implemented and is subject to further refinement. In addition, there has been a dissemination of energy efficiency information.

Finland

The first model for the *energy audit of transport chains* was produced in 2006. The model is presently applicable for users of transport services in an industrial context.

However, a model for the commercial sector and waste transport is being planned. The Ministry of Employment and the Economy subsidises audits which are in compliance with the guidelines prepared by Motiva [35]and carried out by accredited audit companies.

The audit model for compressed air (PATE) was developed in 2003-2004 covering both supply and use.

The potential for improvement was revealed during the development stage as it was noted that 20% of energy consumed is used for the production of compressed air in industry. Production of compressed air in industry requires about 1.4 TWh of electricity per year in Finland.

Other types of audits available are audit for residential buildings and a regional survey of the potential for increased use of renewable energy sources - all working in connection with the

[35] Motiva is an affiliated agency of the Finnish government promoting efficient and sustainable use of energy and materials. Its services are utilised by the public administration, businesses, communities, and consumers.

energy efficiency agreements.

France

The energy performance assessment (DPE in French) is an energy performance evaluation of a household or a building.

Conducted by professionals, the DPE identifies the estimated consumption of energy of the residences and buildings. This programme has been mandatory since November 1st 2006 for the sales of residential and tertiary buildings (except for very particular cases exempted by the European directive) and since July 1st, 2007, for buildings offered for lease. It must be provided upon the completion of construction projects (the whole buildings or parts of building) where the building permit was issued on or after July 1st, 2007.

Between 2000 and 2006, ADEME (the French Energy and Environment Management Agency) has implemented about 5,400 audits, (light audits, detailed audits, in depth feasibility studies). These audits resulted in more than 90 ktoe/year of energy savings (15 kteCO_2/year).

Greece

The programme requires all industries with installed power capacity greater than 75 kW to keep records concerning their energy balance (energy auditing).

These records include information for energy purchases, energy consumption, stock of the utilised forms of energy sources and information related to the production level. The measure also specifies the methodology for computing: (a) the average specific consumption, (b) the consumed energy and (c) the production level.

The implementation and the monitoring of the measure is the responsibility of the Ministry of Environment, Physical Planning and Public Works.

In addition to the programme referenced above, the Centre for Renewable Energy Sources (CRES) conducts surveys on energy consumption using energy audits in industry and makes recommendations on energy efficiency. Up to 2004, a total of 140 energy audits had been performed by CRES on industrial processes.

Latvia

The process of energy audits in buildings begun in Latvia in 2005 to inform energy consumers about buildings energy efficiency and to elicit recommendations.

In 2007 a new State Programme was adopted for the promotion of energy conserving renovation of multi-dwelling houses for years 2007-2010.

Pursuant to this programme, the state will support, for the period 2009-2010, 962 audits with approximately 50% of the costs (in total the state support for undertaking energy audits under this programme will constitute 274,000 EUR in years 2009 and 2010). This measure will be continued after 2010. The Latvian experience in providing state support for auditing can be relevant in wider Central European (new EU member states) context. The Governmental Regulation, adopted in January 2009, introduces buildings certification and standardised auditing and certification. This provides clear energy consumption indicators, and reliable information and recommendations to residents.

Malta

A Cleaner Technology Centre (CTC) was established in February 1993 within the Malta

University Services, with the role of advising local industry on introducing cleaner production processes which favour waste minimisation and energy efficiency.

The following initiatives have been implemented to enhance energy savings and improve energy efficiency in the industrial sector:

- Power factor correction for large scale energy users;
- An energy auditing scheme for major industrial activities (production processes);
- Eco-contribution as a disincentive to minimise waste (industrial, commercial & domestic sectors).

Portugal

Mandatory energy audits are provided for under the Intensive Energy Consumption Management System (SGCIE) for all companies and facilities that have an annual consumption over 500 toe/year:

- with a 6-year periodicity, in energy-intensive facilities with consumption above 1000 toe/year, and
- with a 8-year periodicity for energy audits to facilities with energy consumption between 500 and 1000 toe/year.

Romania

According to the Energy Efficiency Law a certification procedure is in force for energy auditors for industry. Now this activity is managed by the Department for Energy Efficiency Regulation from the Romanian Energy Regulatory Authority - ANRE.

A different certification procedure, managed by the Ministry of Regional Development and Tourism, is in force for energy auditors for other facilities.

Slovak Republic

Since January 2009:

- Producers of electricity or heat are obliged at newly built or refurbished facilities to provide equipment with the highest possible energy transformation efficiency. Electricity producers using combustion engines of 1 MW capacity or more, or gas turbines having more than 2 MW capacity, and producers of electricity using other thermal processes with the total capacity of the energy source 10 MW and more are obliged to provide energy audits of the equipment. They are also obliged to investigate the possibility of CHP operation of such equipment.
- Energy audits have to be implemented at non-industrial buildings, in industry and agricultural establishments. Energy intensity findings resulting from the audit have to be updated every three years.
- Energy auditors, energy services, competences, records and administration are defined.

Spain

The Spanish Ministry of Industry, Tourism and Trade with IDAE[36]'s support co-ordinates audits and energy efficiency actions developed with Autonomous Communities, Entrepreneurial Associations and firms. Through this joint co-ordination, aid from the Administration is channelled to finance energy audits in beneficiary sites, whose number is estimated to be 260 for the period 2008-2012.

Russian Federation

A number of governmental, industrial and commercial subjects (e.g. central governing bodies, local self-governments, public utilities that produce and/or transport water, natural gas, heat, electricity, oil and oil derivatives and coal; organisations whose aggregate costs associated with the consumption of natural gas, diesel, fuel oil, thermal energy, coal and electricity exceed ten million roubles for a calendar year; organisations that take measures in the field of energy savings and improvements of energy efficiency, funded fully or partially from the funds of the federal budget and of the budgets of constituents of the Russian Federation and from local budgets) have to conduct energy audits at least once every five years.

These audits are carried out by specialised organisations. At the end of the examination an energy passport is released containing the following information:

- availability of metering devices for used energy resources;
- volumes and volume changes of used energy resources;
- energy efficiency indicators;
- size of losses of transmitted energy resources (for those organisations that deal with transmission of energy resources);
- potential for energy saving, including also an evaluation of possible saving of energy resources in natural terms;
- a list of model measures for energy saving and improvement of energy efficiency.

5.7 Energy end-use efficiency in the public (government) sector

Africa and Middle East

In **South Africa** an important measure is the retrofit of government owned buildings, especially in instances where a government agency contributes to significant consumption of energy and in certain instances where it controls the majority share of energy service delivery.

[36] IDAE means Institute for Diversification and Saving of Energy; it is a state-owned business entity that reports to the Ministry of Industry, Tourism and Trade through the State Secretary for Energy.

North America

Canada

The Ontario Energy Board has no direct role in ensuring energy efficiency improvements are taken by the public sector. The Office of Energy Efficiency's ("OEE") Federal Buildings Initiatives is a voluntary program that helps facilitate energy efficiency retrofit projects in buildings owned or managed by the Government of Canada. Developed and administered by The Office of Energy Efficiency, it enables federal organisations to implement these projects through third-party energy performance contracts without necessarily using their own capital funds.

In *Ontario*, the Green Energy Act and related policy initiatives will help public institutions better manage their energy use through a series of conservation initiatives.

This includes greening Government of Ontario and broader public sector buildings/facilities, and requiring the development of energy conservation plans throughout the broader public sector, including municipalities, universities, colleges, schools and hospitals.

The Government of Ontario has implemented initiatives such as engaging Ontario Public Service staff in a government-wide conservation effort, aggressively conserving energy in Government-owned buildings, and cutting back on energy waste in leased space.

The Ontario Power Authority is involved in many conservation initiatives for many different sectors – including the Conservation and Technology Development Funds, the BOMA Toronto CDM program, the Cool Savings Rebate, demand response programs, Electricity Conservation on Ontario Farms newsletter, housing initiatives, and a new construction program.

The OPA has been encouraging municipalities in Ontario to appoint Municipal Energy Conservation Officers ("MECOs"), responsible for engaging communities at the local level in creating a culture of conservation. The Municipal Energy Conservation Officer is not a mandatory position but a voluntary appointment to be made from and within Ontario's communities. The Ontario Power Authority believes that having a strong local champion is pivotal in engaging communities and individuals in Ontario's conservation efforts and that institutionalizing a defined role for energy conservation at the municipal level can play an integral role in achieving Ontario's conservation goals.

The Alberta Utilities Commission does not have the mandate to perform these duties while in *British Columbia*, the Provincial Government has stated objectives to become carbon neutral but not to be explicitly energy efficient.

In *Quebec*, The Régie de l'énergie Quebec in conjunction with the Agence de l`efficacité énergétique with financial support from Hydro-Québec and Gaz Métro launched the Municipal Buildings component of its program to promote energy efficiency. The program encourages the implementation of an action plan aimed at improving energy efficiency by means of renovations and retrofits of municipal buildings. A municipality that wishes to become actively involved in controlling its energy expenditures must draft an energy efficiency action plan that is known and approved by all concerned.

Mexico

The National Program for the Sustainable Use of Energy 2009-2012 includes strategies,

objectives, actions and goals. The programme is implemented through Guidelines to Public Sector which are focused on providing services using the best available practices for energy efficiency. The effort includes the development and implementation of permanent programs directed to the application of the same energy efficiency criteria for acquisitions, leasing, construction and services that are procured.

Some aspects of the public sector measures are:

1) The issuance of binding opinions to the agencies of the Federal Public Administration, in relation to the best practices for sustainable use of energy;
2) Recommendations to states, municipalities and individuals in relation to the best practices for sustainable use of energy;
3) Provision of technical advice on the sustainable use of energy to the agencies of the Federal Public Administration, as well as to state governments and municipalities upon request. Bilateral agreements are used in the administration of this programme.
4) Participation in the dissemination of information between government and social sectors.

United States of America

Several states have efficiency standards that governmental buildings and schools must meet, and funding specifically targeted to such efforts. In other states, governmental buildings may be eligible for efficiency services provided by utilities or third-party providers, however such projects may not always receive preferential treatment.

California

California has programs to support energy efficiency in the public sector at all levels.

The Governor's Green Building Initiative directs all state facilities to attempt to reduce energy purchased from the grid by 20% by the year 2015.

This includes the potential for using distributed generation as well as conservation. The California Public Utilities Commission oversees utility energy efficiency portfolios, which include state agency partnership programs and local government partnership programs.

These programs focus on improvements to facilities and training of facility operators. The California Energy Commission administers a loan program for local government, schools and hospitals to fund energy efficiency opportunities. The loans have low interest rates and fixed ten year payback periods.

Maine

There are a variety of energy efficiency measures that relate to the public sector. Public buildings are increasingly assessed for potential energy savings. A grant program operated by Maine supports energy efficiency programs in local government operations. Maine supports energy efficiency in local schools, where a large part of local government energy spending occurs.

Through its mandatory building codes, which apply to all public-sector buildings, the government is working to ensure that each municipality helps achieve efficiency through their

process of approving and permitting new construction.

Massachusetts

The Massachusetts Department of Energy Resources is the agency that works with the Program Administrators to design and implement energy efficiency programs for all customers in Massachusetts.

Pursuant to Massachusetts law, Program Administrators may prioritise projects that have substantial benefits in reducing peak load, reducing the energy consumption or costs of municipalities or other governmental bodies[37].

Minnesota

Legislation in the state requires the public sector to meet energy efficiency measures. The Minnesota Office of Energy Security oversees these activities.

New York

New York State has rules in place for efficient usage of energy within state government buildings.

Oregon

Oregon public schools located in service territories of electric utilities subject to the public purpose charge are allocated 0.3% of electric utility revenues collected as part of the public purpose charge.

Monies are provided to aggregating entities called Education Service Districts; schools are repaid by the Educational Districts for investments made in energy efficiency projects that are certified by the Oregon Department of Energy (ODOE). Before investing in energy efficiency projects, schools must first commission a full energy audit, with auditors certified as capable by ODOE. Schools may then work through the list of recommended measures over the years to come, as funds become available.

Texas

The State Energy Conservation Office (SECO) oversees the Schools and Local Government Program, which provides a number of integrated services to assist public school districts, colleges, universities and non-profit hospitals in establishing and maintaining effective energy efficiency programs.

The program provides assistance through energy efficient school partnerships and energy management training workshops.

Technical support is provided through facility-related services which address energy accounting, energy efficient facility operation and maintenance, indoor air quality, water conservation, comprehensive energy planning, and on-site training in setting up student-involved energy awareness projects and energy education. [38]

[37] An Act Relative to Green Communities, Acts of 2008, chapter 169 ("Green Communities Act"), G.L. c. 25, § 21(b)(2).

[38] For more information, see http://www.seco.cpa.state.tx.us/sch-gov.htm

SECO also oversees programs for Texas state agencies and institutions of higher education.

The State Agencies Program delivers a variety of programs and services to ensure that existing state facilities are operated and maintained for optimal energy efficiency and those new facilities are designed and built for energy efficiency from the ground up. Program responsibilities also include the administration and maintenance of the Energy Conservation Design Standard for new state buildings[39].

Vermont

Government buildings are eligible for the services provided by the Energy Efficiency Utility, the third-party efficiency provider.

Washington

State legislation required a reduction in state agency energy use of at least 10% by September 1, 2009 compared to 2003 usage.

In addition, major state construction projects (over 25,000 sq ft) must be designed and built according to LEED- Silver standards[40]. All major facility projects of public agencies receiving any funding in a state capital budget must be designed, constructed, and certified to at least the LEED-Silver standard and must include building commissioning as a component of the design process. The 2011 Washington State Supplemental Budget includes $100 million for energy conservation grants to public schools and higher education. With additional funding from local schools and utilities he state funding is expected to generate $200 - $300 million in conservation projects in this sector 2010-2011.

Wisconsin

The Division of State Facilities in the Wisconsin Department of Administration is primarily responsible for energy efficiency in state buildings.

State and local governments are also eligible for Focus on Energy incentives to implement efficiency improvements, and the Focus on Energy program has a Schools and Government sector dedicated to this effort. Legislation passed in 2006 required all state buildings to conform to high environmental and energy efficiency standards. It applied to both existing buildings and new construction and required the establishment of energy efficiency goals for state facilities, office buildings or complexes.

South America

Brazil

The Energy Efficiency Law n º 10.295 was promulgated on 21th October 2001 and is the legal basis for this activity in Brazil. Currently, this law is the primary governmental tool used to implement energy efficiency programmes. This law also sets energy efficiency minimum standards for products made and/or marketed in Brazil.

It is important to mention that in the context of PROCEL, there is a sub-program, named

[39] For more information, see http://www.seco.cpa.state.tx.us/sa.html

[40] Executive order 05-01 (1/5/05).

PROCEL EPP (Public Edifications) for the public sector, designed to promote energy efficiency in public buildings. The primary activities promoted by the PROCEL EPP are technological research, modernisation of the final electricity use facilities, and the dissemination of energy efficiency information.

Uruguay

The Energy Efficiency Project carries out the Energy Efficiency Plan in the Public Sector. Requirements for an efficient use of energy apply to public enterprises, central government and local administrations. Indicators of EE Programme in the Public Sector are:

- 40 Energy Efficiency Plans developed by agencies.
- Investment of 6 million dollars in energy efficiency in the public sector.
- 120 civil servants (Energy Officers) trained in Energy Efficiency at the end of the project.

One of the action of this plan is to introduce Energy Efficiency Plans in public agencies, and measures aiming at a better use of energy, through the recruitment of Energy Services Companies (ESCOs) and the UTE's Energy Efficiency Services Group.

On the other hand, due to reductions in energy supply as from 2005, the PAEE (Electricity Saving Plan) was established to save energy, in principle on a voluntary basis, but with concrete targets to be met.

In May 2006, compulsory energy efficiency measures for the public sector and for households and small business were introduced. From January, 2008, new efficiency measures were set, mandatory for Public sector and voluntary for private sector.

Other actions include:

- Local regulation on thermal insulation for buildings.
- Subsidies for refurbishing public lighting systems and to promote metering (Decreto 408/008)
- Buildings energy diagnoses.
- National prize for energy efficiency.

Asia

China

The government has set mandatory temperature control standards for air-conditioners in public buildings. Pilot work was launched to set up a monitoring system on energy conservation in office buildings of government agencies and large public buildings in 24 provinces and cities.

India

Please see section *5.1 Legal or regulatory instruments.*

Japan

Please see section *5.1 Legal or regulatory instruments*.

Australia

Measures to promote energy efficiency in the public sector have been introduced both at federal and State/Territory level.

The Energy Efficiency in Government Operations (EEGO) policy was put in place in September 2006 with the aim of improving the energy efficiency, and consequently reduce the whole of life cost and environmental impact, of Government operations. EEGO comprises three major elements:

- annual reporting of energy performance by agencies;
- portfolio energy intensity targets; and
- Minimum Energy Performance Standards (MEPS) for office buildings, appliances, vehicles.

Portfolio targets for office buildings are to be met by the 2011-2012 financial year.

The various State and Territory Governments around Australia have implemented policies designed to reduce the energy usage of Government tenanted and/or owned buildings, and ensure sustainable practices across Government activities.

In particular, Government Energy Efficiency Actions Plans were introduced in South Australia in November 2001 in order to meet energy efficiency improvement targets under the South Australian Strategic Plan (Government is required to improve the energy efficiency of its buildings by 25 per cent on 2000/2001 levels by 2014). Action plans define minimum energy efficiency measures in government operations and cover construction of new government buildings, major refurbishment projects, operation and maintenance of government assets, equipment procurement policies and vehicle fleet use. Performance under the Energy Efficiency Action Plan is to be independently verified and publicly reported.

The New South Wales Government Sustainability Policy sets targets and strategies for the Government in sustainable water and energy use, reduction of greenhouse gas emissions, waste and fleet management and sustainable purchasing.

A key objective of the Policy is to reduce building energy use and greenhouse gas emissions in government owned and occupied buildings to help New South Wales Government achieve carbon neutrality by 2020.

All Government owned and leased office buildings occupied by budget dependent agencies must obtain and achieve 4.5 star ratings for energy and water under the National Australian Built Environment Ratings System (NABERS) system by July 2011.

The Queensland Government has put in place a number of policies designed to improve the energy efficiency of Government operations.

The Strategic Energy Efficiency Policy for Queensland Government Buildings, which was introduced in 2007, established specific reduction targets of 5 per cent by 2010 and 20 per cent by 2015 for Government buildings.

Government departments are also required to develop and implement a Strategic Energy Management Plans. An Energy Efficiency Retrofit Program and 5-Star Energy Performance Targets for new Government office buildings were introduced in 2009/10. The retrofit program will invest $8 million in improving the energy efficiency of existing buildings in order to achieve 5-star energy performance standards.

The Northern Territory Energy Smart Building Policy sets a 10 per cent energy intensity and greenhouse gas reduction targets for all Northern Territory Government agencies to meet by 2010-11. This target is set against a baseline established in 2004-05.

The Victorian Government established Government Sustainable Energy Targets in 2001, which require all government departments to improve their energy efficiency by 15 per cent by July 2006. Having met that target, the Government has committed to cut energy use by a further five per cent to 20 per cent of 1999/2000 levels by 2010. All new Government offices are required to achieve 5 Star environmental ratings.

Europe and the Russian Federation

The European Directive on energy end-use efficiency and energy services (Directive 2006/32/EC) includes provisions on the exemplary role of the public sector. Many EU countries are therefore trying to comply with these provisions introducing good public sector measures.

In addition, the European Commission issued in 2008 a communication on the potential benefits of green public procurement. A number of countries have already adopted or are establishing energy efficiency procurement criteria; some of them have also adopted concrete procurement targets.

Denmark

The country has been implementing energy efficiency procurement in its governmental institutions to achieve cost-effective energy savings since the early nineties.

In a 2005 Departmental Circular on improving energy efficiency in state-owned institutions certain obligations on state institutions were mandated. These include:

- incorporating energy consumption considerations into procurement policy;
- ensuring buildings obtain energy performance certificates - energy labels - (including those under 1,500 m^2 as of 1 July 2009);
- implementing energy saving projects with a payback of less than five years;
- public reporting on energy and water consumption greater than 100,000 kWh/institution.

Each ministry must appoint a contact person, whose responsibility it is to of coordinate activities and communications with state institutions. Institutions can also seek advice from electricity, gas and district heating companies.

In 2007 local governments in Denmark (as represented by the organisation for municipalities

KL) entered into an agreement with the Ministry of Energy, agreeing to fulfil the obligations outlined in the Circular. In 2009, an agreement was concluded with the Danish Regions, where the regions also accepted to meet the obligations for state institutions outlined in the Circular.

Through a voluntary initiative designed to increase green public procurement over period 2008-2009, the Danish Environmental Protection Agency has prioritised several initiatives that can be classified under the following seven themes: partnership for green public procurement, including green procurement by the central government, communication and awareness, tools for green procurement, enhancement of private professional procurement, innovation-promoting procurement, green procurement by hospitals, and European and Nordic cooperation on green procurement.

Estonia

To optimise activities directed at the efficient use of energy, municipalities seeking financial assistance from national or EU sources are obliged to develop relevant plans.

The process of energy planning started in the second half of the nineties when energy development plans for more than 20 municipalities were prepared as pilots in the context of an EC PHARE financed project. Later, financial assistance for energy related projects was available through the National Energy Efficiency Plan, financed from the state budget. In 2004 a 65 page manual on management of energy efficiency projects was issued, targeted especially to local governments.

Currently, no comprehensive survey of local level energy development plans is available. The latest overview reflects plans drawn up using financial support from National Energy Efficiency Plan. This overview was compiled by the Energy Department of the MoEAC (Ministry of Economic Affairs and Communications). During the period 1994 – 2006 87 energy development plans have been prepared for 72 municipalities (out of a total of 227), i.e. 32% of municipalities have this type of local level strategy document enabling them to prioritise the relevant measures and identify needed investments. No aggregated data on actual efficiency improvements realised is currently available.

Finland

The former voluntary energy and climate agreement in the municipal sector has been replaced by the Energy Efficiency Agreement and Programme for Municipalities for 2008-2016. The municipalities join either the agreement or the programme depending on their size. The agreement is for larger cities, municipalities and joined municipalities.

Germany

The German Integrated Energy and Climate Programme contains two specific measures: a programme for the energy-efficient modernisation of social infrastructure and another programme for the modernisation of federal buildings.

In addition, the German government has developed Guidelines for the procurement of energy-efficient products in Federal buildings.

Now, the foreseeable operating costs over the serviceable life (above all the costs for the energy consumption of the devices to be procured) must be taken into account as well as purchasing costs during the evaluation of offers (life-cycle-costs principle).

Greece

In June 2008, the Ministry of Development issued a common ministerial decision to impose obligatory measures for the regulation of lighting, ventilation, heating, cooling, power factor correction and load balancing. This direction extends to all buildings in the public and wider public sector and also provides for energy saving measures.

Concisely, the decision includes measures relating to:

a) Obligatory connection to the natural gas distribution network, where possible.

b) Power factor correction and load balancing.

c) Preventative, regular maintenance of air-conditioning equipment.

d) Observation of various CEN standards for the determination of the desirable and allowed indoor temperatures, the required quantity of fresh air, as well as the levels of adequate lighting depending on the room space.

e) Replacement of bulbs with more energy efficient examples(class A or A+).

f) Installation of Building Automation Systems (where they do not exist).

g) Use of suitable chill paints.

At the local level, the Ministry of Development recently issued a new program named "EXIKONOMO" (SAVE) for municipalities with more than 10,000 citizens. Actions are categorised in five areas, as follows:

1) Projects for energy efficiency improvement in existing buildings, implementation of technological measures in various categories of municipal buildings such as Town Halls, municipal services buildings, cultural centres, schools, multi-sports and training centres, special buildings etc.

2) Projects concerning reconstruction of roads, squares, parks and other public areas.

3) Pilot actions in public urban transport.

4) Technical interventions in other specific urban infrastructures with low cost investments for the improvement of energy efficiency, for instance in pump plants, biological waste treatment plants etc.

5) Information dissemination activities to raise public awareness, energy monitoring.

Each approved project will be financed up to 70% of its total budget. The municipality will pay the remainder during the period (2009-2012).

Hungary

The UNDP/GEF[41] supported project, was specially designed to improve energy efficiency in local municipalities' public lighting activity. This programme took place between 2001 and 2008.

[41] The Global Environment Facility of the United Nations Development Programme (UNDP/GEF), established in 1991, helps developing countries fund projects and programs that protect the global environment. GEF grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

Under the project energy audits were performed for approximately 1200 buildings owned by local municipalities.
The possible funding of such energy audits for local municipalities by banks needs to be further explored.

Ireland

The Public Sector Programme promotes energy-efficient design, technologies and services in new and retrofit public-sector projects. These projects are excellent examples of good practice and a demand leader for the services and technologies involved. The programme has three main elements:

- A Design Study Support Scheme which provides support for professional expertise to examine the technical and economic feasibility of design and technology solutions.
- A Model Solutions Investment Support Scheme which supports energy management and technology solutions in existing buildings and new-build specifications.
- An Energy Management Bureau which supports outsourced energy management services to report on energy usage and identify energy-related projects.

Lithuania

During the period of 2002–2005, the respective municipalities and Counties have implemented 62 renovation projects in schools.

They have introduced a considerable number of energy efficiency measures such as heat regulation and control, insulation of building structures or their replacement by new ones (windows, roofs, walls, doors), improved hygienic conditions and learning conditions for children with disabilities.

The results of project assessment and monitoring showed that normalised thermal energy savings per heating season achieved 11,6 GWh or 27% savings compared to thermal energy consumption before renovation.

The EU Structural Funds supported the renovation of public buildings to reduce associated energy consumption. The investments were directed to the improvement of energy efficiency for these buildings by repairing and/or reconstructing the building envelope and improving their thermal characteristics. The investments were put also into repair and/or reconstruction of energy systems (engineering and technological-engineering), thus improving their energy characteristics.

During the period 2004-2006 82 projects were supported. This is expected to save more than 40 GWh annually.

Malta

The government committed itself to initiate energy efficiency by taking the role of “leading by example” and undertook to demonstrate efficiency improvements effected, particularly in government-owned industry and the public sector.

For example, one of the most significant achievements involves the government owned water utility WSC (Water Services Corporation). The company provides all of the potable water needs of the nation. It has always been in the limelight for its intensive yet vital energy demand on the national energy bill. With the introduction of the latest water engineering and energy technology,

the WSC is now one of the finest examples of energy efficiency, undertaking the most dramatic changes over a short time span, to both the local infrastructure (house connection) and the plant and distribution network. At one time reverse osmosis and desalination consumed approximately one fourth of the national energy bill. Electricity demand by WSC reduced from around 15% of total energy in 1995 to 6% in 2004 through a combination of actions including - modern energy recovery technology, leakage detection, demand management and water conservation.

Netherlands

Within Europe, the Netherlands provides good examples when it comes to sustainable procurement. As a matter of fact, the government planned that in 2010 100% of central governmental procurement will take sustainability (including energy efficiency) criteria into account. For regional and local government, this percentage will be at least 50%.

In the programme Sustainable Operational Management for Governments (DBO), criteria on sustainable procurement are developed and information dissemination activities are carried out. The Dutch government will enter into agreements with local authorities to reduce carbon dioxide emissions. These agreements will also contain provisions related to energy efficiency.

The buildings owned by the national government will be climate neutral from 2012 on. This will be accomplished by increasing energy efficiency and also increasing the use of renewable energy. The remaining emissions will be compensated for. The exemplary role of the central government will also be undertaken by acting as „launching customer". Government will apply innovative energy concepts in housing and mobility. Through its buying volume, the government can give a strong impetus to the development of innovative concepts, products and services.

Norway

In 2009, an extraordinary program: Grants to energy efficiency measures in public buildings in 2009 was introduced. The objective of the program is to contribute to employment in the construction sector at the same time as increasing energy efficiency in public buildings.

Portugal

The Portuguese National Energy Efficiency Action Plan comprises a set of measures designed at energy end-use efficiency in the public (government) sector, namely relating to buildings, transportations, and public lighting (such as Buildings' Energy certification; Solar thermal for swimming polls and sport centers; Cogeneration in hospitals; Vehicles with higher CO_2 emissions phase out; Green procurement and; Greener technologies in public lighting).

United Kingdom

Salix Finance Ltd is a private company funded by government to establish energy efficiency revolving loan schemes in the public sector.

The company, set up by the Carbon Trust, is developing and delivering innovative spend-to-save programmes to overcome barriers in the public sector that currently prevent cost-effective capital investment projects.

Salix is receiving DECC (Department of Energy and Climate Change) funding of GBP30m from 2008-11 from the Environment Transformation Fund, which builds on the GBP20m it has already received between 2005-2008.

Salix provides interest free loans to organisations, who are required to provide matched funding and establish an on-going 'ring-fenced' energy saving fund within the organisation. The energy or estates team (typically) then uses this fund to support projects across the estate that pay back into the loan fund using the energy savings they generate.

The loans, once established, continue to deliver energy and emission savings over time, with recycled energy savings used to repay the individual project loan and then released for front-line services. In normal circumstances Salix will keep their funding in place until the client runs out of projects.

The value of the recycling approach is that the energy costs saved by the projects are fed back into the fund which then supports further projects, which in turn deliver more energy savings and so on. This allows each pound to be used several times over time to generate carbon savings.

Russian Federation

In the area of public procurement, orders placed by State or municipal customers for delivery of goods, execution of works, provision of services for state or municipal needs need to comply with energy efficiency requirements. This means that these orders have to aim at maximal possible energy saving, energy efficiency and reduction of customer's costs.

Central governing bodies and local self-governments (as well as organisations with participation of the state or municipality and organisations that carry out regulated types of activities) are required to introduce programs in the field of energy savings and improvement of energy efficiency; central governing bodies and local self-governments have also an obligation to disseminate information through information and educational programs in the field of energy savings and improvement of energy efficiency.

Budgetary institutions have to ensure reduction of consumed energy resources by at least 3% a year. Budgetary institutions have the right to conclude energy service contracts.

5.8 Transmission and distribution tariffs

North America

Canada

Within transmission and distribution tariffs, there are not incentives that unnecessarily increase the volume of energy being transported in *Ontario*. Tariffs are cost-reflective. *Alberta* and *British Columbia* do not consider that there are any incentives that unnecessarily increase the volume of energy that is being transported, while in *Nova Scotia* transmission and distribution tariffs are based on cost of service studies.

Mexico

Transmission and distribution tariffs for renewable and CHP projects are based on long term marginal costs of the system that are applied under a postage stamp criteria.

United States of America

Maine

The Maine Public Utilities Commission periodically considers mechanisms and rate designs to ensure that transmission and distribution rates in Maine are not at odds with efficiency objectives. Maine has implemented a revenue decoupling mechanism to address the issue.

Oregon

Transmission Efficiency: At the transmission level, open access transmission tariffs governing wheeled power generally use a cost-causation or cost reflective structure that provides an incentive to move power efficiently. This cost allocation methodology generally also insures against overbuilding transmission resources but does not provide for large amounts of incremental capacity to facilitate integration of new variable generation.

Oregon is participating in a $450,000 benefit cost study for the development of an energy imbalance market across the West through the Western Electricity Coordinating Council.

This initiative intends to better utilise existing transmission resources.

If successful, dispatch of non-firm and conditional resources would be improved through centralised dispatch. This initiative does not create a regional transmission organisation but would cause existing tariffs on file with the Federal Energy Regulatory Commission to be revised. Distribution System Energy Efficiency: There are no specific requirements, to date, for electric utilities to ensure that distribution systems deliver energy at the minimum voltage required for reliable service.

As such, more energy is sold than is required to serve actual customer purpose (the load that is required to deliver an electric function).

There is insufficient incentive to invest in the distribution system balancing and control systems that would ensure a reliable distribution system at these lower voltages; there is insufficient incentive to run the system at lower voltages, in the same way that there was (historically) insufficient incentive to achieve energy efficiency acquisitions.

The Commission has begun work to create sufficient incentive for investments in voltage optimisation, without retreating from incentives for reliable system service. For Distributed Generation demand tariffs and energy tariffs are separately justified. There are no incentives to reduce transmission or distribution investments in favor of distributed generation. In addition there are not currently sufficient sensors and distributed distribution level transmission controls to properly manage large penetration of distributed generation.

South America

Brazil

There are differentiated tariffs destined to peak periods and seasons. These peak tariffs are more expensive than the others. This issue is regulated by ANEEL and these tariffs are destined to medium and large consumers, such as industry and commerce.

Uruguay

According to the current legal framework, tariffs are proposed by UTE and established by the central government, with the advice of NRA (URSEA).

Customer bills are based on actual energy consumption, and all the information is presented in a clear and understandable way for customers.

The information provided in residential bills allows customers to understand what is being billed, as well as improve efficiency consumption.

Tariffs and actual energy consumption are presented, as well as a bar chart that shows consumption during last 13 months. This chart allows comparing consumption between different months.

Information related to energy efficiency is presented in the back of the bill, as well as the Energy Efficiency Project website address (www.eficienciaenergetica.gub.uy), where general information about energy efficiency, tips and calculators for consumption estimation are provided.

Australia

The framework for regulating the settings of tariffs for using transmission and distribution networks is set out in the National Electricity Rules.

Under this framework, distribution and transmission businesses are obliged to establish tariff structures which, in broad terms, reflect costs.

There is discretion for the regulated businesses in respect of how they fulfil this requirement, subject to regulatory oversight by the AER. To illustrate, this framework enables a network business to propose time-of-use tariffs (to the extent that they are cost-reflective), but does not obligate them.

Europe and the Russian Federation

In European countries transmission and distribution tariffs are cost reflective and therefore do not include any incentives to increase the volume of energy transported. In addition, in some countries (e.g. *Portugal*) tariffs do include incentive mechanisms to reduce network losses.

Outside the European Union, in *Croatia*, *Macedonia* and *Ukraine*, tariffs are cost reflective as well.

In **Russian Federation** long-term transmission and distribution tariffs are set on the basis of long-term parameters for regulated activities using the benchmark method to ensure profitability of the invested capital. Energy efficiency programs have to be adopted by each regulated organisation in accordance with the requirements set by the national regulator.

5.9 Regulation of billing and other information to customers on their consumption

Africa and Middle East

In most African and Middle East countries, no specific regulation of billing exists and no special information that enables customers to understand and reduce their own consumption is provided in bills (like, for example, the level of consumption articulated among different aggregations of hours, or the distributor's energy mix and the related environmental impact).

However, a few initiatives have been taken in some countries in order to achieve energy efficiency goals through billing practices. In **Egypt**, for example, a marketing campaign on electricity bills as been carried out to encourage consumers to use fluo-compact light bulbs (FCL).

The Electricity Regulatory Commission of **Jordan**, in the context of the preliminary introduction of a time-of-use pricing regime, plans to provide each consumer with two bills, one of which is based on a flat tariff with the second based on a time-of-use tariff for its energy consumption. This provision should encourage consumers to gradually change their behavior so as to reduce electricity bills.

North America

Canada

In *Ontario*, once a smart meter is activated, electricity bills will be calculated based on real-time data rather than estimated consumption. Smart meters will automatically and regularly send meter readings to the consumer's utility via wireless and other technologies. Smart meters plus time of use rates will provide consumer's with a cost management tool. Time of Use rates vary depending on the time of day, the day of week (week or weekend, and holidays) and the season (summer or winter). With rates that vary, consumer's have an incentive to shift and/or reduce electricity consumption at times of peak demand.

The three Time of use periods are as follows:

- On Peak – the cost of energy and demand are highest
- Mid-Peak – the cost of energy and demand are moderate
- Off-Peak – the cost of energy and demand are lowest

Electricity and gas distributors in Ontario include actual prices on a consumer's bill.

As previously mentioned, once a smart meter is activated, there will no longer be estimated electricity bills – smart meters will automatically and regularly send meter readings via wireless and other technologies. Some electricity distributors include a comparison of consumption for the current period with consumption for the same period last year; however this comparison may be based on estimated, not actual consumption. The two major gas distributors in Ontario, Enbridge Gas and Union Gas, also include a comparison of consumption for the current period with consumption for the same period last year.

In addition, included with a consumer's electricity or gas bill may be a brochure or insert

promoting a conservation program offered by the utility. The brochure or insert would include all the relevant contact information of the utility or participating third party, should the consumer be interested.

In *Alberta*, billing is not regulated with the aim of reducing energy consumption. The British Columbia Utilities' Commission does regulate billing. Billing is based on actual energy consumption and presented in clear and understandable terms. However, billing is not designed specifically with the aim of reducing energy consumption.

Information on bills contain monthly consumption of electricity, gas, water in a rolling 12 month period. Some have year over year comparisons, some do not, depending on the utility you choose. Consumers have a choice to either accept floating monthly rates for gas and electricity or contract for fixed price. Consumer group contact information is located on the webpage but not the bill. Some of the websites contain energy efficiency information but the bills do not.

In *Nova Scotia*, most electricity billing is based on demand and actual energy consumption. Time-of-use tariffs are very limited. Electrical utility bills list consumption levels, demand, tariffs applicable to each, and the billing period costs. In addition, NSPI shows billing period consumption for each billing period over the past 12 months. Bill stuffers occasionally provide hints for reducing electricity usage as well as contact details for more information

Utilities in *British Columbia* provide different billing information. In general, the bills are laid out to show a fixed demand charge and a consumption-based energy charge.

BC Hydro is currently the only utility with tiered-rates so the energy charge for BC Hydro's customers shows energy consumption at the lower and higher rate which is intended to motivate conservation.

The other utilities do not have tiered-rates but all utilities' bills have graphical or numeric comparisons to past consumption in the same period for previous years.

Mexico

Under the Law for the Sustainable Use of Energy, public agencies and energy sector firms must include in their bills and tickets legends to promote the sustainable use of energy and its benefits in environmental preservation. The legends must be approved by the Commission.

United States of America

California

Information on customer bills includes historical consumption to compare prior year usage to the current bill.

The investor owned utilities (IOU) frequently use bill inserts and direct customer mailings to supplement broad-based media advertising to provide customer information about demand side programs including energy efficiency and low income bill assistance. Following deployment of advanced meter infrastructure (AMI), the IOUs will be providing enhanced web-based customer information on their daily and hourly usage patterns.

Maine

Utility bills in Maine typically provide current and historic consumption information. In addition, with the installation of smart metering, Maine utility customers will have access to usage information in much greater detail and in near real-time. Although utility bills do not specifically promote state energy efficiency measures, the Maine Public Utility Commission does reach out to consumers through a well-supported marketing program, including a substantial web presence geared to both residential and commercial consumers.

New York

The utility bills in New York include a bar chart that shows customers their past energy consumption levels for each month during the previous year. In addition, the bill provides the utility's website, address and phone number. In some cases information is provided on where information regarding energy efficiency can be obtained.

Oregon

Pilot programs are currently under design to provide customers with monthly bill comparisons against the average and minimum energy users of other households of similar size in the same neighborhood.

Monthly bills or bill inserts will also recommend installation of energy efficiency measures believed to be available to the customer based on knowledge about the customer from utility and energy efficiency delivery non-profit databases. This program has been initiated by the Energy Trust of Oregon (ETO), a Commission-sponsored non-profit providing energy efficiency delivery services, and co-sponsored with the investor owned electric utility and natural gas utility of Oregon's largest city.

Texas

Public Utility Commission of Texas rules require that customer bills display actual price and consumption information. Retail electric providers may also provide additional historical use information. In addition, more consumption information will be available from websites and in-home devices with the deployment of advanced meters.

Vermont

The bill format varies considerably by utility, and is dependent on the utility's ability to provide such information.

However, the larger utilities provide information that shows a comparison of the customer's current use with use during the same period the prior year.

Typically information on energy efficiency measures is not included on the utility bill, unless a particular utility is working collaboratively with the third party efficiency provider to reduce load in a specific geographic area.

Wisconsin

Customers' Bills are required to contain the following: number of days in the billing period; number of units consumed; clear itemisation of all utility charges and credits; information on temperature during the billing period; and a statement that the utility will, upon customer request, provide the information and assistance necessary to evaluate fuel consumption and conservation. Bills must also provide the customer charge, energy blocks, demand charges, minimum bills and all items necessary for the customer to check the calculation of the bill.

South America

Brazil

Household bills provide information that enables customers to understand and reduce their energy consumption.

Other initiatives aimed at providing further information also qualify as energy efficiency projects required by ANEEL, but the final decision on how to invest the money is taken by the distribution companies.

It is also important to mention that marketing programs destined for public education are also parties of PROCEL and CONPET, the national energy efficiency programs. They are CONPET at Schools (CONPET nas Escolas) and Educational PROCEL (PROCEL Educação). These sub-programs are intended to educate people about what actions they can take to save energy.

Uruguay

Metering of UTE consumers with dual time tariff (residential and general) and triple time tariff (industrial) are in place.

Dual time tariff is voluntary. Triple time tariff is optional for customers with more than 10 kW subscribed and compulsory for more than 40 kW.

Moreover, high consumers (with more than 200 kW subscribed and consumption about 90.000 kWh per month) have telemetering.

Australia

The required informational content of energy bills – and, in most jurisdictions, the form of the regulated standard retail offer - is not regulated under the national Rules. It is a matter for individual state and territory governments, as part of their responsibility for regulation of energy retailing more generally.

An investigation into bill benchmarking is being undertaken under the auspices of the National Framework for Energy Efficiency.

This measure explores the requirement for energy retailers to include average energy consumption data on energy bills, and provide householders with information that will allow them to measure and compare their energy consumption against a useful benchmark. The objective is to motivate energy consumers, in particular those with above average energy consumption, to implement energy efficiency improvements. A Regulatory Impact Statement was released for public consultation In October 2009.

Europe and the Russian Federation

According to Directive 2006/32/EC on energy end-use efficiency and energy services, EU "Member States shall ensure that, where appropriate, billing performed by energy distributors, distribution system operators and retail energy sales companies is based on actual energy

consumption, and is presented in clear and understandable terms. Appropriate information shall be made available with the bill to provide final customers with a comprehensive account of current energy costs. Billing on the basis of actual consumption shall be performed frequently enough to enable customers to regulate their own energy consumption" (Art. 13).

With this legislative background the EU countries adopted different approaches. A mandatory meter reading frequency is defined in most European countries. In general, the frequency of meter reading is higher for large customers than for households and small customers, and it is common for the customer to read the meter himself or herself, and to send the data to the Distributor/Supplier. Regardless of who reads the meter, the Distributor/Supplier remains legally responsible for the meter readings.

In some cases bills must always be based on actual consumption (*Finland*, *Ireland*, *Norway*, *Romania*, *Slovenia*, *Sweden* and *Spain*) at least for customers with hourly readable meters. It is interesting to note that Ireland is the country with the highest frequency of meter readings: here, meters are read six times per year, even in the absence of a legal framework requiring such frequency, or even a guarantee that meters will be read at all. Special provisions are in place in *the United Kingdom* for customers of pensionable age, disabled or chronically sick: in the event that they request meter reading, a supplier must, free of charge, arrange to read the customer's meter at least once each quarter and is also obliged to inform the customer of that reading.

Outside the European Union, in the *Republic of Macedonia*, billing is always based on actual energy consumption while in *Ukraine* and *Croatia* billing can be based on consumption estimates. In *Ukraine*, besides, the process of billing is not regulated by the law. The procedure for settlements is determined by the parties in the agreement on supply of electricity.

According to Ukrainian legislation the energy supply company has to give recommendations concerning possibilities and expediency of use of electricity for heating and also concerning energy efficiency and modes of consumption of electricity; it also provides information concerning quality of electricity, tariffs (prices), procedure for payment, conditions and modes of power consumption.

In many countries billing specifications are stipulated by the Energy Regulator and typically require that bills contain all of the elements necessary to ensure that the customer has a complete and clear understanding of the bill. Some countries provide also historical data on energy consumption to allow comparisons across different billing periods (e.g. *United Kingdom* *Norway* and *Spain*). In *Sweden*, even if billing is not regulated by law, the bill shows the actual energy consumption and consumption during the previous 13 months. In *Portugal* the electricity bill provides information on actual energy consumption (the last reading available), on current prices and it also shows the average spending a day. Additionally it states the energy sources mix used to produce the amount of energy consumed and the CO_2 emissions.

Some countries also provide website addresses and telephone numbers to facilitate consumer access to information on available energy efficiency measures (*France*, *Norway*, *United Kingdom*, *Republic of Macedonia*).

In **Russian Federation** bills for electricity and gas consumed by residential consumers contain information about volumes and cost of consumption, and also contact information of the supplier. The Energy Regulator (FST) does not regulate the billing process.

5.10 Other initiatives for providing information to the consumers

Africa and Middle East

In many countries public institutions, both national or international, energy utilities and other organisations carry out information campaigns and programmes to educate the consumers about what they can do to save energy.

In **Algeria**, for example, awareness and communication campaigns are frequently organised by APRUE, and addressed to the public through the media. During the last four years, APRUE has also organised an "Open Doors on Energy Conservation in Schools" project, whose aim is to raise awareness of young students about the importance of energy conservation.

In **Egypt**, there an information dissemination program on energy efficiency and greenhouse gases reduction, partially financed by the Egyptian Electricity Holding Company (EEHC) and the United Nations Development Programme (UNDP).

North America

Canada

The Ontario Energy Board does not directly promote marketing programs to educate the public about what they can do to save energy, however, electricity and gas distributors in Ontario have a direct role in the promotion of conservation programs.

The Ontario Energy Board's Guidelines for Electricity Distributor Conservation and Demand Management provide comprehensive information on the Ontario Energy Board's policies relating to Conservation and Demand Management activities undertaken by electricity distributors in Ontario. The policies set out in this document are intended to guide distributors in designing program proposals, applying to the Ontario Energy Board for funding for promotional programs (and other Conservation and Demand Management programs), and implementing these programs. In the near future, these Guidelines will be replaced with a new Conservation and Demand Management Code to address the rules and requirements for implementing conservation programs under the new framework outlined within the Green Energy Act Similar funding arrangements apply to gas distributors.

The Alberta Utilities Commission does not promote marketing programs to educate the public about what they can do to save energy. The British Columbia Utilities Commission also does not promote marketing programs to educate the public but has approved the utilities to provide broad-based education as part of their conservation programs.

Mexico

In order to accomplish the goals and meet the obligations established in the Law for the Sustainable Use of Energy, several actions are required, such as:

1. The obligation to design a strategy to generate energy efficiency recommendations to States, Municipalities and Individuals.
2. The development and publication of a catalogue of appliances and equipment that

includes information about their respective energy consumption characteristics.

3. The implementation and maintenance of the National Sub-system of Information respecting the Use of Energy, which contains data about energy consumption, factors related to this consumption, and energy efficiency performance indicators from México and other countries in order to facilitate performance comparisons.
4. Update information about Funds and Trusts that promote directly or indirectly the sustainable use of energy.
5. To provide comprehensive procedures for the verification and recognition of performance.
6. To promote scientific and technological research into the sustainable use of energy.
7. To develop a program to promote the certification of processes, products and services.
8. To design a strategy for the generation of binding opinions on energy efficiency matters.
9. To propose the incorporation of educational programs into curricula respecting the sustainable use of energy.
10. To promote the creation of experts and expertise in the field of energy sustainability.
11. To work toward an evaluation of impacts methodology respecting actions taken in furtherance of the sustainable use of energy.

United States of America

California

California's Statewide Marketing & Outreach aims to increase ratepayer awareness of energy use and available efficiency/conservation measures as well as to facilitate the ability to incorporate technological advances or behavior changes. The Education and Training Programs are operated by investor owned utilities at nine Energy Centers. The Energy Centers seek to increase knowledge and generate behavior change such as reducing energy usage, lowering utility bills, reducing operating and maintenance costs, and improving productivity. The Programs also provide services to those who design more efficient buildings or processes and who conduct energy efficiency retrofits and renovations. Targeted Information Programs are designed for target audiences, including commercial and industrial end-users, residential (including ethnic communities with in-language outreach), and residential market actors (architects, designers, contractors).

Maine

The Maine Public Utilities Commission (PUC) conducts a public education campaign to increase awareness of household electricity usage, which operates in conjunction with a successful effort to promote the use of compact fluorescent light bulbs.

The Maine PUC undertakes a variety of media strategies and direct outreach to the public to support these programs, including a presence in elementary schools and the development of appropriate curricula for use by teachers.

Massachusetts

In Massachusetts the Department of Public Utilities does not market energy efficiency programs, as the Program Administrators, collectively and individually, market their energy efficiency programs.

Minnesota

The utilities are the primary source of energy efficiency information for customers. The Public Utilities Commission reviews the cost of this marketing in a rate filing by the utility. The Office of Energy Security has a website that provides information on available programs, educational information and information about tax and oather program incentives.

New York

The state's utilities and the New York State Energy Research and Development Authority (NYSERDA) all have marketing and outreach efforts to inform customers about energy efficiency programs that are available to them and provide general information about saving energy.

These organisations also do outreach events, overseen by NYSERDA, where they speak to the public. In addition, NYSERDA has developed a curriculum to be used in schools on a variety of energy topics, including energy efficiency.

Oregon

The Public Utility Commission of Oregon website provides a link to the Energy Trust of Oregon (ETO) website. The ETO is the Commission sponsored non-profit that provides energy efficiency delivery services to four of the six investor owned utilities (electric and natural gas) in Oregon

Texas

The Public Utilities Commission of Texas (PUCT) conducts a public education campaign that includes, among other topic, what customers can do to save energy. Information on consumer organisations and energy efficiency measures is also available to the public from websites for the PUCT and the electric choice public information site at www.puc.state.tx.us and www.powertochoose.org. Also, there is a website with links to information about the energy efficiency programs administered by the investor-owned utilities in Texas to meet their statutory goal for energy efficiency under which was developed under the auspices of the Electric Utility Marketing Managers of Texas[42].

Vermont

The Energy Efficiency Utility (EEU), the third party efficiency provider for Vermont, markets its efficiency programs through advertisements. In addition, the Vermont Public Service Board and the larger electric utilities in Vermont provide links to the EEU's website.

Washington

The Washington Utilities and Transportation Commission allows utilities to recover expenses for marketing that provide information that assists customers in conserving energy or in reducing

[42] http://www.texasefficiency.com

peak demand for energy (Natural gas - WAC 480-90-223; Electric - WAC 480-100-223).

Wisconsin

The Focus on Energy program has a strong information and education (and training) component, both in the Residential and Business sectors. The Focus on Energy program has a website and uses print, radio and on rare occasions, television to promote energy efficiency. Focus also uses Facebook, Twitter, Vimeo and YouTube to educate and inform the public about energy efficiency. The Focus program works closely with public libraries and funds KEEP- a continuing education program for kindergarten through high school teachers on how they can teach energy efficiency in the classroom.

South America

Brazil

There are differentiated tariffs associated with peak periods and seasons. These tariffs make electricity more expensive to use during peak periods. This is regulated by ANEEL and these tariffs are targeted to medium and large consumers, such as industry and commerce.

Uruguay

URSEA does not take part in public education programmes, but Energy Efficiency Project establishes educational campaigns, where activities focused on primary, secondary school and labour university, as well as communication campaigns – in coordination with UTE- in press and television are developed.

In particular UTE elaborates –in coordination with Ministry of Industry, Energy and Mines, and the Energy Efficiency Project- a campaign aimed to exchange incandescent bulbs for efficient low consumption bulbs. The objective of this programme, called “A todas luces”, was to distribute 2.300.000 efficient low consumption bulbs, in order to reduce in 3 % per year the amount of energy sold by UTE.

Asia

India

A National Campaign on Energy Conservation was launched by the Indian Government in 2005 to raise awareness in the domestic, commercial, agricultural, industrial and educational sectors. The campaign (now called General Awareness Campaign) is being revamped and extended.

The National Energy Conservation Awards program is an innovative program launched by the Ministry of Power over a decade ago.

It aims to reward best practices for small, medium and large industries, the construction sector, State Designated Agencies and municipalities.

BEE is also implementing educational programmes in schools such as the Building Energy Awareness on Conservation (BEACON) and the Painting Competition on Energy Conservation.

Australia

The Living Greener website is the Federal Government web portal for information about living more sustainably and reducing environmental impact, including information about improving energy efficiency. The portal is primarily an interactive source of information about existing Federal and State and Territory government programs and financial support.

In addition, the Federal, State and Territory government energy ministers approved the parameters of the new disclosure scheme for office building energy efficiency in November 2009. Federal legislation is now being developed to give effect to the scheme in the second half of 2010.

The scheme will be implemented in two phases, commencing with a national disclosure scheme for large commercial office buildings. Extension of the scheme to other commercial buildings will be considered for phase two. The new scheme will require building owners to disclose a valid Building Energy Efficiency Certificate to prospective buyers and lessees, including a National Australian Built Environment Rating System (NABERS) Energy base building star rating.

The “Black Balloons” information campaigns have been conducted in Victoria, South Australia and New South Wales. These separate campaigns use the similar motif of a black balloon representing carbon pollution produced through energy use. The campaign aims to encourage consumers to reduce their energy usage through implementation of energy efficiency measures.

Victoria launched the original “black balloon” campaign in 2006. The campaign and associated website are aimed primarily at households. In New South Wales the three year, $15 million “savepower” community education and awareness program comprises mass media communication including a campaign and website; education and training; and research and evaluation. The campaign primarily targets households, but also provides information for schools, business and government.

Europe and the Russian Federation

The Directive 2006/32/EC on energy end-use efficiency and energy services contains rules respecting the dissemination of information to the relevant actors on energy efficiency mechanisms. It also addresses financial and legal frameworks adopted to achieve energy savings.

Accordingly, European Member States have introduced a range of information measures such as advertising campaigns, educational materials and initiatives, advice on how to save energy, and web-based energy savings tools. Some information measures target the general public, while others target professional stakeholders (e.g. energy managers, architects and building sector professionals) or civil servants.

In addition to national initiatives, it is worth mentioning that the European Community has launched a number of projects to facilitate the sharing of experiences in energy efficiency programmes among its members (e.g. the exBESS project, within the Intelligent Energy Europe – EIE Programme, aimed at developing and promoting the widespread application of benchmarking and energy management in order to improve energy efficiency in industrial SMEs with particular focus on the food and drink industry). This project was built upon the Norwegian benchmarking system and is being extended across Europe.

Austria

The National Regulatory Authority, E-Control, has recently introduced, or is going to introduce, a number of information measures, of which the most interesting ones are:

- a booklet, published in late 2009 aimed at informing end-use residential consumers about energy efficiency and the saving potential for energy and cost saving;
- a specific training for E-Control employees to make them better able to answer some of the typical questions asked by consumers concerning energy efficiency;
- A new internet tool that will provide information for residential consumers about their energy use and their ability to save energy and money; it will be published in 2010 on the E-Control homepage. Currently, there are two tools available: "quick check" and "profit check". They are available on the same homepage that provides information about usage and the conservation of electricity in households.

Finland

Energy Awareness Week has been organised in Finland annually during week 41 since 1997. During the theme week schools, companies and other organisations give focus on promoting energy efficiency.

The objective is to get people to think and act in favour of sensible use of energy and in an environmentally conscious way in their daily life voluntarily. Topics include heating, use of water, traffic, use of electricity and green buying decisions and try to motivate people to use energy efficiently and rationally. Target groups include consumers/households, schoolchildren, kindergartens, companies and various intermediary parties. 200-300 companies, municipalities, educational establishments, organisations etc. are engaged in the theme week each year.

The National Energy Theme Week for Second Grade Pupils has also been organised during week 41 since 1996 to make children familiar with everyday energy issues. Energy issues and sustainable development are included in the Finnish national school curriculum. The energy subject matter is studied during one to two lessons every day during the theme week. The theme week at schools culminates in a national energy saving competition. Local energy companies support schools by providing education packages, organising visits to their premises and awarding the schools locally. Teaching material is developed in cooperation with teachers and Motiva (a state-owned company). The week is aimed at second grade pupils in primary schools (aged around eight). The size of the target group has been 20,000-25,000 per year since 1996 (roughly half of the age group).

Another information measure is the Energy Efficient House Campaign which aims to increase the share of low-energy houses in Finland up to 20% in 2010.

Given the large proportion of homes built by their owners, a four-year campaign (2005-2008) has been carried out for the promotion of low-energy houses.

The campaign has been implemented with a wide participation of various stakeholders, which is the innovative component of the campaign.

The main communication channels in the campaign have been the campaign website, another website popular among the home builders, a brochure, posters and a guidebook. In addition, participating companies used their own communication channels.

In the campaign, home builders are given information on the benefits of low-energy houses and

information for decision making. Communal building supervisors are the key contact points for builders and need to be informed. Retailers are given information to help them offer energy efficient solutions for customers. The main target groups are builders of new single family houses (those who build their own homes), building supervisors and media. The secondary target groups are building supervisors, retailers of construction materials, planners and students of building and construction.

France

The French sectoral organisations (FFB, CAPEB, FNSCOP) and a few obliged actors (so far mainly EDF), under the control of the French Ministry for Environment and Sustainable Development and Planning (MEDAD) and of the French Agency for Environment and Energy Management (ADEME), have designed a sustainable building training scheme during 2007 that commenced in January, 2008. This programme is managed by the ATEE NGO (www.clubc2e.org). It is built on a common platform that encompasses 3 modules:

1.General knowledge about building and climate change, and buildings as energy systems;

2.Conceptual and software tools to make a global energetic refurbishing offer;

3.Nine specialised modules about how to properly implement effective energy efficiency solutions in the renovation of buildings (insulation, solar hot water…).

The training organisations that are addressing modules 1 and 2 were selected through a public offering in 2007; those for module 3 are currently being selected.

It is expected that 50,000 workers in the building industry will have been trained through this programme by mid-2009.

Norway

Enova, the Norwegian state-owned agency whose mission is the promotion of energy efficiency, has launched a number of web-based benchmarking schemes to identify best practices in the industrial, building and transport sectors.

Portugal

Since 2008, ERSE has been promoting a Training Academy aimed at developing an informed and enlightened public awareness of energy matters. ERSE has been conducting workshops open to the public on PPEC (see section *5.4 Tenders*), and has developed an extranet for the energy consumer with relevant information relating to end-user energy efficiency. For example, it provides tips on how to save energy. In addition, ERSE is currently developing a project specially targeted at energy education in schools.

5.11 Commercial offers entailing services to reduce energy consumption

North America

Canada

Throughout the province of *Ontario*, both electric and gas utilities have developed and promoted various Conservation and Demand Management ("CDM") programs over the last several years.

Some of these offerings include:

Electricity:

Examples of Residential and Municipal sector programs:

- Municipal street and traffic light LED conversions
- Electrical appliance rebate/exchange
- Consumer training and education
- Dedicated Conservation and Demand Management website
- Water heater load control
- Compact fluorescent light bulb ("CFL") giveaways and exchanges
- Home energy audits
- Seasonal LED light exchange
- Conservation kits for customers
- Customer price alert/demand response

Examples of Industrial, Institutional and Commercial sector programs:

- Building retrofits
- Building demand response
- Mid-large customers – interval metering
- Energy audits
- Business incentive programs

Examples of programs targeted towards Low-income participants:

- Energy audits – social housing units
- Low-income consumer retrofits
- Social Housing Refrigerator program
- First Nations consumer retrofits

Gas:

Examples of programs offered by gas utilities:

- Free Energy Savings Kits (which may include an energy-efficient showerhead, kitchen aerator, bathroom aerator, and/or pipe wrap
- Programmable thermostat offer
- Drain Water Heat Recovery

Provincial (province-wide) programs offer by the Ontario Power Authority:

- The Great Refrigerator Roundup
- Cool Savings Rebate toward replacing an old air conditioning system
- Peaksaver

In *Alberta*, there are many efficiency initiatives undertaken by the private sector, but this is not an element of the competitive market for gas and electricity. There are market mechanisms in place for market participants to reduce consumption in times of tight supply or high prices in real

time. This is not considered to be a part of an energy efficiency strategy.

There are no tariffs or programs in the competitive market that are designed to reduce energy consumption in *British Columbia*. In *Nova Scotia*, tariffs are reflective of the cost of service and time-of-use tariffs are very limited.

United States of America

California

During the period approximately 1998-2001 California encouraged formation of "Direct Access" energy services providers, who would replace the IOUs as providers of commodity energy, possibly in tandem with energy efficiency or energy management services.

A wide variety of business models and service offerings competed in the retail marketplace for both residential and non-residential customers, with the IOUs continuing to provide the delivery infrastructure. After the energy crisis of 2001, no new Direct Access contracts were permitted, in order to keep customers captive on the IOU systems for long-enough periods to repay high-cost power contracts that were executed to ensure adequate energy availability. At this time, about 10 percent of statewide electric sales are sold via legacy Direct Access contracts. Some of these continue to offer energy management services. In October, 2009, SB 695 became law, and allows new Direct Access contracts to be signed with non-residential customers, up to the total amount of load served at the peak of the direct access market.

Massachusetts

Competitive suppliers are not prohibited from offering green programs.

New York

Some of the energy suppliers (ESCOs) doing business in New York State work with large commercial and industrial customers to provide overall energy solutions which might include efforts to reduce energy consumption.

Oregon

Residential rates are tiered, in an "inverted block" rate design. Inclining block" (or "inverted") designs charge a higher rate per kWh at higher levels of energy usage (and a lower rate at lower usage levels), appropriately reflecting the marginal cost of supply.

The higher "tail-block" rate is designed to capture energy uses with a high degree of peak coincidence. For example, residential customers with central air-conditioning will likely pay for that load at higher-tier rates and therefore will pay higher average prices. That fairly allocates to those customers the higher costs they impose on the utility system. Higher tail-block rates provide an incentive for energy-efficient behavior.

Texas

Renewable energy products are one of the types of products that are broadly available in the competitive retail market in Texas.

Washington

Residential and small commercial rates are tiered, charging more per kWh for higher usages levels. The summer rates structure of one utility has three tiers to better reflect the marginal cost

of large residential air conditioning load on hot peak summer days.

Europe and the Russian Federation

Few examples are known of commercial offers entailing services to reduce energy consumption. In *France* one supplier offers a tariff that increases with the volume consumed. Most suppliers offer extra consultation services, in some instances free of charge. Such services may be delivered on the bill, on the phone, by internet, or on-site.

In *Portugal* at least one of the suppliers operating in the competitive market, in the business segment, offers an energy audit respecting lighting equipment. The audit consists of a site survey followed by customer-specific recommendations on how to increase energy efficiency and therefore lower the electricity bill.

5.12 Smart metering

Africa and Middle East

A number of African and Middle East countries are considering the gradual replacement of old meters with electronic versions for energy efficiency purposes. In Egypt, for example, a feasibility study has been carried out for the introduction of smart meters on a large scale, and a pilot project has been implemented, involving the installation of about 20,000 electronic meters.

In **Jordan** the Electricity Regulatory Commission (ERC) has taken significant steps to reform the electricity tariff through the introduction in 2008 of a time-of-use tariff. This is a three part tariff available to many consumers' categories such as new medium agricultural and commercial consumers, as well as for consumers whose load is greater than 200 kW. In the near future ERC plans to apply a two part tariff to residential consumers and other consumers, as soon as electronic meters are installed. Since 2008 all the new procurements are for electronic devices. At the same time, ERC has started a campaign to increase public awareness regarding the time-of-use tariff and the appropriate consumer behaviors to achieve the saving goals.

In **Saudi Arabia**, a programme for the installation of remotely readable smart meters is already under way for commercial and industrial customers and it is planned to be gradually extended to all customers.

North America

Canada

In *Ontario*, the Government of Ontario has a target to have electricity smart meters installed in all Ontario homes and small businesses by the end of 2010. There is no similar move on the gas side to replace traditional (metric and imperial) meters with smart (digital) meters. The Ontario Energy Board's role is not to promote smart metering; the primary role of the Ontario Energy Board is to provide the regulatory framework for the implementation of the technology.

The Government of Ontario is promoting smart meters with the aim at reducing consumption

and helping Ontario to build a more efficient, responsive, reliable, and more environmentally sound electricity system, while also helping consumer's manage electricity costs. However, the Government of Ontario has not promoted smart meters with the aim of consumption reduction; rather the goal is to have consumers use less power during peak times.

The *Alberta* Government has indicated its intent to initiate a smart metering policy and the commission will be engaged in a public process to facilitate the implementation of this policy. The *British Columbia* Provincial Government has legislated British Columbia Hydro to install smart meters for all residential customers by 2012. In *Nova Scotia*, smart metering is not currently being promoted. A small pilot project related to remote meter reading has been undertaken by Nova Scotia Power and some consideration is being given to Advanced Metering Infrastructure ("AMI") by the electrical utility.

Mexico

The Commission has smart metering aimed to the abatement of energy consumption.

Last December 11th 2009, the Commission published the Methodologies for Quantifying Emissions of Greenhouse Gases and Avoided Energy Consumption by the Sustainable Use of Energy, these methodologies are used to calculated how much the consumption of other organisations is and how much energy they can save by acting sustainably [43].

United States of America

In 201, the U.S. federal government announced more than $3 billion (U.S. dollars) in grants for smart grid projects. This money stimulated a significant increase in smart grid activity at the state level. At the time of this report, several states had only recently received proposals from electric utilities with proposed plans for deploying smart grid technologies.

California

The California Public Utilities Commission has approved the investor owned utilities' proposals to invest in advanced meter infrastructure for all residential customers.

This AMI deployment targets residential customers since commercial and industrial customers already have interval meters.

This will allow the Commission to establish time of use and peak pricing tariffs for residential customers in the future as optional or default rate to replace current residential rate structures.

The AMI deployment includes enhanced web-based customer usage information to provide feedback and information about energy efficiency and demand side programs to help customers manage their bills. The smart meters will enable the use of in-home displays and home area networks to enable customers to track and manage their energy consumption.

[43] These methodologies can be found on this web site:

http://www.conuee.gob.mx/work/files/metod_gei_cons_evit.pdf

Maine

The Maine Public Utilities Commission has recently approved smart metering programs for Maine's two largest utilities, and over the next several months will be conducing proceedings to examine and implement programs that make use of the enhanced metering capabilities, e.g., dynamic pricing.

Massachusetts

In Massachusetts: Each of the four electric investor owned utilities have submitted smart-grid proposals. The consideration of these proposals is ongoing at the time of this report.

Minnesota

The Minnesota Commission has issued an order adopting the federal definition of smart metering, with language that promotes investment in cost effective technology to improve energy efficiency.

In response to the federal Energy Independence and Security Act of 2007, the Minnesota Public Utilities Commission opened two dockets on this topic. A Commission Order issued June 5, 2009 promotes smart grids/metering through standardising definitions, discussing/allowing rate recovery, requiring access to smart meter/smart grid activities, and requiring annual reporting for the Commission to review. The Order encouraged utilities to implement and move forward with smart grid technologies such as smart metering.

Oregon

Smart metering has been broadly deployed by two of the investor owned electric utilities in Oregon: Portland General Electric (PGE) and Idaho Power. PGE smart meters are being used as part of a voluntary critical peak pricing pilot (due to start in October 2010). A peak rate pilot was required by the Commission as a condition of allowing investment in smart meter installation. Mandatory time of use rate metering is opposed by consumer advocate groups in Oregon (as disadvantaging busy low income families who do not have the resources or time to spend on paying attention to daily patterns in energy use). Voluntary time-of-use rate programs are not marketed by the electric utilities, but remain available to new customers. Idaho Power has received Federal grants for upgrades to their information systems to take advantage of intelligence provided by their smart meter installations.

Texas

The Public Utility Commission of Texas was given responsibility to establish a surcharge for the utilities to deploy advanced meters, as directed by State statute (see PURA § 39.107).

The PUCT developed a rule establishing minimum functionality and requiring that advanced meters meet standards developed by the American National Standards Institute. Three utilities have already begun installing over six million smart meters, and the deployment plan for one other utility is pending, which will result in the installation of over 250,000 additional advanced meters. Some municipally-owned and cooperative utilities have also installed advanced meters.

Wisconsin

The Public Service Commission recently encouraged and worked with utilities to apply for federal grants encouraging deployment of Smart Grid technologies.

Large investor-owned utilities are in various stages of installing smart meters. The experience

in Wisconsin to date indicates that the smart meters have generally not been used to their potential for reducing energy use. Pilots in the service territories of two utilities are attempting to determine how best to use this technology

South America

Brazil

Smart metering projects are eligible for inclusion with energy efficiency programs promoted by ANEEL. These projects are designed to reduce the energy peak demand. ANEEL and other government institutions are currently discussing this issue.

Asia

In **Japan**, the government will launch in 2010 a five-year trial project to prove the efficiency of 'smart grids'. The project will begin in four major areas: Yokohama, Kitakyushu Toyota in Aichi Prefecture and Keihanna (covering Kyoto, Osaka and Nara). Municipalities will flesh out the details of the project with large corporations in the areas by the end of June 2010. In this framework, the Yokohama city government plans to equip 4,000 homes with smart meters to automatically adjust the amount of electricity supplied to each home, while monitoring how electricity is being consumed in the entire community participating in the trial.

Australia

The National Electricity Law has recently been amended to provide for jurisdictions to mandate the trialling or roll-out of smart meters. The model adopted is for regulated distribution businesses to be responsible for implementing any mandated roll-out.

The Australian Energy Market Commission (AEMC) is currently reviewing the Rules for economic regulation to assess whether any amendments are required to handle the financial consequences of such mandated actions for regulated distribution businesses.

The government of *Victoria* has already mandated such a distributor-led roll-out – prior to the amendments to the National Electricity Law, and hence under a different, state-based legal framework. The Minister for Energy in Victoria has recently announced an indefinite moratorium on the introduction of time-of-use pricing associated with the roll-out program, in light of concerns about the potential impact on consumers.

The Australian Government has committed up to $100 million to develop the Smart Grid, Smart City demonstration project in partnership with the energy sector.

This initiative will gather robust information about the costs and benefits of smart grids to inform future decisions by government, electricity providers, technology suppliers and consumers across Australia. The demonstration project will be based in Newcastle, New South Wales, and will be Australia's first commercial-scale smart grid.

Europe and the Russian Federation

In Europe actual implementation of smart meter policies differ quite widely, as a consequence of differences in legal frameworks and powers of regulators. However, a growing number of Member States are in the process of drafting policies or are at least planning to do so.

In total, five countries are proceeding to a roll-out of electricity smart meters and they have some type of legal framework on the implementation of smart metering. These countries are Finland, Greece, Italy, Spain and Sweden. In four of these countries, an explicit roll-out-plan has been officially decided upon, while in Sweden the roll-out is implied by the meter reading frequency obligations. A roll-out is under discussion in a further 12 countries, as illustrated in Table 7.

Table 8 – Overview of status of electricity smart metering roll-out

Smart meters are already installed	Smart meters are being installed	Roll-out plan is decided	Roll-out plan is under discussion	There is no roll-out planned
Denmark (15%)	Iceland (15%)	Finland	Austria	Hungary
Italy (90%)	Denmark (35%)	Greece	Czech Republic	Luxembourg
Sweden (99%)	Italy (5%)	Italy	Denmark	
Finland (25%)	Netherlands (4%)	Spain	France	
			Germany	
			Great Britain	
			Ireland	
			Netherlands	
			Norway	
			Poland	
			Portugal	
			Slovak Republic	

Source: Status Review on Regulatory Aspects of Smart Metering (Electricity and Gas) as of May 2009, ERGEG

In *Austria*, despite the lack of a legal obligation for installing smart meters at customer premises, some grid operators have begun to roll-out smart meters on a voluntary project basis. At the moment, approximately 30,000 smart electricity meters are installed in Austria. A nationwide roll-out is under discussion. The Austrian Energy Regulator also supports the roll-out of gas smart meters.

In *Belgium* (Brussels and Flanders regions), there are pilot projects ongoing or in preparation. The results will be used to decide on a roll-out of smart meters.

In the *Czech Republic*, there are pilot projects and further analysis in progress which could work as the basis for a roll-out.

Also in *Denmark*, the decision on installing smart meters has been based solely on voluntary decisions by DSOs. In contrast to other countries, a rather high number of electricity meters have already been replaced by a smart meter device, and the DSO plans to equip another 35% of their customers with a smart electricity meter during the next years.

In *Estonia*, a large-scale smart meter roll-out is under discussion, while about 2% of all customers already have a smart meter device. A roll-out should begin in 2011 and end in 2013.

In *Finland*, smart electricity meters are being installed and 25% of all electricity meters have been replaced by a smart meter. By 2014, at least 80% of all customers and small production locations should have an hourly read smart meter device. There are certain exceptions to mandatory hourly metering, such as customers equipped with:

- a main fuse no more than 3 x 25 A; and
- a main fuse over 3 x 25 A, but with electricity consumption of no more than 5.000 kWh/y and electricity supplied by the delivery responsible supplier.

The roll-out will begin during 2009; for customers with main fuse over 3x63 A it will be finished by the end of 2010.

In *France*, CRE, the Energy regulator, is supporting advanced metering initiative by financing experiments, through the distribution tariff. ERDF - main French DSO - experimentation began in March 2010, in Lyon and near Tours, on 300,000 consumption sites. CRE will give its position on deployment of ERDF smart metering system in March 2011 at the end of the experimentation. Deployment is due to occur progressively by 2012-2017 to all 35 million meters. The estimated total cost amounts to 4 billion euros, or ca. € 120 per consumer.

In *Germany*, a compulsory full roll-out of smart meters is under discussion. Germany pursues a policy of competition in the metering market. By enabling the customer to choose from competitive offers for metering devices and services, smart solutions should be in place. The customer is then able to decide to install a smart meter which reflects actual energy consumption and provides information on actual time of use or has other functionalities. In Germany, there are at least 50 pilot projects with a span of 10 to 100,000 installed meters per project. Smart meters need to be installed by the metering operator in buildings that are newly connected to the grid and in those buildings that are subject to major reconstruction from the 1st January 2010. By the same date, smart meters are to be offered by the metering operator to every customer, but the customer can refuse this offer and request a regular meter.

In *Great Britain*, the rollout mandate and overall timeline have been agreed but the detailed plan for the roll out is still under discussion. Two financing schemes will be launched. The first will experiment with pay-as-you save schemes, using saving on energy bills to pay for the upfront costs for energy efficiency improvements. The second is a cash-back scheme to pay individuals and businesses if their use low-carbon energy sources to generate heat or electricity.

In *Greece*, a smart meter roll-out has been decided. All medium voltage (MV) customer meters have been replaced and since 2005 smart meters are also installed at new low voltage (LV) connections ≥ 85 kVA. Every new MV and LV (≥ 85 kVA) connection is supplied with a smart meter. A roll-out for all LV connections ≥ 85 kVA has also been decided. For the MVlevel, a general meter replacement was executed from 2002 to 2005, and the Automatic Meter Reading capability will be activated for these meters throughout 2007 to 2009. On the Lvlevel for connections ≥85 kVA, new connections are equipped with smart meters since 2005, and a full-scale replacement roll-out as well as the activation of Automatic Meter Reading capability is

planned for the years 2010-2013.

In *Hungary*, a study is currently being elaborated to prepare an introduction.

In *Ireland*, a pilot study on smart metering is being carried out and it is anticipated that smart metering may be rolled out in future - however this has not yet been decided upon.

In *Italy*, a nationwide roll-out plan regarding 95% of all meters installed is almost complete. More than 33 million of intelligent electricity meters are working, while the rest (more than 1.5 million) are going to be installed by the end of 2011.

In *Luxembourg* trial tests of smart meters are being carried out by some DSOs.

In *Norway*, the smart meter roll-out is expected be finalised by the end of 2014. The regulator will make the decision on the roll-out plan and minimum requirements for functions by the end of 2009.

The *Portuguese* regulator has conducted a preliminary study on the smart meter installation. The distribution grid operator is implementing a project called Inovgrid, which consists of a smart grid and smart meters that will empower consumers with more freedom of choice, more information and instruments to manage their electricity bill. By the end of 2010, it is expected that 30 000 low voltage customers should have the equipment installed.

In *Poland*, a smart meter roll-out which should begin in 2010 and should be ready in 2017 is under discussion. In *Spain*, the smart meter roll-out began in January 2008 and will be completed by the end of December 2018. The installation of smart meter depends on the kind of consumer. There are 5 types of metering points for consumers depending on the contracted power:

Type 1: $P \geq 10$ MW

Type 2: $10 \text{ MW} > P \geq 450$ kW

Type 3: $450 \text{ kW} > P > 50$ kW

Type 4: $50 \text{ kW} \geq P > 15$ kW

Type 5: $P \leq 15$ kW

Automatic Meter Reading is compulsory for Type 1 and 2, and optional, but very usual, for Type 3.

There is a timetable to replace the old meters by smart meters. According to it the Distribution Companies have to install the Automatic Meter Management system:

- Between the 1st of January 2008 and the 31st of January 2010, each Distribution company will have to replace 30 % of its meters (type 5).
- Between the 1st of January of 2011 and the 31st of January of 2012, each Distribution company will have to replace 20 % of its meters (type 5).
- Between the 1st of January of 2013 and the 31st of January of 2015, each Distribution company will have to replace 20 % of its meters (type 5).
- Between the 1st of January of 2016 and the 31st of January of 2018, each Distribution company will have to replace 30 % of its meters (type 5).

In *Sweden*, the implementation of smart meters is based on an obligatory provision to read the meter below 63 ampere every month from 1st July 2009. Approximately 90-95 % of these meters has the capacity of being read hourly. All meters above 63 ampere are all read hourly.

In other countries, like *the Slovak Republic*, discussions on a roll-out of smart meters are ongoing.

Outside the European Union, in *Ukraine*, in order to reduce losses of electricity above permitted levels and also to reduce consumption of energy, energy distribution companies are introducing smart metering systems on the border with the wholesale market and with some categories of consumers. The Energy Regulator takes into consideration the introduction of smart metering systems when reviewing investment programs of energy companies. In 2009 the Energy Regulator allocated for these purposes 15.4 million Hrivnas.

Russian Federation

The federal law envisions that generated, transmitted and consumed energy resources have to be metered obligatory using metering devices. By 1 January 2011, owners of buildings, constructions have to finish installation of such metering devices at their facilities; by 1 July 2010, organisations dealing with supply of water, natural gas, heat, electricity, and also with their transmission, have to install, replace and operate devices used for metering of energy resources, including also using smart metering technologies.

5.13 Demand Side Management Programmes

Africa and Middle East

Load Response programs are not very common in African and Middle Eastern Countries.

In **Egypt**, one load shedding agreement for 160 MW is in place between the TSO and a large fertiliser company. Moreover, the Egyptian regulatory authority is preparing a regulatory framework for interruptible contracts, including rules for load shifting, peak sharing, planning of regular and annual maintenance.

In **Saudi Arabia**, current electricity tariffs have no incentive to minimise energy use in all sectors and across customer classes, especially residential which accounts for over 53%.

A recent change in tariffs has been undertaken, by introducing time of day charges for the industrial sector.

Time of Day Tariffs have been successfully introduced for large consumers (industrial and commercial) over the past three years, on a voluntary basis. Recently, in May 2010, ECRA's Board of Directors approved Time-of-Day tariffs for industrial consumers, on a compulsory basis. This will replace the flat energy charge (0.12 SR/kWh) by three distinct rates depending on the time of energy consumption. It will be 0.26 SR/kWh (0.056 Euros) at peak times of the day (compared with 0.15 SR/kWh at shoulder and 0.10 SR/kWh at off peak times). This change is aimed to stimulate customers to reduce their energy consumption during the peak hours. Over time, it is planned to implement Time-of-Use tariffs for all other customer's classes.

North America

Canada

In Ontario, part of the Ontario Energy Board's mandate is to approve funding for Conservation and Demand Management (CDM) and Demand Side Management (DSM) programs for electricity and gas utilities. These programs may include demand response related programs such as the installation of a programmable thermostat. To help *Ontario* manage peak demand, the peaksaver program allows an electricity utility to install a device (thermostat or switch) enabling an air conditioning unit to receive a signal that will automatically cycle it down for short periods of time. This process is intended to come into effect during the day on the hottest days during the week (the weekend days are excluded unless extreme circumstances are observed).

With smart meters, as consumption is moved away from the more expensive (peak) times of the day, this can help Ontario reduce its peak demand, which can help limit the building and operation of peak generating facilities. As previously mentioned, the Ontario Energy Board's role is to provide the regulatory framework for smart metering in Ontario.

In *Alberta*, this is not part of the mandate of the commission. The British Columbia Utilities Commission regulates demand-side management through the enactment of government legislation, orders and policies, specifically:

1. Demand Side Management clauses in the Utilities Consumer Advocate
2. Ministerial Order No. 271 – Demand Side Measures Regulation (attached)
3. The British Columbia Energy Plan (attached)

These statutes and policies give the British Columbia Utilities Commission approval authority over utility funding requests and plans for Demand Side Management and conservation programs and require the utilities to file with the BCUC a long-term resource plan that includes plans for cost-effective demand-side measures.

Mexico

All the objectives, strategies, action lines and goals of the National Program for Sustainable Use of Energy 2009-2012 are focused on best practices and technologies for demand-side management.

United States of America

California

The investor owned utilities have well established demand response programs to reduce summer peak demand. Price responsive demand response programs for commercial and industrial customers provide pay-for-performance incentives for capacity or energy bid into demand response programs. Penalties may also be assessed on demand response participants who fail to curtail load when called upon to do so. In addition to the voluntary event-based load reduction programs, the California Public Utilities Commission is establishing default "critical peak pricing tariffs for all non-residential customers. Following deployment of

AMI, time of use and peak pricing tariffs may also apply to residential customers.

Minnesota

Minnesota encourages utilities to provide demand-side management options to their customers. For example, "saver-switch" is a program most utilities offer to their customer to reduce peak load during high demand periods.

At least three electric utilities in Minnesota offer energy "buyback" programs for their large customers. These utility-initiated programs are not mandated by the Commission but the tariffs and conditions are reviewed and approved by the Minnesota Public Utilities Commission. In addition, electric utilities offer demand control programs for residential and small business customers during periods of high demand, as determined by the utility. Electric utilities in Minnesota also offer real time pricing for large customers and in some cases for residential customers.

New York

Utilities have demand response programs that pay participating customers for curtailing energy usage on peak days. In addition, many energy efficiency programs have demand side management benefits. The NYPSC has established mandatory hourly pricing for the largest users in New York State. Over time, the minimum threshold for participation has been lowered.

Oregon

As with energy efficiency resource acquisitions, investor owned utilities (IOU) are required by Commission guidelines to include demand side management in Integrated Resource Planning and to acquire all cost-effective Demand Side resources.

Energy efficiency is merely one “class” of Demand side resources required as part of least cost acquisition of resources.

Investor Owned Utilities (electric and natural gas) have peak reduction programs in place to reduce critical peaks and to shave peak loads.

These include the Portland General Electric critical peak pricing pilot program (due to launch in October 2010), Idaho Power Irrigation Curtailment programs (irrigators are paid to curtail usage when notified) and Idaho Power Company’s air conditioning Cool Credit (A/C Cool Credit) program. A/C Cool Credit provides a $7 per month credit to customers who permit Idaho Power to cycle their air conditioners on summer afternoons. The IOUs also have critical peak generation programs in place to meet critical peaks. These include Portland General Electric’s Distributed Generation programs (where Industrial backup generators are paid to be available to be brought into use to meet load during critical peaks).

This program provides maintenance for hospitals and other critical institutions backup generators, which also helps insures those generators are available when needed. Northwest Natural Gas Company relies primarily on expanding efficient use of natural gas (e.g., high efficiency furnaces) to control peak demand.

Texas

The Public Utilities Commission of Texas promotes demand response in the competitive market by establishing rules that allow demand to participate in the Electric Reliability Council of Texas (ERCOT) wholesale market. Demand response resources are eligible to participate in capacity reserve markets as Loads Acting as a Resource and in an Emergency Interruptible Load

Service program. In addition, many industrial customers engage in demand-side management activities on their own, reducing consumption when prices are high, because it is cost effective to do so.

Vermont

Under Vermont law, before constructing transmission or distribution projects, the utility must demonstrate that the need giving rise to the proposed project cannot be met through a more cost effective manner, including through demand side management.

In addition, the Energy Efficiency Utility, the third part efficiency provider in Vermont, has recently been given authority to assist customers in participating in demand response programs. Individual utilities can also opt to work with demand response aggregators.

Washington

Since companies are required to acquire all cost effective conservation and least cost resources these types of programs or measures fall under either of the two criteria listed and the companies should be considerating the impacts (costs and benefits). An economic rate structures to reduce demand in the form of time of use rates was introduced by a utility a decade ago but was on found to be beneficial to customers. To date no specific proposals have been brought to the Commission.

Wisconsin

The Public Service Commission supports and enables demand-side management programs. All large investor-owned utilities have direct load control, interruptible tariffs and time-of-use rates.

South America

Brazil

The current regulations enable demand side management projects to qualify as energy efficiency projects required and regulated by ANEEL, but the final decision on how to invest the money is taken by the distribution companies.

Uruguay

URSEA has not been involved in activities related to demand-side-management. In recent years, UTE has developed communication campaigns about dual and triple time tariffs, triplicating the number of dual time customers.

Asia

China

Demand Side Management has traditionally been understood in China to mean load management rather than end-use energy efficiency (although that thinking is changing and policy- makers are beginning to recognise that DSM refers broadly to both). China has a long history of load management, though crudely executed through forced shut-downs of various

enterprises at various times, rather than through a system of incentive payments.

End-use energy efficiency, receives significant funding in China, mostly through direct government spending, which totals approximately 3.5 percent of electric system revenues (roughly half of which is direct government investment, and the remainder is funded through a variety of sources, including system benefits charges, utility surcharges, and loan programs).[44] A new approach to DSM, the Efficiency Power Plant (EPP), is currently being developed in five provinces.

An EPP is a bundle of energy efficiency programs designed to yield electricity savings in amounts, timing, and durations that very closely resemble – and are as predictable and substantial as – the output of a conventional power plant (CPP).

The EPP concept was developed partly to help convey the idea that energy efficiency is a resource comparable to supply-side resources, but also to simplify program design and implementation.

By packaging energy efficiency program into large blocks, greater or equal to 300 MW, planners and policymakers more readily see the advantages of incorporating EPPs in power sector planning and investment.[45]

The Chinese Government is evaluating four general approaches to the EPP.

The differences between them relate to the source of funding, the grid company role, and the degree to which they are integrated with other power sector reform policies. The first approach, or model, is the most comprehensive and powerful of the four. Under this model, grid companies have the obligation to meet customer needs using the least-cost mix of both conventional power plants and EPPs. Because EPPs are much less expensive than CPPs (roughly one-third the cost), this model results in substantially increased use of EPPs. Model 1 also requires regulatory reforms so that, in ratemaking, the costs of CPPs and EPPs are treated comparably.

As it currently stands in China, grid companies are permitted to recover the capital costs of conventional power resources through rates, but there is no such opportunity for cost-recovery for Efficiency Power Plants or demand-side management more generally.

Model 1 is also fully integrated with China's economic and environmental objectives for power sector reform, in that it provides for continuous investment opportunities in demand-side

[44] By way of comparison, the United States, as a whole, spends approximately two percent of electric revenues on efficiency. Lin Jiang, "Energy Conservation Investments: A comparison between China and the US," *Energy Policy*, Volume 35, Issue 2, February 2007, pp. 916-924; Levine, Mark, et al., "The Greening of the Middle Kingdom: The Story of Energy Efficiency in China," Lawrence Berkeley National Laboratory Report (LBNL-2413E), 2009; and the Energy Information Administration, http://www.eia.doe.gov/emeu/cabs/China/Background.html.

[45] The Regulatory Assistance Project, "Meeting China's Energy Efficiency Goals Means China Needs to Start Building Efficiency Power Plants (EPP)," November 2005, http://www.raponline.org/docs/ChinaEEGoalsForEEPowerPlantsEEP_2005_11.pdf; and Moskovitz, David, et al., "Meeting China's Energy Efficiency and Environmental Goals with Efficiency Power Plants (EPPs)," June 2007, http://www.juccce.com/documents/Technologies/Consumption/Energy%2520Efficiency/MeetingChina%27sEnergyEfficiencyGoals_Moscovitz.doc+moskovitz&cd=1&hl=en&ct=clnk&gl=us.

resources over the long term. Model 2 differs from Model 1 in two significant ways.

First, the grid company role is substantially reduced. It is limited to collecting the funds needed to repay the EPP financing, and the efficiency services are delivered by an entity independent of the utility. Secondly, EPP costs are included in electricity prices in a different way, as the model calls for a system benefit charge to be collected through a small uniform charge on all kilowatt-hour sales.

The third model differs from model 2 solely in terms of funding. Under this approach, repayment of EPP financing comes directly from the government, through either existing revenue sources or new taxes designed to encourage energy efficiency.[46]

Model 4 combines the EPP's aggregation approach with traditional loan or ESCO approaches, in which consumers who choose to invest in energy efficiency pay for the investment over time.

The grid company can act as the collection agent, which thus allows for on-bill loan repayment. This approach is currently followed in Guangdong Province.[47]

Currently there are no grid company-sponsored energy efficiency programs, and this leaves open a substantial gap.

Australia

The energy market rules provide for various routes through which individual or aggregations of customers participate in the energy market. This covers retail contracts which provide exposure to wholesale market price variations, direct registration and participation in the wholesale market, and in response to tenders for short-term services issued by the system operator.

In addition, the framework for economic regulation of networks provides incentives for cost efficiency, including in instances where the most efficient action is to contract with a customer for the provision of services to curtail load at specified times – rather than to build additional network infrastructure.

These types of activity are premised on the basis of consumers revealing the value of their consumption, and willingly agreeing to curtail consumption (at some inconvenience) in return for appropriate remuneration.

Europe and the Russian Federation

The most widespread Demand Response measures in Europe include services of load interruptibility (e.g. France, Ireland, Italy) and time-of-use (TOU) tariffs (e.g. Italy, Portugal). Smart Meter roll-out policies in many countries are aimed at providing suppliers with the possibility of developing new tariff models which better reflect consumption behaviour, and which provide information on the relevant system consumption peak.

[46] For example, pollution taxes. China has a system of "pollution levies" relating to SO_2 emissions. The revenues yielded by such taxes could be used to fund energy efficiency investments.

[47] Moskovitz, David, et al., "Meeting China's Energy Efficiency and Environmental Goals with Efficiency Power Plants (EPPs)," op. cit.

France

Big consumers who contract for interruptible supply can be disconnected when the system becomes overloaded. Since 2008, the French balancing market has also been experiencing a new kind of demand response: aggregators may combine small reductions of consumption at sites connected to the public distribution and transmission grids.

Furthermore, when smart meters are deployed, energy efficiency - oriented DSM measures will be applicable.

Ireland

The Powersave scheme is a voluntary demand side management initiative operated by EirGrid on behalf of the Commission for Energy regulation (CER).

The scheme is designed to incentivise registered Powersave customers to reduce their electricity consumption or increase exports during periods where total system demand is close to available supply.

The rationale behind the provision of the Powersave scheme is to encourage medium and large scale customers, with on-line quarter-hour interval meters, to reduce their electricity consumption or increase exports of electricity during periods of peak demand.

All licensed electricity suppliers are permitted to offer the Powersave scheme to their respective customers. Customers wishing to participate in the scheme must have the capability to reduce consumption by a minimum of 100kW or alternatively increase electricity exports during periods of limited supply. In return, a 'Registered Powersave Customer' who responds to a Powersave request, will be compensated via a payment mechanism that is based on the kWh reductions achieved during the 'Powersave Event'.

Similar to Powersave, the WPDRS is a voluntary DSM scheme operated by EirGrid on behalf of the Commission. The WPDRS encourages medium and large electricity consumers with online quarter hour meters to reduce their peak winter consumption and demand. The scheme operates on business days between 17:00 -19:00 from November to March. Customers are required to reduce metered consumption and have a maximum import capacity greater than or equal to 250 kVA. Participants are rewarded for demand reductions via payments based on pre-approved reduction rates, which are published by the CER.

Portugal and *Spain*

Demand-side bidding is operational in the Iberian electricity pool.

The system operator has in place an interruptible regime by which large consumers with a capability to reduce demand are offered an interruptible tariff, which results in a discount to the consumer and helps to alleviate demand at peak times.

Additionally, ERSE (the Portuguese Energy Regulator) sets time-based tariffs in order to incorporate into prices the costs of producing energy in different time periods, hence encouraging timely efficiency consumption patterns in end-users.

Russian Federation

The decree of the Government of the Russian Federation approved the "Rules for elaboration and approval of schemes and programs of prospective development of the electricity sector",

which, among things, envision introduction of demand management programs, which include economic methods of demand management, such as:

- Increase of prices for energy and capacity during high demand periods or in case of deficit of generating capacities (fall – winter period, peak load hours);
- Increase of the connection fee in high demand nods;
- Discounts for consumers that decrease their load at set periods (seasonal nature, peak hours);
- Promotion of energy saving policies of energy consumers by means of reducing taxes and granting various benefits will allow improving energy efficiency and changing conditions for tariff setting.

5.14 Other measures

North America

United States of America

California

California's Greenhouse Gas policies and reduction strategies call upon gas and electric energy efficiency to provide about 15 percent of the total GHG emissions reductions that California targets to achieve by 2020.

Maine

The federal government supports energy efficiency efforts through a variety of grant programs. Recipients of grants include state and municipal governments, private corporations, non-profit organisations, and other entities. These grants are especially significant in 2009 and 2010, as the American Recovery and Reinvestment Act has channelled unprecedented amounts of federal money into such efforts.

Massachusetts

The Program Administrators (PA) jointly develop their energy efficiency programs and submit them to the Energy Efficiency Advisory Council ("EEAC") for review and approval. The EEAC comprises multiple interests; from state government to non-profit environmental groups to industry groups. Before the PA's energy efficiency plans are submitted to the DPU, the plans must be approved by the EEAC.

Minnesota

Federal incentives.

New York

New York State has an extensive program for weatherisation of low income housing.

Oregon

Many US Corporations in the energy industry (oil, gasoline, natural gas) and utility companies

are working to generate a green image, given the popularity of an environmental ethic with a substantial portion of consumers. This leads to significant advertising dollars and air time dedicated to commercials urging consumers to use energy efficiently or lauding industry achievements in discovering ways to save customers money by developing or deploying energy efficient technologies or energy efficiency programs. Portland General Electric (PGE) and PacifiCorp-Oregon (PP) retain close to $1 million/year for advertising, outreach and marketing of Energy Trust of Oregon energy efficiency programs to utility customers. These efforts are part of PGE and PP's efforts to deliver on the aggressive energy efficiency targets in their Integrated Resource Plan (IRP) Action Plans.

Texas

The Texas Department of housing and Community Affairs offers a weatherization assistance program to help low-income customers control their energy costs through the installation of weatherization materials and consumer education. The Texas State Energy Conservation Office offers information and technical assistance to electric consumers as well as loans for energy efficiency projects to schools, universities, local governments and state agencies.

Washington

Utilities have a special tariff that allows them to collect funds from ratepayers to support utility conservation programs as expenses are incurred, thus avoiding carrying costs.

Australia

Solar Cities is a $94 million Federal Government initiative designed to trial new sustainable models for electricity supply and use.

It is being implemented in seven separate electricity grid-connected areas around Australia. Each Solar City will trial a unique range of energy options, such as energy efficiency measures for homes and businesses, pricing trials to reward those people who use energy wisely, the use of solar technologies and community education about energy use. The Cities are managed and partly funded by consortia comprising industry, business and governments in partnership. The Solar Cities program was announced in 2004 and will continue until mid 2013.

Europe and the Russian Federation

Austria

The most innovative and popular measure in Austria is the long-term programme for active climate protection (klima:aktiv), which was launched in 2004. The programme was established in order to support the achievement of the Climate Change Strategy's goals. It is overseen by the Ministry of the Environment, and managed by the Austrian Energy Agency. The aim of the programme is to support energy efficiency and increased use of renewables in all sectors of the economy, through direct grant support and accompanying measures, such as information and advice. The overall goal is to reduce greenhouse gas emissions.

The klima:aktiv thematic sub-programmes develop technological and organisational solutions able to compete in the market, address innovative quality standards and promote training of all relevant groups. The implementation of the klima:aktiv programmes must be accomplished within set time limits and results in concrete, measurable targets.

The government provides over 7 million €/year. In addition, relevant branches of the economy are invited to make contributions. The partners allow for easier access to the target groups. Thus, actions are capable of making powerful impacts leading to market transformation and energy savings.

Other important initiatives entail the Austrian Energy Regulator's role in support of energy efficiency for low-income households and public schools.

In 2009, E-Control and Caritas Austria cooperated on a joint pilot-project for the reduction of energy poverty in Austria. Within this project, on-site inspections were conducted in 58 low-income households, who were provided with advice on how to save energy (with little or no investments) and the related costs. The project also included the provision of energy-saving lightbulbs and efficient fridges.

In addition to the objective of supporting low-income households with advice on how to save energy and money, the project focused on the following activities:

- a survey concerning the energy demand structure and building standards of low-income households;
- evaluation of the energy saving potential;
- evaluation to determine if energy consulting in low-income households is feasible (acceptance of the households, costs and financing);
- creating a well-grounded base for future projects to reduce "energy poverty".

The study showed that many of these households have an energy saving potential of up to 25% without incurring any additional costs. However, more cost-intensive energy efficiency measures (e.g. renovation of the buildings) cannot be implemented by these households.

Therefore E-Control has developed a list of measures that should be implemented to help low-income households escape from energy poverty. This list is addressed to politicians, public and private property managers, and the energy industry and includes the following elements:

- renovation of social housing buildings;
- programmes that incentivise the installation of new heating equipment;
- financing programmes that enable households to implement energy efficiency measures;
- installation of prepayment meters free of charge;
- installation of smart meters and making use of the possibilities they offer;
- simplification of formal processes and making them more transparent;
- development of practical early-warning systems in the event of payment difficulties;
- issue of more understandable bills;
- better communication with organisations that help low-income households avoiding or escaping energy poverty;
- to be lenient with additional fees, meter instalment charges etc.

Another project begun in 2009 is aimed at helping households of the SOS-Kinderdorf to reduce both their energy consumption and their energy bills.

E-Control, the Bundesgremium des Radio- und Elektrohandels, the Forum Hausgeräte and the Austrian Economic Chamber of Trade, Commerce and Industry cooperated in this project. Electric energy was monitored in selected SOS-Kinderdorf households through energy monitoring systems (EVM) provided by E-control. At the beginning of 2010, old household appliances (fridge, freezer, washing machine, lightening, TV) were exchanged for new sponsored efficient appliances. The energy saving was measured through the EVM. Households had savings of up to 26 %, representing savings of about 400 € per year. A follow-up project involving energy efficiency consulting is planned.

Another project, a cooperation between E-Control and the Environmental Education Forum, is aimed at providing knowledge about energy and energy efficiency to young people, their teachers and their parents. For this project, a web portal has been created that offers interactive applications and didactic material free of charge (www.e-control.at/schule).

The main topics included are:

- Basic knowledge about electricity and its generation;
- Overview of the market players;
- Understanding the meaning of energy efficiency;
- The possibility to act in an energy efficient way in everyday life;
- Creating awareness about the relevance of energy efficiency;
- Realising the importance of energy in everyday life.

This school project is available for all Austrian schools and is aimed at pupils aged 10 to 16 years.

Lithuania

The Ministry of Education and Science has implemented the “Education Improvement Project C Component” (Component C) project, which is financed by the World Bank (WB).

The purpose of Component C was to improve the use of the funds allocated to education by reducing the energy consumption in the schools participating in the Project.

Savings were used for the improvement of the quality of and access to education. Put simply, the aim of the long-term implementation of Component C is to use the funds saved in 62 renovated schools for improving education quality.

Netherlands

The "More With Less" programme is a joint initiative from the Dutch government, energy retailers, social housing providers, construction and installation companies. It aims to make 500,000 buildings 30% more energy efficient in the period 2008 - 2011, increasing to 2.4 million buildings by the year 2020.

The programme is supported by home owners and consumer representative organisations and aims at specific target groups: home owners, tenants, housing companies and building owners, ensuring that all market parties involved participate and send out the same message.

"More With Less" attempts to tackle the obstacles to energy conservation within each target group. The energy efficiency measures and programme benefits are provided at periods within

the regular renovation cycle, which is in the case of removal and renovation, when people are already inclined to invest. The programme focuses on enabling building owners to conserve energy with the least possible effort.

The entire process, from receiving certified energy advice up to the installation of the required energy efficiency measures, is overseen by the contact person of the building owner. The contact person can be the contractor, the energy counselor, the installer, or the architect; it is s/he who is the one-stop contact point. This person can, if needed, arrange for various aspects of the programme: subsidies, energy labels, offers, finance, etc.

To overcome financial barriers the programme ensures fixed monthly expenses. In other words, the increase in monthly expenses for energy efficiency investments will be at least set-off by the monthly gains in terms of reductions in the energy bill. This is accompanied with education provided in cooperation with consumer organisations, and feedback on energy use every two weeks.

Norway

Enova is a public enterprise owned by the Royal Norwegian Ministry of Petroleum and Energy which was created in 2001 with the mission to contribute to environmentally sound and rational use and production of energy. It relies on financial instruments (like investment support) and incentives to stimulate market actors to achieve national energy policy goals.

Enova administers the Energy Fund (Energifondet), funded by a mandatory levy of 1 øre/kWh (0.008 Euro/kWh) on the distribution tariffs and byan allocation from the State budget. In order to further strengthen the Norwegian approach, the government established a new fund called “Statutory fund of energy conservation and renewable energy” in 2007, funded through the State budget. Enova chooses the measures and administers the fund to achieve the national goals in the most effective manner. The energy fund is used to support related measures such as purchasing services, the payment of grants and other financing measures in the field of consumption, and environmentally friendly heat, wind and natural gas generation sources. The fund supports projects in industry, the tertiary sector, the residential sector, as well as the production of new, renewable energy generation facilities.

The establishment of Enova signals a shift in Norway's organisation and implementation of its energy efficiency and renewable energy policy. By gathering strategic policy responsibilities in a small, flexible and market-oriented organisation, Norway seeks to create a pro-active agency that has the capacity to stimulate energy efficiency by motivating cost-effective and environmentally sound investment decisions. Enova enjoys considerable freedom with respect to the choice and composition of its strategic focus and policy measures.

Enova’s objectives, adopted by the Norwegian Parliament in the spring of 2000, are:

- to limit energy use considerably more than business as usual;
- to increase annual use of water-based central heating based on new renewable energy sources, heat pumps and waste heat of 4 TWh by the year 2010;
- to install wind power capacity of 3 TWh by the year 2010;
- to increase environmentally friendly land-based use of natural gas.

Therefore Enova focuses its efforts on both the energy supply and the energy demand side. The development and adoption of reliable methodologies for performance measurement and

verification of results are among its highest priorities.

Concerning the support programs for energy efficiency and savings in new buildings Enova provides investment support equal to 0.2 – 0.5 NOK/kWh, limited to 10% of the investment costs.

Enova also gives financial support to industry. The precondition for financial support to industry is a commitment to reduce energy consumption by 10% within 4 years. The industry must also put in place an energy management plan.

Enova is working to boost the competitiveness of Norwegian industry through environmentally friendly and efficient energy use. In the course of 2005 Enova extended its main programme oriented towards Norwegian on-shore industry. Through the programme “Reduced energy use – industry”, all companies that have projects with total potential energy results of more than 0.5 GWh can apply for investment support.

Qualifying projects include energy-efficient solutions or processes, measures for energy recovery or use of waste heat and conversion to renewable energy sources. The maximum grant level is 20 % of approved project costs.

The companies have to report energy consumption and production figures to Enova for at least five years after the project is finished.

As a part of the program, Enova gathers energy consumption and production figures in a database. The companies have to report once a year on a web-based reporting scheme. Enova calculates specific energy consumption for different industry sectors and presents the anonymous data on the website. These benchmarking figures may be used to compare the company with other similar companies or with their own historical figures.

Moreover, pulp and paper companies are offered the possibility to participate in a five-year programme, which requires that certain energy efficiency obligations are fulfilled, and provides for penalties in case the obligations are not met. These commitments are considered an alternative to the behaviour modification effect of the electricity tax, and the companies are therefore granted a full exemption from the electricity tax on electricity used in the industrial production process during the programme period.

The objective of the tax exemption is to achieve a more efficient use of energy. The motivation for the programme is to achieve the same goal in companies characterised by high energy consumption, where the potential for savings is therefore significant.

Concerning residential customers, in the autumn 2006 the parliament introduced a new grant scheme**,** with the objective of reducing electricity consumption in households. This programme is still running. The target group of the grant scheme is private households. They can apply for grants for investments in heat pumps (not air-to-air heat pumps), pellet-fueled boilers, fireplaces using pellets and electric heating control devices. The grant is restricted to 20 % of the investment costs or a maximum grant of 4,000 NOK (approximate 500 €) for boilers or fireplaces using pellets or for heating control devices and a maximum of 10,000 NOK (approximate 1250 €) for heat pumps (not air-to-air heat pumps). A similar grant scheme was in use in the spring 2003.

The country also introduced grants for energy savings in homes, buildings and outdoor equipment areas. In order to achieve better communication with the market actors in the homes, buildings and outdoor equipment sectors, Enova changed the programme structure from

several sub-programmes to a single overall programme in 2005. The objective was to make it simpler for the actors, by having everyone wishing to participate having to deal only with a single programme. The target group for the programme is the investment decision makers for projects with energy targets. Advisers, architects, contractors, manufacturers and suppliers of goods serve as driving forces for the development and implementation of these projects.

Qualifying projects are those that can be supported by investments leading to a minimum of 10 % energy saving in buildings, portfolios of buildings, outdoor equipment, such as street lighting, railways, sports grounds, water works, sewage treatment plants and waste management facilities. Grants are also given to prototype projects covering the extra cost of the project to achieve the energy goal. These projects could include rehabilitation or new buildings for both residential and non-residential buildings. The energy goal has to be at least 50 % below the normal standard.

Enova has proven a very cost-effective manager of the energy fund.

6 The role of National Regulatory Authorities in the promotion of end-use energy efficiency

This chapter is organised as a series of tables summarising the specific competences of National Regulatory Authorities relating to energy efficiency and highlighting when competences are assigned to or shared with other institutions.

Tables are broken down by geographical area.

Table 9 – AFRICA AND MIDDLE EAST

COUNTRY	REGIONAL ASSOCIATION	NATIONAL ENERGY REGULATOR ROLE
Algeria	MEDREG	The Regulatory Commission for Electricity and Gas (CREG) has no direct responsibilities in the field of energy efficiency which is instead promoted by the Government Agency for Energy Conservation (APRUE). Although CREG has not responsibility on this area, it agrees with any action to support the reduction of energy consumption and promote a regulatory framework compatible with energy efficiency measures.
Egypt	MEDREG	Egyptera (the national regulatory authority) has some responsibilities in the field of energy efficiency, considering that no other national energy efficiency agency exist in the country. The energy regulator promotes energy efficiency projects and delivers an evaluation report about the energy efficiency measures which are beneficial for consumers.
Israel	MEDREG	No information on the NRA (PUA-E) role in energy efficiency.
Jordan	MEDREG ERRA (affiliated)	The Electricity Regulatory Commission (ERC) has responsibilities on the field of energy efficiency. ERC promotes the reduction in energy consumption through the tariff system, the reform of codes and licenses to encourage utilities to implement energy efficiency measures, the enforcement of building codes and labelling prescriptions. ERC cooperates with other parties (e.g. Ministries) to implement energy efficiency programmes.
Morocco	MEDREG	Ministry of Energy and Mining.
Saudi Arabia	ERRA (affiliated)	The role of ECRA (the Energy Regulator) includes the investigation and promotion of energy efficiency measures, in coordination with the Ministry of Water and Electricity.
South Africa	AFUR	NERSA, the Energy Regulator, shares competences with the Department of Energy and ESKOM (the most important electricity public utility).

Togo	AFUR	The Autorité de Réglementation du Secteur de l'Electricité (ARSE) has no competencies in the field of energy efficiency.
Tunisia	MEDREG	No formal competencies. A specific agency, the National Agency for Energy Conservation (ANME), has responsibilities in this field of energy efficiency.

Table 10 – NORTH AMERICA

COUNTRY	REGIONAL ASSOCIATION	NATIONAL ENERGY REGULATOR ROLE
Canada	CAMPUT	The Ontario Energy Board is tasked with the mandate of protecting customer interests with respect to rates, cost effectiveness, reliability and quality of service in the gas and electricity sector. The Ontario Energy Board licenses and regulates Ontario's natural gas and electricity utilities. This includes participants like the Independent Electricity System Operator, the Ontario Power Authority, generators, transmitters, distributors, wholesalers, retailers and all marketers who sell natural gas to residential and small commercial consumers. As a result, the Ontario Energy Board sets transmission and distribution rates, and approves expansionary activities of the regulated entities. For example, the Ontario Energy Board ensures that the construction of a natural gas pipeline is in the public interest by considering need, safety, economic feasibility, community benefits, security of supply and environmental impacts. To this end, the Ontario Energy Board is heavily invested in energy efficiency and hence it facilitates opportunities for conservation and demand side management of electricity and gas. The Ontario Energy Board's policies are in line with the policies of the Ontario government (i.e. the Green Energy Act).The Ontario Energy Board is committed to integrating the objectives in the Green Energy Act with the Board's traditional mandate around economic efficiency, cost effectiveness, consumer protection, and promotion of public confidence in the sector. The Ontario Energy Board has three new objectives: 1) The promotion of renewable energy, including the timely connection of renewable energy projects to transmission and distribution systems; 2) The promotion of conservation and demand management; and, 3) The facilitation of the implementation of a smart grid. The Ontario Energy Board has a number of initiatives underway to facilitate the creation of the clean, green energy supply in Ontario. The Alberta Utilities Commission regulates investor-owned natural gas, electric, and water utilities and certain municipally owned electric utilities to ensure that customers receive safe and reliable service at just and reasonable rates. Staff also responds to customer inquiries and complaints respecting utility matters. In addition, the AUC ensures that electric facilities are built,

		operated, and decommissioned in an efficient and environmentally responsible way. The AUC also provides regulatory oversight of issues related to the development and operation of the wholesale electricity market in Alberta as well as the retail gas and electricity markets in the province. Pursuant to the Public Utilities Act, the Nova Scotia Utility and Review Board exercises general supervision over all electric utilities operating as public utilities within the Province. This jurisdiction includes setting rates, tolls and charges; regulations for provision of service; approval of capital expenditures in excess of $25,000 and any other matter the Nova Scotia Utility and Review Board feels is necessary to properly exercise its mandate.
Mexico	ARIAE	The National Commission of Energy Efficiency (CONUEE) is an independent administrative agency of the Ministry of Energy (Secretaria de Energia), 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's responsibilities include: 1) Standardisation and other regulatory practices: o Implement the registration of users who have obtained the certificate of a person or institution responsible for energy; o Binding opinions to the agencies of the Federal Public Administration, in relation to best practices for sustainable use of energy; o Recommendations to states, municipalities and individuals; in relation to best practices for sustainable use of energy; o 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, publication of the certification program within one year. o 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. 2) Public Policies for Sustainable Use of Energy: o Facilitate the optimal use of energy; o 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. o 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.
United States	NARUC	
California		The California Public Utilities Commission (CPUC) has broad authority under the California Constitution to regulate the rates and services of California's electric and natural gas investor-owned utilities to protect the public interest. Taking into account statutory mandates and California's energy and environmental policies, the CPUC has adopted aggressive energy efficiency and demand goals for the investor owned utilities (IOU) to maximize reliance on cost-effective demand side savings before investing in new renewable or fossil generation. To meet these goals, the CPUC authorizes specific program budgets and program plans through periodic budget applications and rulemaking proceedings. For 2010, the CPUC regulated IOUs are directed to spend approximately $1 billion on ratepayer funded Energy Efficiency programs, and about $370 million for demand response (DR) programs. The DR program budget does not include the authorized capital investment of $5.6 Billion in AMI meters for Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas and Electric Company.

Maine		Currently, Maine's efficiency programs are planned and administered by Efficiency Maine, which is within the MPUC. As of July 1, 2010, the responsible entity will be the Efficiency Maine Trust, which is not within the MPUC but which the MPUC has certain statutory roles with respect to, including approval of efficiency program plans.
Massachusetts		The DPU reviews: program budgets; program cost-effectiveness; program funding, including the ability of PAs to include a reconciling factor on customer's electric and gas bills; the performance incentives that PAs are eligible to earn for their energy efficiency efforts; the evaluation studies PAs rely on to determine program savings.
Minnesota		We regulate the rates of investor owned utilities and implement energy policy for all investor owned and other public utilities. The Minnesota Public Utilities Commission oversees financial aspects of energy efficiency, such as financial incentives for energy efficiency achievements, tracker account monitoring and approval of rider levels and carrying charges for utility recovery of costs related to energy efficiency. The Minnesota Office of Energy Security oversees all energy efficiency program development, approval and evaluation. The Minnesota Department of Commerce--Minnesota Office of Energy Security (specifically, the State Energy Office and the Office of Energy Planning and Advocacy, within the MN Office of Energy Security) has competency and responsibility for energy efficiency.
New York		The NYPSC has responsibility for setting rates for utilities, establishing metering requirements, and overseeing the energy efficiency efforts of utilities and NYSERDA. In addition, it sets the requirements for billing formats, has responsibility for revenue decoupling, and oversees the utilties' outreach efforts.
Oregon		The Public Utility Commission has been responsible for oversight of the third party energy efficiency supplier (since its inception in 2001) and responsible for ensuring that public purpose charge funds are cost-effectively spent. The Commission is now also responsible for oversight of the interface between the energy efficiency supplier and the Investor Owned Utilities (since the advent of utility tariff-based funding for energy efficiency acquisition in early 2008). Three state agencies collaborate in oversight of third party entities providing energy efficiency services. These entities have historically had a wealth of energy efficiency expertise to share. Each agency can (and does) educate the others in its area of specialisation. The Oregon Department of Energy provides technical assistance and certification of energy efficiency investments in the public sector, including consumer, municipal and public utilities. The Oregon Department of Housing and Community Services provides training, funding and coordination for the Community Action Agencies of Oregon (multi-county

		providers of community services). The Public Utility Commission of Oregon provides oversight for energy efficiency delivery by the Energy Trust of Oregon and for utility programs carried out by Idaho Power Company and Avista Natural Gas. Finally, the Public Utility Commission of Oregon provides standards for energy efficiency planning in Investor Owned Utility Integrated Resource (least cost, least risk) Plans (electric and natural gas) and oversight of actual acquisitions and funding against planned resource acquisitions.
Texas		The PUC sets the guidelines for energy efficiency programs and oversees the utilities' administration of the programs[48].
Vermont		The Vermont Public Service Board (PSB) oversees the EEU, sets policies and contracts. The PSB has several staff that are familiar with energy efficiency policy, and to some degree, technical aspects of efficiency measures. In addition, a separate state agency is responsible for evaluating the performance of the EEU and typically has more technical competence regarding efficiency measures.
Washington		The mission of the agency is to provide rates to utilities that are fair, just, reasonable, and sufficient. Utilities must acquire lowest reasonable cost resources and therefore must justify prudence of acquisition prior to receiving rate recovery. This standard of lowest reasonable cost is superseded by a statute requiring utilities to purchase a certain percentage of renewable energy regardless of whether it is the lowest reasonable cost resource.
Wisconsin		The Public Service Commission of Wisconsin has oversight responsibility for the statewide energy efficiency and renewable resource program in the state which is called "Focus on Energy." The Commission is responsible for setting program goals and budgets; contracting for evaluation of the program; approving the contract between the utilities (SEERA) and the Program Administrator; and approving the selection of the Program Administrator.

[48] http://www.puc.state.tx.us/rules/subrules/electric/index.cfm

Table 11 – SOUTH AMERICA

COUNTRY	REGIONAL ASSOCIATION	NATIONAL ENERGY REGULATOR ROLE
Brazil	ARIAE	ANP –was created by the Federal Law 9.478/1997, known as Oil Act. One of its responsibilities is to guarantee the best practices in natural resources conservation and the rational use of the oil, natural gas and oil products, as well as to guarantee the environmental protection. ANEEL - was created by the Federal Law 9.427/1996. One of its competencies is to fight against energy losses in all the electrical sector segments: generation, transmission and distribution. ANP and ANEEL are both bound to the Energy and Mines Ministry. ANP has no formal competencies or responsibilities in energy efficiency, the institution only offers technical support when is consulted about the issue, frequently for Energy and Mines Ministry. ANEEL has a specific energy efficiency department that is in charge of the programs assessment and approval. The main competencies are developed by the Energy and Mines Ministry, but the Federal Energy Efficiency Programs are implemented by Petrobras and Eletrobras, as mentioned above. EPE – Empresa de Pesquisa Energética – is also bound to the Energy and Mines Ministry, and is in charge of the Brazilian energy planning, including the energy efficiency issues and goals. INMETRO – Instituto Nacional de Metrologia – is the Metrical Brazilian Institute, and is in charge of labelling programs coordination
Uruguay	Ursea	According to Law 18597, URSEA controls whether equipments fulfill all labeling requirements, and, if necessary, has the power to set penalties.

Table 12 – ASIA

COUNTRY	REGIONAL ASSOCIATION	NRA ROLE
China (People's Republic of)	NA	The State Electricity Regulatory Commission (SERC) does not have any policy-setting responsibilities in terms of energy efficiency, but plays an important role in terms of stipulation and enforcement of safety and technical standards, enforcing environmental legislation and standards for the energy sector. SERC proposes tariffs and adjustments to the government pricing authority on the basis of market conditions, which may cover energy efficiency considerations.
India	SAFIR	CERC has a limited role in fostering energy efficiency policy as this is mainly the remit of the Government and the Bureau of Energy Efficiency (BEE) at federal level as well as state governments. However, CERC regulates the tariff of generating companies owned or controlled by the Central Government as well as tariffs for tariff for inter-State transmission of electricity. For example, Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant base line should take into account the benefits obtained from the Clean Development Mechanism (CDM) into consideration, in a manner so as to provide adequate incentive to the project developers.
Japan	NA	Energy matters are the responsibility of the Agency for Natural Resources and Energy (ANRE), which is part of the Ministry of Economy, Trade and Industry. ANRE leads efforts to promote energy efficiency in cooperation with the Ministry of Land, Infrastructure and Transport (MLIT)

Table 13 – AUSTRALIA

COUNTRY	REGIONAL ASSOCIATION	NATIONAL ENERGY REGULATOR ROLE
Australia	AEMC	The Australian Energy Market Commission (AEMC) has a limited role in energy efficiency policy settings, as these remain the responsibility of jurisdictional and Federal governments. The role of the AEMC is established in Law, and is linked to the promotion of a National Electricity Objective (NEO) which focuses on economic efficiency in the use of, and investment in, electricity services. The AEMC's responsibilities encompass the making of Rules governing the National Electricity Market and aspects of the gas market, and development of the Australian energy market.

Table 14 – EUROPE AND THE RUSSIAN FEDERATION

COUNTRY	REGIONAL ASSOCIATION	NATIONAL ENERGY REGULATOR ROLE
Austria	CEER	E-Control, The National Regulatory Authority, has prepared a Green Book on energy efficiency. It has also competences as for metering systems (smart meters) and information on billing. Otherwise, competencies rest primarily with other public bodies.
Armenia(A)	ERRA	The Public Services Regulatory Commission of Armenia does not have powers and duties in energy efficiency questions. In Armenia policies aiming to reduce specific consumption of energy resources (energy conservation) are lead by the Ministry of Energy and Natural Resources.
Belgium	CEER	CREG, the National Regulatory Authority, is involved in the development of advanced metering. The following public sector organisations also have a role in energy efficiency: Federal Public Service Economy, Flemish Energy Agency, Brussels Institute for Environment Management and Ministry of Energy for Walloon.
Bulgaria	CEER ERRA	No information on the NRA (SEWRC) role in energy efficiency. Main role rests with the Energy Efficiency Agency, a governmental institution (Ministry of the Economy and Energy).
Czech Republic	CEER	ERU, the National Regulatory Authority, is not directly responsible for efficiency parameters; this is much more in competence of the Ministry of Industry and Trade or the Ministry of Environment of the Czech Republic.
Cyprus	CEER MEDREG	No information on the NRA (CERA) role in energy efficiency. The Ministry of Commerce, Industry and Tourism is responsible for the adoption and implementation of energy efficiency measures. In 2000 the Cyprus Institute for Energy was founded to assist the government in the promotion and implementation of both RES and energy efficiency measures.
Croatia(A)	ERRA MEDREG	HERA, the Energy Regulator, doesn't play any special role. Competencies rest primarily with the Ministry of Economy, Labour and Entrepreneurship, the Ministry of Environmental Protection, Physical Planning and Construction and the Environmental protection and energy efficiency Fund.
Denmark	CEER	DERA, the National Regulatory Authority, does not play any special role. The Danish Energy Agency (a governmental agency) has to advise the Minister for Climate and Energy, to assist other authorities and to conduct analyses and assessments of developments in the energy sector.
Estonia	CEER	No role for the National Regulatory Authority. It rests with

	ERRA	Ministry of Economic Affairs & Communication.
Finland	CEER	No role for EMV, the National Authority Regulator. It rests with Ministry of Employment and the Economy and Motiva Ltd (state owned company).
France	CEER MEDREG	CRE, the National Regulatory Authority, is involved in the development of advanced metering. Role rests primarily with the Ministry of Finance, the Ministry of Energy, Climate & Environment, the Energy and Environment Management agency (ADEME), the Standardisation Agency, State owned banking institution (Caisse des dépôts et consignations) and local authorities.
Germany	CEER	No role for Bundesnetzagentur (BNetzA), the National Regulatory Authority. Role rests with the Federal Ministry of Economy.
Greece	CEER	No role for RAE, the National Regulatory Authority. It rests with the Ministry for Development.
Hungary	CEER ERRA	HEO, the Hungarian Energy Office (National Regulatory Authority), participates as expert in the committees evaluating energy saving tenders. Role rests primarily with the Ministry of Transport, Telecommunication & Energy. Technical implementation is carried out by the Energy Centre (a not-for-profit public institution) and the Ministry of National Development and Economy is in charge of Environmental and Energy Operative Programmes.
Ireland	CEER	CER, the National Regulatory Authority, approves regulated tariffs and industry schemes. Role rests with central government and local administrations.
Italy	CEER MEDREG	Primary responsibility rests with central government. AEEG, the Energy Regulator, is responsible for the definition, implementation, administration, monitoring and enforcement of the white certificate scheme. Besides AEEG integrates promotion of energy efficiency in regulatory measures.
Latvia	CEER ERRA	No role for PUC, the Energy Regulator. The Ministry of Economics is in charge for implementing energy efficiency measures.
Lithuania	CEER ERRA	No information on the NRA (NCC) role in energy efficiency. The key institutions are the Ministry of Economy, the Ministry of Environment and the municipalities. The State Enterprise Energy Agency has a number of competences as well.
Luxembourg	CEER	All policy issues concerning energy efficiency are within the competence of the Ministry of Economics & Foreign Trade and the Ministry of Environment. In the transmission and distribution tariff calculation method, the regulator (ILR) explicity states that energy efficiency and demand side management measures may be incorporated in the tariff structure to submit by TSO/DSOs for approval.

Macedonia[(A)]	ERRA	In accordance with Energy Law, ERC (the Energy Regulator) has not responsibilities regarding energy efficiency. In accordance with Energy Law, the Government of the Republic of Macedonia - Ministry of economy and the Energy Agency are responsible bodies for the promotion of energy efficiency, including smart metering.
Malta	CEER MEDRED	No information on the NRA role in energy efficiency.
The Netherlands	CEER	The Dutch Energy Regulator (Energiekamer) which operates as a chamber within the National Competition Authority has no role in energy efficiency matters. Main competences rest with the Government.
Norway[(A)]	CEER	NVE, the National Regulatory Authority, does not have a role in the support scheme handled by ENOVA (a public enterprise owned by the Royal Norwegian Ministry of Petroleum and Energy). NVE has a role in implementing Directives for end-user energy efficiency. NVE does also follow the development of energy use in Norway, and gives advice to the Ministry on issues related to energy efficiency and savings.
Poland	CEER ERRA	ERO, the Energy Regulator, is being involved in the drafting of the Law on energy efficiency. They will probably have a role in managing the Tradable White Certificates mechanism. They also play a role in smart metering roll-out.
Portugal	CEER MEDREG ARIAE	ERSE, the National Regulatory Authority, has responsibilities in energy efficiency promotion, as clearly stated in the End-User Efficiency Directive (2006/32/EC) transposition to the national order. But there are other organisations with competences or responsibilities in energy efficiency, such as ADENE (National Energy Agency) and DGEG (General Directorate for Energy and Geology). According to the Tariff Code, ERSE establishes tariffs ensuring that they are cost reflective and hence provide the proper price signal to consumers. Besides ERSE manages PPEC (tender mechanism), receives the applications to the programmes and evaluates them according to a pre-defined metric. Once the measures are being implemented, ERSE is in charge of monitoring its progress and issues payment order to promoters. Each year ERSE writes a report on the results of the implementation of the measures supported by PPEC.
Romania	CEER ERRA	In November 2009, the Romanian Energy Regulatory Authority (ANRE) took over the tasks, rights and obligations, budget, financing and staff of the Romanian Agency for Energy Conservation, ARCE (former specialised body at national level in the field of energy efficiency) and the activity was reorganised by Governmental Decision no. 1428/2009. Also

		ANRE is in charge to set up the transmission and distribution tariffs and retail prices for customers who do not choose to change their supplier. To this purpose, ANRE set up differentiated time zones and load factors tariffs for the final customers and introduced, starting in 2005, incentive regulation for setting up grid tariffs.
The Russian Federation(A)	ERRA	The Federal Service for Tariffs (FST) of Russia is authorised: - to introduce differentiated tariffs including a social rule for the consumption of electricity; - to introduce electricity tariffs differentiated by day zones (hours), days off and work days; - to elaborate requirements to programs on energy saving and improvement of energy efficiency of organisations whose activities are regulated by the service. Main competences in the area of energy efficiency rest with the Ministry of Energy, the Ministry of Economic Development and the executive power bodies of the constituents of the Russian Federation.
Slovak Republic	CEER ERRA	URSO, the Slovak Regulator, has responsibilities in end-use energy efficiency. It does not undertake any reporting on energy efficiency: it falls within the competence of the Ministry of Economy of the Slovak Republic.
Slovenia	CEER MEDREG	AGEN-RS, the Energy Regulator, doesn't play any role. The Departments of Efficient Energy Use and Use of Renewable Energy Sources within the Ministry of the Environment, and Spatial Planning and Eco Fund are responsible for the implementation of the energy efficiency measures in all sectors. The Energy act, Resolution on the National energy program and Control of Pollution Act are the main legal documents for implementation of energy efficiency and utilisation of renewable energy sources in Slovenia.
Spain	CEER MEDREG ARIAE	CNE, the National Regulatory Authority, only takes action in the energy efficiency area when it receives a specific mandate. Main role rests with the Spanish Ministry of Industry and the state-owned agency IDAE.
Sweden	CEER	EI, the Energy Regulator, takes the lead concerning the smart meters initiative. Primary responsibility for promoting energy efficiency rests with the Swedish Energy Agency (government agency).
Ukraine(A)	ERRA	No role for NERC, the Energy Regulator. The authorised central executive power body responsible for ensuring state implementation in the field of efficient use of energy resources and energy efficiency is the National Agency of Ukraine for Ensuring Efficient Use of Energy Resources (NAER).
United Kingdom	CEER	Ofgem, the National Regulatory Authority, has important duties relating to the environment and sustainable development, and

		the Secretary of State for Business, Enterprise & Regulatory Reform has provided statutory guidance on environmental matters to which it must have regard. Ofgem is committed to playing its part in facilitating the transition to a low carbon energy sector. It takes full account of the impact on the environment across the range of its decision-making. Its published documents fall into two broad categories, those relating to Environmental Policy and those relating to its administration of Government Environmental Programmes. Ofgem also contributes to the debate on how to reduce carbon emissions from the energy sector in the most cost-effective manner, for example by responding to Government consultations. Ofgem administers Government environmental programmes including the Climate Change Levy exemption and the CERT efficiently and effectively. Ofgem has leads on the roll out of smart meters initiative.

(A) Countries outside the European Union.

7 Glossary of Terms

Certification/labelling: Measures enabling consumers to compare the energy efficiency of products and appliances.

Decoupling: Ratemaking and regulatory tool designed to break the link between a utility's earnings and the energy consumption of its customers. Decoupling removes the inherent disincentive that a utility has under traditional ratemaking to promote energy conservation. Under a decoupling mechanism, the utility cannot increase its earnings by increasing its sales volumes because additional margin revenues are refunded to customers.

Demand Side Management (DSM): Energy efficiency or load management programs that help customers manage their use (demand) of electricity and that avoid the necessity to build new generation.

Demand Side Bidding (DSB): A mechanism that encourages consumers to undertake changes to their usual pattern of consumption in return for financial reward. The financial reward can be in the form of reduced electricity prices, or via a direct payment for electricity they have 'not consumed', or even an availability payment for the promise of being available to make a consumption change at an agreed time. Common forms of demand participation are consumers' offers in organised markets or pools and the supply by energy users of specific additional services such as ancillary services, congestion management, creation of reserve capacity, etc..

3rd Party Energy Efficiency Services: Energy efficiency utility providing energy efficiency services, such as technical assistance and financial incentives. The 3rd party may be funded by an energy efficiency charge to consumers (i.e. system benefit charge) on service provided by their primary electric company.

One example is Efficiency Vermont (http://www.efficiencyvermont.com/pages/).

Eco-design: new concept aiming to reduce energy consumption by products such as household electrical appliances. Information concerning the product's environmental performance and energy efficiency must be visible if possible on the product itself, thus allowing consumers to compare before purchasing.

ESCO (Energy Service Company): An entity that enables a customer to reduce consumption, and that typically splits the cost savings.

Least-Cost Planning/Integrated Resource Planning: A plan for meeting the public's need for energy services provided by a regulated electric or gas utility, after safety concerns are addressed, at the lowest present value life cycle cost, possibly including environmental and economic costs. Least-cost planning may involve a strategy combining investments and expenditures on energy supply, transmission and distribution capacity, transmission and distribution efficiency, and comprehensive energy efficiency programs.

Lost Revenue Adjustment: A mechanism by which regulators can allow utilities to recover lost revenue resulting from activities such as energy efficiency and demand-side management, thereby promoting energy efficiency despite lowered demand caused by energy efficiency programs.

Obligations on suppliers or distributors paid for by customers/Portfolio standards: Energy saving obligations for energy utilities without the release of tradable certificates demonstrating the implementation of interventions. Portfolio standards may include also obligations for renewables.

Passive-energy Houses: buildings which ensure a comfortable indoor climate in summer and in winter without needing a conventional heating system. The minimal heat requirement can be supplied by heating the supply air in the ventilation system - a system that is necessary in any case. The standard has been named "Passive House" because the passive heat inputs delivered externally by solar irradiation through the windows and provided internally by the heat emissions of appliances and occupants essentially suffice to keep the building at comfortable indoor temperatures throughout the heating period. It is a part of the Passive House philosophy that efficient technologies are also used to minimise the other sources of energy consumption in the building, notably electricity for household appliances.

Performance Benchmarking: Scheme that allows comparing the impact of energy efficiency performance across multiple buildings or manufacturing plants or across similarly situated residential customers (also known as **Peer-to-peer comparison**). The term can also be referred to comparison of different utilities' performance. In this case, using a set of predetermined indicators of energy efficiency, the regulator can compare the progress of a given utility against others and benchmark its success, essentially ranking utilities' implementation of energy efficiency programs. Regulators may provide incentives for high-ranking utilities and disincentives for low ranking utilities.

Quasi-governmental organisation: An entity that is treated by national laws and regulations to be under the guidance of the government, but also separate and autonomous from the government. While the entity may receive some revenue from charging customers for its services, these organisations are often partially or majorly funded by the government.

Rate of Return Enhancement (also known as Annual Earnings Assessment Proceeding (AEAP) Incentive): System of incentives earned by a utility based on a portion of the net present value of the savings achieved by ratepayers participating in energy efficiency programs.

Soft loans (public loans): loans subsidised by public funding that are offered at interest rates below market interest rates for investments in energy efficiency. Often these loans are combined with innovative funds which involve banks and the private capital in addition to the public sector.

System Benefits Charge/Public Benefits Fund: A charge/surcharge on a consumer's bill from an electric distribution company to pay for the costs of certain public benefits such as energy efficiency or low-income assistance.

Taxes and fees associated with energy use: Energy or energy-related CO_2 taxes, pollution levies and public benefits charges (imposing an energy tax on some energy users, in order to establish public programs and funds for the promotion of energy efficiency).

Technical standards: Standards for appliances, vehicles and buildings.

Tender: Request for proposal to have an external party provide needed services or equipment. The purpose is to promote competition, thus reducing the input price. The process can also involve the sale of assets or licenses by the party issuing the announcement.

Voluntary agreements: A form of self-regulation by the industry or other sectors, in addition to

mandatory requirements; they can consist in the fixation of non binding targets on energy efficiency improvements, emission limits, etc.

White Certificates: Mechanism consisting in the introduction of energy saving obligations for energy utilities and in the release of tradable white certificates demonstrating the implementation of interventions.

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http://www.cenef.ru/ – It's the site of the Center for Energy Efficiency providing for analytical materials about the potential, strategies and measures that have to be taken in order to improve energy efficiency in Russia

North America

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