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Best Practices in Designing and Implementing Energy Efficiency Obligation Schemes

Research Report
Task XXII of the International Energy Agency
Demand Side Management Programme

Report prepared by:
The Regulatory Assistance Project

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The IEA Demand Side Management Programme

The International Energy Agency (IEA) was established in 1974 as an autonomous agency within the framework of the Economic Cooperation and Development (OECD) to carry out a comprehensive programme of energy cooperation among its 25 Member countries and the Commission of the European Communities.

An important part of the Agency's programme involves collaboration in the research, development, and demonstration of new energy technologies to reduce excessive reliance on imported oil, to increase long-term energy security, and to reduce greenhouse gas emissions. The IEA's R&D activities are headed by the Committee on Energy Research and Technology (CERT) and supported by a small Secretariat staff headquartered in Paris. In addition, three Working Parties are charged with monitoring the various collaborative energy agreements, identifying new areas for cooperation and advising the CERT on policy matters.

Collaborative programmes in the various energy technology areas are conducted under Implementing Agreements, which are signed by contracting parties (government agencies or entities designated by them). There are currently over 40 Implementing Agreements, including the IEA Demand-Side Management (DSM) Programme. Since 1993, the following countries and organisations have been working to clarify and promote opportunities for DSM.

Australia
Austria
Belgium
Canada
Denmark
European Commission
Finland
France
Greece
Italy
India
Japan (Sponsor)
Republic of Korea
Netherlands
New Zealand
Norway
Spain
Sweden
Switzerland
The Regulatory Assistance Project (Sponsor)
United Kingdom
United States

A total of 24 Tasks (multinational collaborative research projects) have been initiated by the IEA DSM Programme, 16 of which have been completed and one not proceeded with. Each Task is managed by an Operating Agent (Project Director) from one of the participating countries. The Operating Agent is responsible for overall project management, including project deliverables, milestones, schedule, budget, and communications. Overall control of the programme rests with an Executive Committee comprised of one representative from each contracting party to the Implementing Agreement. In addition, a number of special ad hoc activities—conferences and workshops—have been organised.

The actual research work for a Task is carried out by a combination of the Operating Agent and a group of Country Experts, depending on the nature of the work to be carried out. Each country that is participating in a Task nominates one or more persons as its Country Expert. Each Expert is responsible for carrying out any research work within his or her country that is required for the Task. All the Experts meet regularly to review and assess the progress of the work completed by the Operating Agent and by the group of Experts. Experts meetings are usually held between two and four times a year.

The IEA DSM Programme has undertaken the following Tasks to date:

Task I*	International Database on Demand-Side Management
Task II*	Communications Technologies for Demand-Side Management
Task III*	Cooperative Procurement of Innovative Technologies for Demand-Side Management
Task IV*	Development of Improved Methods for Integrating Demand-Side Management
Task V*	Investigation of Techniques for Implementation of Demand-Side Management Technology in the Marketplace

Task VI*	Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses
Task VII*	International Collaboration on Market Transformation
Task VIII*	Demand-Side Bidding in a Competitive Electricity Market
Task IX*	The Role of Municipalities in a Liberalised System
Task X*	Performance Contracting
Task XI*	Time of Use Pricing and Energy Use for Demand Management Delivery
Task XII*	Cooperation on Energy Standards (not proceeded with)
Task XIII*	Demand Response Resources
Task XIV*	Market Mechanisms for White Certificates Trading
Task XV*	Network-Driven Demand Side Management
Task XVI	Competitive Energy Services
Task XVII	Integration of Demand Side Management, Energy Efficiency, Distributed Generation, and Renewable Energy Sources
Task XVIII*	Demand Side Management and Climate Change
Task XIX*	Micro Demand Response and Energy Saving
Task XX	Branding of Energy Efficiency
Task XXI	Standardisation of Energy Savings Calculations
Task XXII	Energy Efficiency Portfolio Standards
Task XXIII	The Role of Customers in Delivering Effective Smart Grids
Task XXIV	Closing the Loop—Behaviour Change in DSM: From Theory to Policies and Practice

** Completed Task*

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Foreword

This report is a result of work that was completed within Task XXII of the International Energy Agency Demand-Side Management Programme. Task XXII is a multinational collaborative research project that is investigating best practices in designing and implementing energy efficiency obligation schemes.

The original idea for Task XXII was developed by Balawant Joshi, Managing Partner of ABPS Infra Pvte Ltd, based in Mumbai, India. Balawant is the Operating Agent (Project Director) for Task XXII.

The work of Task XXII is supported through task sharing by the Operating Agent and the Regulatory Assistance Project (RAP). RAP is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the electricity and natural gas sectors, providing technical and policy assistance to government officials on a broad range of energy and environmental issues.

This report was prepared by RAP based on research carried out by the Operating Agent and by the RAP Research team. The case studies of energy efficiency obligation schemes implemented in various jurisdictions were researched and written by John Gerhard, Camille Kadoch, Edith Pike-Biegunska, Anna Sommer, Wang Xuan, Nancy Wasserman, and Elizabeth Watson. Eoin Lees provided additional information for the European case studies. Lewis Lamont organised the Bibliography. Camille Kadoch managed the preparation of the report for publication. David Crossley, Senior Advisor to RAP, wrote the review chapters and edited the report.

Executive Summary

An energy efficiency obligation (EEO) is a regulatory mechanism that requires obligated parties to meet quantitative energy saving targets by delivering or procuring eligible energy savings produced by implementing approved end-use energy efficiency measures. The requirement to meet quantitative energy saving targets distinguishes EEOs from other similar mechanisms, such as a general requirement to acquire all cost effective energy efficiency with no target specified.

Governments in various jurisdictions around the world have endeavoured to improve end-use energy efficiency, and in some cases also achieve other objectives, by designing and implementing schemes that place EEOs on particular parties. These EEO schemes share three key features:

- a quantitative target for energy efficiency improvement;
- obligated parties that must meet the target; and
- a system that: defines the energy saving activities that can be implemented to meet the target; measures, verifies, and reports the energy savings achieved through these activities; and confirms that the activities actually took place.

Typically obligations in EEO schemes are placed on providers of networked energy (e.g., electricity and natural gas distributors or standalone retail suppliers). Obligations can also be placed on providers of other energy forms (e.g., LPG, heating oil, transport fuels, district heating), and even on end users of energy. In some jurisdictions, energy savings to meet the obligation are delivered by a third party "energy efficiency utility". This report considers only EEO schemes that place obligations on energy providers, that is, entities that supply energy to end-users.

This report covers 19 EEO schemes implemented in a range of jurisdictions around the world. The table in the Appendix (page 116) summarises and compares key design parameters among these schemes. This table and the detailed case studies of the schemes themselves in section 3 of the report (commencing on page 8) demonstrate that there are many different ways to design and implement EEO schemes.

Despite this diversity, it is possible to identify three broad types of EEO schemes:

- Schemes with quantitative energy saving targets that have been established relatively independently, often with their own enabling legislation. Energy saving targets are specific to each scheme and are not related to resource planning and acquisition by the obligated energy providers. Governments will usually set the targets, but the schemes can be administered by government or by a body (often the energy regulator) that is independent of both government and the obligated energy providers. Schemes in Australia and Europe generally follow this model.
- Schemes with quantitative energy saving targets that are integral components of resource planning and acquisition by the obligated energy providers. These schemes are often established by energy regulators to influence the resource mix adopted by energy providers. The design and implementation of the schemes are frequently subject to legal hearing processes as part of energy provider rate cases. The schemes are usually administered jointly by the energy regulator and the obligated energy providers. Schemes in North America generally follow this model.
- Schemes with quantitative energy saving targets that have been established principally by governments as integral components of government policies. Energy saving targets for these schemes are set by the government and a government agency acts as the scheme administrator. Schemes in China and Korea generally follow this model.

This report describes and explains how the EEO schemes it covers actually operate by systematically classifying information about the schemes into categories that apply to all the schemes. Through a comparative analysis of this information, the report identifies the following best practices in designing and implementing an EEO scheme.

Policy Objectives. Keep the policy objectives of the EEO scheme simple and clear, and focussed on achieving energy savings. If the scheme has multiple objectives, ensure that the achievement of any non-energy-related objectives does not hinder pursuit of the primary objective to achieve energy savings.

Legal Authority. Use a carefully selected combination of legislation, regulation, and Ministerial and administrative processes to establish and operate the EEO scheme.

Fuel Coverage. Decide the fuel coverage of the EEO scheme according to the overall policy objectives for the scheme and estimates of energy efficiency potentials for the different fuels. Start by covering one or two fuels and then expand the scheme to other fuels as experience is gained.

Sector and Facility Coverage. Decide the end-use sector and facility coverage of the EEO scheme according to the overall policy objectives for the scheme and estimates of energy efficiency potentials for the different sectors and facilities. If it is intended to tightly restrict sector and facility coverage, consider whether assessing compliance will become too onerous.

Energy Saving Target. Set the level of the energy saving target for the EEO scheme according to the overall policy objectives for the scheme and aim to strike a balance among making progress, the cost to consumers of meeting the target, and what is practically possible based on an assessment of energy efficiency potential. Set the target in terms of final energy (i.e., the quantities of energy delivered to, and used by, consumers) unless the scheme covers several different fuels, in which case use primary energy. Denominate the target in energy units unless the scheme has a policy objective that relates to greenhouse gas (GHG) emissions reductions, in which case consider using carbon dioxide equivalent units. Set a relatively long timeframe for the target, preferably between 10 and 20 years. Calculate eligible energy savings over the estimated lifetime for each energy efficiency measure. Consider setting sub-targets and portfolio requirements where the scheme has policy objectives that are not solely related to achieving energy savings.

Obligated Parties*. Determine the obligated parties in the EEO scheme according to the fuel coverage of the scheme and the type of energy provider that has the infrastructure and capability to manage the delivery and/or procurement of eligible energy savings. Consider restricting the obligation to larger energy providers. Allocate individual energy saving targets to each obligated party on the basis of that party's market share of energy sales. Consider whether to implement carve-outs for energy-intensive, trade-exposed industries and/or other specified groups of end-users.

Compliance Regime. As an integral component of the EEO scheme, establish a procedure for obligated parties to report claimed eligible energy savings to an appropriate authority and a process for checking and verifying these savings. Establish a penalty to be imposed on obligated parties that fail to meet their individual energy saving targets. Set the level of the penalty high enough to mobilise energy providers to meet their targets.

Performance Incentives. Consider whether to include performance incentives in the EEO scheme to be awarded to obligated parties that exceed their energy saving targets.

Eligible Energy Savings. Enable non-obligated parties in the EEO scheme to implement energy efficiency projects to produce eligible energy savings. Do not place unnecessary restrictions on the energy efficiency projects or measures that can be implemented to produce eligible energy savings, provided that the energy savings can be verified.

* This report considers only EEO schemes that place obligations on energy providers. However, other entities may also be considered as obligated parties. For a detailed discussion of the issues to be considered in determining the best obligated party for a EEO scheme see Neme, Gottstein and Hamilton (2012).

Eligible Energy Efficiency Measures. Consider establishing in the EEO scheme a list of preapproved energy efficiency measures with deemed energy saving values, but do not limit the measures that can be implemented to produce eligible energy savings to only those on the list.

Measurement, Verification, and Reporting. As an integral component of the EEO scheme, establish a robust system for measuring, verifying, and reporting energy savings and other activities that contribute to scheme targets. Consider whether to also establish procedures to verify whether energy savings are additional to what would have happened in the absence of the EEO scheme.

Trading of Energy Savings. Consider enabling trading of energy savings in the EEO scheme among both obligated parties and third parties.

Funding. Establish an appropriate mechanism in the EEO scheme to enable recovery of the costs incurred by obligated parties in meeting their individual energy saving targets.

This report includes detailed case studies of 19 different EEO schemes implemented in a range of jurisdictions around the world. The report identifies three broad types of schemes from Australia/Europe, North America, and Asia. Each of the three types of schemes is the product of quite different ways of thinking about how to use energy providers to deliver energy efficiency.

For the first time, information about the three different types of schemes has been systematically classified into categories that apply to all the schemes. Through a comparative analysis of this information, the report identifies the best practices in designing and implementing an EEO scheme summarised above. Adopting these best practices in designing and implementing new schemes, and updating existing ones, should improve the effectiveness of the schemes in delivering cost-effective energy efficiency.

Abbreviations and Acronyms

ADEME	Agence de l'Environnement et de la Maîtrise de l'Énergie (the French environment and energy management agency)
AEEG	Autorità per l'Energia Elettrice e il Gas (the Italian electricity and gas regulator)
AUD	Australian dollar (currency unit)
Bcf	One billion cubic feet, equal to 2,832 cubic meters
CAD	Canadian dollar (currency unit)
ccf	One hundred cubic-feet, equal to 2.832 cubic meters
CDM	Conservation and Demand Management Code for Electricity Distributors (Ontario, Canada)
CNY	Chinese yuan or renminbi (currency unit)
CO_2-e	Carbon dioxide equivalent
cumac	Cumulative and discounted (in French, cumulés actualisés). This term is used to refer to the annual delivered energy savings from an energy efficiency measure, summed over the lifetime of the measure, and discounted at a standard annual rate.
DC	Direct current
DSM	Demand-side management
EEO	Energy efficiency obligation
ERO	Energy Regulatory Office (Poland)
EEPS	Energy efficiency portfolio standard (New York and Texas)
ESCO	Energy service company
ESS	Energy Savings Scheme (New South Wales, Australia)
EUR	Euro (currency unit)
GBP	British pound (currency unit)
GGAS	Greenhouse Gas Reduction Scheme (New South Wales, Australia)
GHG	Greenhouse gas
GW	Gigawatt
GWh	Gigawatt-hour
kW	Kilowatt
kWh	Kilowatt-hour
KRW	Republic of Korea won (currency unit)
LPG	Liquefied petroleum gas
m^3	Cubic meter
Mcf	One thousand (not one million) cubic feet, equal to 28.32 cubic meters
MJ	Megajoule
$MtCO_2$-e	Metric megatonne of carbon dioxide equivalent
Mtoe	Million metric tonnes of oil equivalent
MWh	Megawatt-hour
PJ	Petajoule
PLN	Polish zloty (currency unit)
REES	Residential Energy Efficiency Scheme (South Australia)
RUE	Rational use of energy (commonly used in Europe, particularly by the European Commission, to describe energy efficiency)
tCO_2-e	Metric tonne of carbon dioxide equivalent
t	Metric tonne
TJ	Terajoule
toe	Metric tonne of oil equivalent
TWh	Terawatt-hour
USD	United States dollar (currency unit)
VEET	Victorian Energy Efficiency Target (Victoria, Australia)

1. Introduction

1.1 Energy Efficiency Obligations

An energy efficiency obligation[1] (EEO) is a regulatory mechanism that requires obligated parties to meet quantitative energy saving targets by delivering or procuring eligible energy savings produced by implementing approved end-use energy efficiency measures. The requirement to meet quantitative energy saving targets distinguishes EEOs from other similar mechanisms, such as a general requirement to acquire all cost effective energy efficiency with no target specified.

Governments in various jurisdictions around the world have endeavoured to improve end-use energy efficiency, and in some cases also achieve other objectives, by designing and implementing schemes that place EEOs on particular parties. These EEO schemes share three key features:[2]

- a quantitative target for energy efficiency improvement;
- obligated parties that must meet the target; and
- a system that: defines the energy saving activities that can be implemented to meet the target; measures, verifies, and reports the energy savings achieved through these activities; and confirms that the activities actually took place.

EEO schemes use the force of law to require obligated parties to achieve energy savings through investments in end-use energy efficiency. They are typically enforced by regulation and by the threat of financial penalties.

Typically, obligations in EEO schemes are placed on providers of networked energy (e.g., electricity and natural gas distributors or standalone retail suppliers). Obligations can also be placed on providers of other energy forms (e.g., LPG, heating oil, transport fuels, district heating), and even on end-users of energy. In some jurisdictions, energy savings to meet the obligation are delivered by a third party "energy efficiency utility". This report considers only EEO schemes that place obligations on energy providers, that is entities that supply energy to end-users.

EEO schemes are established as direct interventions into energy markets that aim to overcome the well-known barriers preventing the implementation of much cost effective energy efficiency. In establishing EEO schemes, governments are intervening into energy markets in a similar way to other environmental interventions (e.g., emissions trading schemes or green certificates for renewable energy).[4]

1.2 Purpose of this Report

The purpose of this report is to identify and describe best practices in designing and implementing EEO schemes. The report:

- outlines the various stages involved in designing and implementing EEO schemes;
- describes experiences with EEO schemes in a range of different jurisdictions; and
- identifies and describes best practices.

1 There are several other terms used for this regulatory mechanism, including "energy efficiency portfolio standard," "energy efficiency resource standard," "energy efficiency commitment," and "energy supplier obligation." In this report, the term "energy efficiency obligation" will be used.

2 Department of Climate Change and Energy Efficiency and Department of Resources, Energy and Tourism, 2011

3 In this report, the term "energy provider" refers to entities that sell energy directly to end-users (energy retailers) and entities that transport energy to end-users' dwellings or premises (energy transmission and distribution system operators). In some jurisdictions these two functions are combined within vertically integrated energy utilities.

4 Lees, 2012

2. Designing And Implementing EEO Schemes

The key principle involved in all EEO schemes is that an obligation is placed on particular energy providers (usually energy retailers or distributors, or vertically integrated energy utilities) to save specified quantities of energy in eligible end-use customers' premises or homes. If an obligated energy provider fails to deliver or procure those energy savings, it will incur financial penalties. In most jurisdictions, energy providers are not restricted to saving energy from their own customers (i.e., they can save energy from any eligible end-use customer).[5]

Following are the steps involved in designing and implementing an EEO scheme:[6]

- determine and clearly state the policy objectives;
- establish the legal authority for the obligation;
- decide which fuels will be covered by the scheme;
- determine the sectors and types of facilities that will be covered by the scheme;
- set the energy saving target, including measurement units and timeframe;
- assign responsibility for meeting the obligation (i.e., who are the obligated parties and what are their individual obligations?);
- establish a compliance regime;
- determine whether performance incentives will be available for obligated parties that exceed the scheme targets;
- decide which parties will be allowed to produce eligible energy savings that contribute to meeting the scheme targets and how these parties will be authorised or accredited to achieve savings;
- define the energy efficiency measures that will be approved to produce eligible energy savings;
- decide how energy savings and other activities that contribute to scheme targets will be measured, verified, and reported;
- decide whether trading of energy savings will be included;
- establish mechanisms that will provide sustained funding to cover the costs incurred by obligated parties in delivering or procuring energy savings;
- administer the obligation scheme;
- report scheme results; and
- identify areas for improvement and take action.

2.1 Policy Objectives

Determining and stating the policy objectives is the most important stage in designing an EEO scheme because these objectives define what the obligation is intended to achieve and will significantly affect all the other parameters of the scheme.

There is a range of policy objectives that can be achieved through establishing an EEO scheme, for example:

- to acquire cost-effective energy efficiency as an energy resource;
- to reduce energy bills for all, or a subset of, end-use customers;
- to assist low-income households with their energy bills;
- to stimulate the development of an energy services industry;
- to improve environmental outcomes;
- to enhance energy security and reliability; and
- to achieve some or all of the above.

It is important to clearly state the chosen policy objectives because these will strongly influence how the EEO scheme is developed and implemented. In particular,

5 Lees, 2012

6 The Appendix (page 116) compares key design parameters among 19 EEO schemes implemented in a range of jurisdictions.

the policy objectives will inform the organisation that is eventually given the responsibility for administering the scheme about how it should carry out this responsibility.

2.2 Legal Authority

As a regulatory mechanism implemented by government, an EEO scheme must be established under a legal authority. There are two types of authority that may be used.[7]

First, the EEO scheme may be established by single purpose enabling legislation or amendments to existing legislation. Legislation removes any uncertainty about legal authority and it states clearly that energy efficiency is a high value energy resource. Once legislation is passed, however, it is relatively inflexible and cumbersome to change. Changes may be required as experience is gained in implementing an EEO scheme.

Second, the EEO scheme may be established by regulation. Regulation uses existing legal authority so an EEO scheme may be established quickly. Scheme parameters may also be modified more easily in response to experience and changing conditions than under legislation. If an EEO scheme is established under regulation, clear directions must be provided to the administrator of the scheme about the policy objectives to be achieved, because the administrator will not be able to refer to enabling legislation.

It is also possible to establish the broad design of an EEO scheme under enabling legislation, and then set up detailed implementation procedures under regulation. The advantage of this method is that detailed procedures are more likely to require modification as experience is gained in implementing an EEO scheme.

2.3 Fuel Coverage

An EEO scheme may be established to cover only one fuel type or may cover a range of different fuels (e.g., electricity, natural gas, LPG, heating oil, transport fuels, district heating). The decision on fuel coverage will depend on the overall policy objectives the scheme is designed to achieve. In addition, the choice of fuels to be covered should be made on the basis of estimates of energy efficiency potentials for the different fuels.

7 Swanson, 2012

2.4 Sector and Facility Coverage

An EEO scheme may be established to cover only one economic sector or may cover several sectors (e.g., residential, commercial, industrial). In addition, the scheme may be restricted to one type of facility (e.g., residential homes, commercial buildings) or the facility coverage may be unrestricted. The decision on sector and facility coverage will depend on the overall policy objectives the scheme is designed to achieve. In addition, the choice of sectors and facilities to be covered should be made on the basis of estimates of energy efficiency potentials for the different sectors and facilities.

In jurisdictions where there are energy-intensive, trade-exposed industries (e.g., aluminium smelting), governments may decide to exclude (or "carve out") such industries from an EEO scheme on the grounds that their competitiveness in international markets may be adversely affected.

2.5 Energy Saving Target

Setting the energy saving target is the second most important stage in designing an EEO, after deciding the policy objectives. The target defines the path to achieving long-term energy saving goals. There are several decisions to be made when setting the energy saving target.

The first decision involves setting the actual level of the target. The level should be set in the light of the overall policy objectives for the EEO scheme. The aim is to strike a balance between making progress and judging what is practically possible based on an assessment of energy efficiency potential. Setting the target level is often merely a political decision.

The second decision requires determining whether the target will be set in terms of primary energy or final energy. Although final energy relates most closely to the energy quantities familiar to end-users and energy providers, targets set in primary energy may be preferable for EEO schemes that cover a range of fuels with different conversion factors from primary to final energy (e.g., in converting coal or natural gas to electricity).

The third decision entails choosing the units that will be used for denominating the target, for example, energy savings in megawatt-hours (MWh), megajoules (MJ), or tonnes of oil equivalent (toe), or GHG emission reductions

in tonnes of carbon dioxide equivalent (tCO_2-e). The choice of unit does not change the actual level of the target, because all the units are interconvertible. The denomination unit may be selected to demonstrate progress in achieving a particular policy objective (e.g., reducing GHG emissions).

The fourth decision involves determining the timeframe over which the target will be in place. Typically energy saving targets are established over the medium to long term (i.e., for between 10 and 20 years). Setting a relatively long timeframe provides assurance to the obligated parties that costs involved in setting up systems and procedures to meet the target will be justified.

The fifth decision concerns setting the time period over which eligible energy savings from energy efficiency measures will be calculated. The two major options are first-year savings or savings over the lifetime of the measure. Selecting first-year savings may favour low-cost, short-lifetime measures over more costly measures that save more energy over a longer time period and that may be more cost effective in the long run. Focussing on low-cost measures may also encourage projects that install only one measure in a facility rather than carrying out comprehensive energy efficiency retrofits that capture all available cost-effective energy savings.

If energy savings are calculated over the lifetime of an energy efficiency measure, a subsidiary decision is required about how annual scheme targets will be set. Annual targets may be set on the basis of:

- energy savings from the measure that were accrued only in the target year ("annual savings"); or
- all energy savings from the measure accrued from the date when the measure was installed to the end of the target year ("cumulative savings").[8]

The final decision comprises determining whether to set sub-targets and portfolio requirements that address particular policy objectives, such as stimulating an energy services industry, assisting disadvantaged households, or reducing peak energy demand in addition to reducing energy consumption. Resolving whether to set sub-targets and portfolio requirements is essentially a political decision. If sub-targets are set, suitable metrics to measure progress in achieving the relevant policy objectives must be developed.

2.6 Obligated Parties

In EEO schemes, obligated parties are the entities that are required to meet the scheme target. Most often these are the providers of the fuels covered by the scheme. Obligated energy providers may include:

- in traditional, regulated electricity and gas markets: vertically integrated energy utilities;
- in unbundled electricity and gas markets: energy retailers and/or transmission and distribution system operators;[9] and
- in other energy markets: road transport and heating fuel suppliers.

It will be necessary to decide which type of energy provider will be obligated. This decision should be based on whether a particular type of provider has relationships with end-users and also has the infrastructure and systems necessary to manage the delivery and/or procurement of eligible energy savings. Larger energy providers are usually able to themselves implement energy efficiency projects in customers' facilities, or to contract third parties to do so.[10] If some small energy providers in a jurisdiction lack the requisite systems, infrastructure, and capability, or only have a small number of end-use customers in the jurisdiction, it may be necessary to restrict the application of an EEO to the larger energy providers.

Once the obligated parties have been identified, it will be necessary to allocate individual targets to each party. This is typically done by dividing up each overall scheme

8 Cumulative savings are sometimes indicated by the abbreviation "cumac," meaning cumulative and discounted (in French, cumulés actualisés). This term is used to refer to the annual delivered energy savings from an energy efficiency measure, summed over the lifetime of the measure, and discounted at a standard annual rate.

9 An EEO may also be placed on electricity generators where they have direct relationships with large end-use customers and the sector coverage of the EEO scheme includes these customers.

10 This report considers only EEO schemes that place obligations on energy providers. However, other entities may also be considered as obligated parties, including energy end-users as in the Perform, Achieve Trade scheme in India (Bureau of Energy Efficiency, 2011). For a detailed discussion of the issues to be considered in determining the best obligated party for a EEO scheme see Neme, Gottstein and Hamilton (2012).

target according to each obligated party's market share of energy sales in the jurisdiction. If there are carve-outs for energy-intensive, trade-exposed industries and/or other specified groups of end-users, sales to these end-users will be excluded from the calculation of market shares.

2.7 Compliance Regime

An EEO scheme requires a compliance regime to determine whether obligated energy providers have met their individual scheme targets and to apply sanctions if they fail to do so. Elements of a compliance regime include:

- a procedure for energy providers to report results against their individual targets to an appropriate authority;
- a process for checking and verifying reported results; and
- a method for applying sanctions to energy providers that fail to meet their targets.

Typically energy providers that fail to meet a target are required to pay a financial penalty. They may also be required to make up any shortfall in energy savings or in any sub-targets or portfolio requirements.

A financial penalty:

- offers energy providers a financial incentive to meet their obligations;
- presents an opportunity to use any revenue from penalty payments to fund energy efficiency projects administered by others; and
- sets a ceiling price where trading of energy savings is included in an EEO scheme.

The level of the penalty should be set high enough to mobilise energy providers to meet their targets. A high penalty may also give energy providers a real choice between meeting their targets or funding others to achieve energy savings.

2.8 Performance Incentives

Some EEO schemes include the provision of performance incentives to obligated parties. Typically performance incentives may be provided for energy providers that:

- exceed their energy saving targets; or
- implement particular specified energy efficiency measures; or
- carry out whole-of-facility retrofits rather than installing only one energy efficiency measure; or
- reach more than their target number of hard-to-reach energy end-users.

Performance incentives may be financial payments or increases ("uplift") in the energy saving values or other results that may be claimed for particular activities in relation to meeting a target. The purpose of these incentives is to encourage out-performance by energy providers in meeting their various targets, with the aim of achieving policy goals earlier than planned.

In some EEO schemes, out-performing energy providers stand to gain significant revenue from performance incentive payments. In such schemes, it is important to have in place robust measurement, verification, and reporting procedures to ensure that incentive payments are justified.

2.9 Eligible Energy Savings

To meet their EEO scheme obligations, energy providers must deliver or procure eligible energy savings that contribute to meeting the overall scheme energy saving target. Depending on the rules of the particular EEO scheme, energy providers may achieve eligible savings by:

- directly implementing energy efficiency projects in end-users' homes or premises; or
- engaging specialist firms to implement energy efficiency projects on their behalf; or
- purchasing verified eligible energy savings achieved by accredited non-obligated parties who implement energy efficiency projects; or
- contributing to a fund that supports the implementation of energy efficiency projects across specified fuels, end-use sectors, and groups of customers.

EEO schemes vary in the parties they allow to implement energy efficiency projects to produce eligible energy savings. Some schemes allow only obligated energy providers to implement such projects, although it may be permissible for an energy provider to engage specialist firms (e.g., energy service companies [ESCOs]) to implement projects on the provider's behalf. Other EEO schemes allow non-obligated parties to produce eligible energy savings by implementing energy efficiency projects. In this case, the scheme will have to establish a process for authorising or accrediting particular non-obligated parties to produce

eligible savings. Some schemes also require preapproval of individual energy efficiency projects and/or individual energy efficiency measures or products before they can be implemented.

2.10 Eligible Energy Efficiency Measures

EEO schemes vary in how they determine the energy efficiency measures that will be eligible to produce energy savings that contribute to the scheme energy saving target.

Many EEO schemes establish a list of preapproved energy efficiency measures. Frequently each of these measures is assigned a deemed energy saving value that can be claimed each time the measure is implemented. Deemed values are usually assigned to simple energy efficiency measures and are calculated from engineering estimates of the energy saving typically achieved by the measure. Deemed values can also significantly reduce the transaction costs of implementing eligible energy efficiency measures.

EEO schemes that have lists of preapproved energy efficiency measures may also establish procedures for approving further measures and assigning them deemed values. Schemes may also establish procedures for calculating the energy savings from measures not on the approved list, or for calculating, on a case-by-case basis, the energy savings from complex energy efficiency projects that employ a range of energy efficiency measures.

Other EEO schemes accept any energy efficiency measure and rely on procedures for calculating energy savings on a case-by-case basis.

2.11 Measurement, Verification, and Reporting

EEO schemes rely critically on the establishment of robust systems for measuring, verifying, and reporting energy savings and other activities that contribute to scheme targets, such as the number of low-income households reached.

Measurement of energy savings may:

- use ex ante deemed savings values for simple projects to reduce transaction costs; and
- use ex post engineering estimates adjusted for site conditions (e.g., estimated hours of use) for more complex projects.

Claimed energy savings may be verified by carrying out audits on energy efficiency projects. Many EEO schemes achieve cost-effective verification by informing project implementors that audits may be carried out at any time and then carrying out audits on a sample of projects on a random basis.

The results from measurement and verification processes can be used to:

- track progress toward long-term goals;
- monitor cost effectiveness;
- inform the calculation and revision of deemed energy savings values; and
- identify problems requiring programme changes or additional regulatory action.

Many EEO schemes require that eligible energy savings must be additional (i.e., energy savings that would not otherwise have occurred). There are four dimensions of additionality:[11]

- **energy savings additionality,** in which energy consumption is actually reduced compared with the situation before the energy efficiency project was implemented;
- **policy additionality**, in which the energy savings are in excess of any other policy, regulatory, or legal requirements to reduce energy consumption;
- **business as usual additionality**, in which the energy efficiency project is in excess of what could reasonably be expected to occur in the relevant sector(s); and
- **financial additionality**, where the energy efficiency project would not have taken place if revenue from the sale of energy savings were not available.

EEO schemes vary in the relative importance they assign to each of these four types of additionality and in how they actually determine whether particular energy savings are additional.

2.12 Trading of Energy Savings

Some EEO schemes allow trading of energy savings among obligated parties, and between obligated parties and accredited third parties where non-obligated third parties

11 Crossley, 2008

are enabled to produce eligible savings. The purpose of trading is to broaden the pool of opportunities to produce eligible energy savings and to enable market forces to identify the most cost-effective opportunities.

Trading of energy savings can be carried out bilaterally or through a market established by a market maker. The market maker may be (but usually is not) the Scheme Administrator or more typically is a third party. Some EEO schemes require disclosure of prices, whereas in other schemes price disclosure is voluntary.

Trading of energy savings is often carried out through the creation and sale of energy efficiency certificates.[12] An energy efficiency certificate is a legal instrument issued by an authorising body guaranteeing that a specified amount of energy savings has been achieved. Each certificate is a unique and traceable commodity carrying a property right over a certain amount of additional energy savings and guaranteeing that the benefit of these savings has not been accounted for elsewhere. However, trading of energy savings can be carried out bilaterally without the necessity to create energy efficiency certificates.

2.13 Funding

There are costs incurred by obligated parties in meeting energy savings targets under an EEO scheme. Schemes vary in how these costs are recovered and who pays them.

Where regulated energy providers are the obligated parties, regulators may need to establish regulatory mechanisms to enable the energy providers to recover the costs of meeting energy savings targets and also to provide compensation for reduced energy sales.

For obligated energy providers in competitive energy markets, there are two possible cost recovery paths:

- *Option 1:* the costs of meeting energy savings targets are treated as a cost of doing business and energy providers adjust their prices to recover these costs; or
- *Option 2:* the costs of meeting energy savings targets are either funded by the government through direct budgetary appropriations, or price surcharges are imposed on regulated "wires and pipes" energy providers.

2.14 Scheme Administration

Key ongoing functions involved in the administration of an EEO scheme include:

- approving eligible energy efficiency measures and (where required) assigning them deemed energy saving values;
- accrediting parties that produce eligible energy savings through implementing energy efficiency projects;
- conducting measurement and verification of actual energy savings, including auditing the results of energy efficiency projects;
- enforcing compliance with the obligation, including reviewing the performance of obligated parties against their targets and administering any penalties;
- registering the creation and ownership of energy efficiency certificates (if required); and
- making and operating a trading market for energy savings (if required).

2.15 Scheme Results

A key decision in establishing an EEO scheme is to consider how scheme results will be reported. Reporting is typically done by publishing an annual report on the operation of the scheme that includes details of:

- developments in the scheme during the year;
- compliance performance by the obligated parties;
- results against the overall scheme energy saving target, including a breakdown of energy savings produced by types of energy efficiency measures;
- results against any scheme sub-targets and portfolio requirements;
- results related to any trading of energy savings;
- estimated costs of compliance by obligated parties; and
- costs of scheme administration.

2.16 Areas for Improvement

Effective EEO schemes establish processes for continuous improvement in the operation and administration of the scheme. This includes consideration of:

- how areas for improvement will be identified; and
- how improvement action will be undertaken.

12 Energy efficiency certificates are also known as "white certificates," "white tags," "energy savings certificates," and "energy efficiency credits."

3. Experiences In Individual Jurisdictions

This section of the report presents detailed case studies of 19 EEO schemes implemented in various jurisdictions around the world. A table in the Appendix (page 116) summarises and compares key design parameters among these schemes. This table and the detailed case studies of the schemes themselves demonstrate that there are many different ways to design and implement EEO schemes.

Despite this diversity, it is possible to identify three broad types of EEO schemes:

- Schemes with quantitative energy saving targets that have been established relatively independently, often with their own enabling legislation. Energy saving targets are specific to each scheme and are not related to resource planning and acquisition by the obligated energy providers. Governments will usually set the targets, but the schemes can be administered by government or by a body (often the energy regulator) that is independent of both government and the obligated energy providers. Schemes in Australia and Europe generally follow this model.
- Schemes with quantitative energy saving targets that are integral components of resource planning and acquisition by the obligated energy providers. These schemes are often established by energy regulators to influence the resource mix adopted by energy providers. The design and implementation of the schemes are frequently subject to legal hearing processes as part of energy provider rate cases. The schemes are usually administered jointly by the energy regulator and the obligated energy providers. Schemes in North America generally follow this model.
- Schemes with quantitative energy saving targets that have been established principally by governments as integral components of government policies. Energy saving targets for these schemes are set by the government and a government agency acts as the scheme administrator. Schemes in China and Korea generally follow this model.

3.1 Australia – New South Wales

New South Wales is one of three Australian states that have implemented EEO schemes. In January 2003, the New South Wales Government introduced an emissions trading scheme, the Greenhouse Gas Reduction Scheme (GGAS), that included an energy efficiency component. GGAS effectively established an EEO in New South Wales denominated in tCO_2-e.

Under GGAS, parties obligated to meet specified carbon emissions reduction targets—referred to as "benchmark participants"—can generate carbon abatement certificates by targeting:

- low emission electricity generation;
- emissions abatement by large end-users; and
- carbon sequestration through forestry.

Until July 2009, benchmark participants could also generate carbon abatement certificates through "demand-side abatement," mostly energy efficiency. The certificates created in GGAS through energy efficiency projects were energy efficiency certificates and could be traded, thereby establishing the first operating energy efficiency certificate trading scheme in the world.[13]

Despite growth in demand-side abatement activities under GGAS, the New South Wales Government recognised that significant barriers to energy efficiency persisted. From January 2009, demand-side abatement is no longer credited under GGAS and has, instead, transitioned into a new, expanded scheme called the Energy Savings Scheme (ESS).

13 Legislation for the Italian energy efficiency certificate trading scheme was passed in 1999, but the scheme did not start operating until January 2005.

The ESS commenced operation on 1 July 2009 pursuant to the *Energy Savings Scheme Rule* and amendments to the *Electricity Supply Act 1995*. The ESS imposes obligations on similar parties to GGAS, requiring them to meet specified annual energy efficiency targets, and establishing a stand-alone energy efficiency certificate trading scheme. The ESS is planned to operate until 2020 unless a national energy efficiency scheme with similar objectives is implemented in Australia before that time.

The ESS was established to expand the original demand-side abatement provisions under GGAS, and to further support GHG emissions reductions under a then-anticipated national emissions trading scheme.[14] Energy Savings Certificates created under the ESS are tracked in the same registry as carbon abatement certificates under GGAS; however, trading of the two types of certificates is separate.

The ESS is one component in a range of energy efficiency policy measures implemented by the New South Wales Government. In 2007, the Government announced an Energy Efficiency Strategy. The principle goals of the Strategy are:[15]

- to reduce GHG emissions from energy consumption in New South Wales;
- to reduce the impact of rising energy prices on businesses and the community by lowering energy consumption; and
- to delay the need to construct additional energy generation and distribution infrastructure in New South Wales, reducing costs within the state economy.

3.1.1 Policy Objectives

The stated goal of the ESS is to "create a financial incentive to reduce the consumption of electricity by encouraging energy saving activities." The Electricity Supply Act sets forth three other objectives for the ESS:[16]

- to help households and businesses reduce electricity consumption and costs;
- to complement the proposed national carbon pollution scheme by providing lower cost GHG emissions reductions; and
- to reduce the cost of, and need for, additional energy generation, transmission, and distribution infrastructure.

The ESS is required to undergo five-year reviews to "determine whether the policy objectives of the scheme remain valid" and whether the terms of the Act "remain appropriate for securing those objectives."[17]

3.1.2 Legal Authority

The ESS is governed by a combination of legislation and regulation. The Scheme was established through amendments to the *Electricity Supply Act 1995* [18] and the *Electricity Supply (General) Regulation 2001*.[19] The ESS is administered by the Scheme Administrator through both the legislation and the *Energy Savings Scheme Rule of 2009*.[20] Other Rules to govern the detailed operation of the ESS are made by the relevant Minister from time to time.

3.1.3 Fuel Coverage

Electricity.

3.1.4 Sector and Facility Coverage

The ESS covers the residential, commercial, and industrial sectors and all facilities within these sectors.

3.1.5 Energy Saving Target

The ESS energy saving targets have been established legislatively, through amendments to the Electricity Supply Act. Table 1 (page 10) shows that in 2009, the first year of the ESS, the target was set to 0.4 percent of total electricity sales in New South Wales, expressed in MWh. The target increases gradually over time, reaching four percent of total sales in 2014, and continuing at that level through 2020. The ESS will operate until 2020 unless a national energy efficiency scheme replaces it before then. Targets are set forth in Schedule 5 to the Act, and are subject to amendment by the State Governor on the recommendation of the relevant Minister. Any such regulation must be made at least 12 months in advance.[21]

14 A national carbon tax will commence in Australia on 1 July 2012 when the tax will be set at AUD 23 per tonne of CO_2-e. The level of the tax will increase gradually until 2015, when it will transition to a national emissions trading scheme with an annual cap on emissions and the market setting a price on carbon.

15 New South Wales Office of Environment and Heritage, 2011

16 New South Wales Legislation, 1995

17 New South Wales Legislation, 1995

18 New South Wales Legislation, 1995

19 New South Wales Legislation, 2001

20 New South Wales Legislation, 2009

21 New South Wales Government, 2012a

Table 1

Targets for the New South Wales Energy Savings Scheme[22]

Year	Effective Scheme Target (% of annual NSW electricity sales)	Retailer Compliance Obligation (% of annual liable electricity sales)
2009 (from 1 July)	0.4%	0.5%
2010	1.2%	1.5%
2011	2.0%	2.5%
2012	2.8%	3.5%
2013	3.6%	4.5%
2014–2020	4.0%	5.0%

While the ESS energy saving targets are set as a percentage of total electricity sales, calculation of individual targets for obligated parties is done on the basis of their market share of liable electricity sales. To calculate liable sales, electricity sales to exempt industries or activities are subtracted from total electricity sales in New South Wales. The *Electricity Supply Act* allows the Minister to grant full or partial exemption from the ESS for any electricity load used in conjunction with emission-intensive and trade-exposed industries or activities. The exemption is provided by a Ministerial Order, as gazetted from time to time. The Order lists the exempted sites, their location, the emissions-intensive trade-exposed activity being carried out, and the proportion of exemption granted. A further deduction is allowed for network losses. Exemption categories include:[23]

- manganese production;
- ammonia production;
- ceramic floor and wall tile production;
- magnetite concentrate production;
- petroleum refining; and
- ethene production.

3.1.6 Obligated Parties

There are three groups of obligated parties, referred to as "scheme participants" in the legislation, who must comply with energy efficiency targets under the ESS:[24]

- all holders of New South Wales electricity retail licenses (i.e., electricity retailers);
- electricity generators that supply electricity directly[25] to retail customers in New South Wales; and
- market customers in New South Wales who purchase their electricity directly from the wholesale Australian National Electricity Market.

Parties in emission-intensive and trade-exposed industries or carrying out such activities may be granted full or partial exemptions from the ESS.

An individual energy saving target is allocated each year to each scheme participant in proportion to their share of liable electricity sales.[26] Individual targets are met by surrendering the number of Energy Savings Certificates required to meet the target. Each certificate represents one metric tonne of carbon dioxide equivalent (CO_2-e) abated by energy saving activities. Calculation of the number of certificates required to meet individual targets is done by calculating total liable electricity sales in MWh, multiplied by the State-wide energy saving target for the year, multiplied by the individual scheme participant's share of liable electricity sales, and then multiplied by a Certificate Conversion Factor[27] based on the average emissions intensity of electricity in New South Wales. The Electricity Supply Act sets the Certificate Conversion Factor at 1.06[28] until 2020, but the State Governor may amend the Act to change this number on the advice of the Minister.

22 New South Wales Government, 2012b

23 New South Wales Government, 2012c

24 A list of scheme participants is available at: http://www.ess.nsw.gov.au/For_Liable_Entities/List_of_Liable_Entities

25 Certain large end-use customers purchase electricity under contracts directly with generators.

26 New South Wales Government, 2012a

27 New South Wales Government, 2012d

28 For every mega-watt hour of electricity produced in New South Wales, approximately 1.06 tonnes of CO_2-e is released into the atmosphere. As the generation mix in New South Wales changes from primarily coal-based to include more gas and renewables, the Certificate Conversion Factor will decrease to reflect the reduced emissions from electricity production.

Figure 1

The Lifecycle of an Energy Savings Certificate in the New South Wales Energy Savings Scheme[29]

3.1.7 Compliance Regime

Compliance with the ESS targets is achieved when a scheme participant surrenders the number of Energy Savings Certificates that corresponds to its individual annual energy savings target. Scheme participants may carry out the energy savings activities themselves, or may purchase certificates from other parties.

Figure 1 illustrates the lifecycle of an Energy Savings Certificate in the ESS.

Scheme participants are required to prepare annual Energy Savings Statements to demonstrate their compliance with the Scheme by 18 March of each year. Failure to submit a statement in compliance with statute carries a penalty. The Scheme Regulator must prepare an annual report to the Minister on the extent to which scheme participants have complied, or failed to comply, with individual savings targets during the previous year.[30]

The ESS includes a penalty for any energy savings shortfall—that is, for any energy sold or consumed in excess of a scheme participant's individual annual target. The penalty is the product of an annual penalty rate, multiplied by the volume of shortfall. Annual penalty rates are set forth in Schedule 5A of the *Electricity Supply Act,* and may be adjusted by movements in the consumer price index. The base penalty for 2012 is AUD 24.86 per certificate (i.e., per tCO_2-e).[31] The tax-adjusted value of this penalty sets a theoretical ceiling price for an Energy Savings Certificate in trading.[32] There is also a maximum penalty of 2,000 penalty units for improper creation of energy certificates.[33]

As an alternative to paying the penalty, a scheme participant may choose to carry forward all or part of its shortfall to the following compliance period. There is a limit on the total shortfall that may be carried forward. The maximum shortfall that may be carried forward in any given year is ten percent, with the exception of 2009, when up to 50 percent of the shortfall could be carried forward into 2010.[34] Any shortfall carried forward must be made up in the following year.

3.1.8 Performance Incentives

No performance incentives are available.

29 Sniffin, 2012

30 New South Wales Legislation, 1995

31 New South Wales Government, 2012b

32 Crossley, 2008

33 New South Wales Legislation, 1995

34 New South Wales Government, 2012a

3.1.9 Eligible Energy Savings

Energy savings that can be used to meet ESS targets are created through implementing energy efficiency projects. Projects can be implemented by scheme participants or by non obligated parties who have been assessed successfully in an accreditation process.[35] The purpose of accreditation is to filter out projects that are unlikely to result in the creation of Energy Savings Certificates.

Non obligated parties seeking accreditation must submit an application for a particular energy efficiency project. The application must contain information on the energy saving activities included in the project for which accreditation is sought, including details of the calculation methodologies to be applied to each activity. The application for accreditation must demonstrate that the proposed activities meet the requirements of the ESS as Recognised Energy Savings Activities.[36] There is an AUD 500 fee for a project to become accredited.

To qualify for accreditation, an applicant must also be an Energy Saver, which is:

- the person responsible for paying for the energy consumed on the site where the Recognised Energy Savings Activities are taking place; or
- a third-party nominated by the original Energy Saver (typical nominated third parties include energy service companies, aggregators of Energy Savings Certificates, and businesses selling energy efficient appliances); or
- a person issued with a building rating under the National Australian Built Environment Rating System (where the proposed energy efficiency project uses this calculation methodology).[37]

Accredited parties are known as Accredited Certificate Providers. An Accredited Certificate Provider is authorised to create a specified number of Energy Savings Certificates in relation to the particular Recognised Energy Savings Activities for which it is accredited.

Enabling non-obligated parties to become Accredited Certificate Providers has stimulated the development of a vibrant energy services industry in New South Wales. Specialised firms carry out energy efficiency projects to create Energy Savings Certificates under the ESS that can then be sold to scheme participants who require certificates to meet their energy saving targets.

3.1.10 Eligible Energy Efficiency Measures

To be eligible for inclusion in the ESS, a Recognised Energy Savings Activity must involve:[38]

- modifying end-user equipment or usage of end-user equipment (including installing additional components);
- replacing end-user equipment with other end-user equipment that consumes less electricity;
- installing new end-user equipment that consumes less electricity than other end-user equipment of the same type, function, output, or service; or
- removing end-user equipment that results in reduced electricity consumption, where there is no negative effect on production or service levels.

A Recognised Energy Savings Activity must have been implemented on or after 1 July 2008. Importantly, it must not include an activity that has been undertaken to comply with any statutory requirement. This ensures there is regulatory additionality in the ESS. In addition, a Recognised Energy Savings Activity cannot reduce the scope or quantity of production or service from the use of electricity. Closing part of a factory, for example, would not qualify.

Generally a Recognised Energy Savings Activity must be implemented in New South Wales. However, the legislation enables Energy Savings Certificates to be created under the ESS for "any activity, or class of activities, that reduces the consumption of electricity in another jurisdiction, if an approved corresponding scheme is in operation in that

35 New South Wales Government, 2012e

36 Recognised Energy Savings Activities are the specific activities implemented to reduce the consumption of electricity or increase the efficiency of electricity consumption. To be eligible under the ESS, the activity must have been implemented on or after 1 July 2008.

37 The National Australian Built Environment Rating System (NABERS) is a voluntary performance-based rating system for existing buildings. NABERS rates a building on the basis of its measured operational impacts on the environment. See more information at: http://www.nabers.com.au/

38 New South Wales Government, 2012a

jurisdiction."[39] This provision may be used in the future to enable harmonisation of the ESS with other EEO schemes in Australia.

3.1.11 Measurement, Verification, and Reporting

There are four methods for calculating the energy savings created through implementing a Recognised Energy Savings Activity:[40]

1. **Project Impact Assessment Method** – a case-by-case approach for calculating energy savings from one-off energy efficiency projects. The calculation is based on an engineering assessment of the energy consumption of a process, system, or equipment before and after implementation of the activity.

2. **Metered Baseline Method** – applies to activities that reduce the electricity consumption of a whole site, or discrete part of a site, such that the energy savings can be determined by reference to a site baseline.

3. **Deemed Energy Savings Method** – The Deemed Energy Savings Method is a generic approach for measuring the lifetime or "deemed" savings of an activity upfront or before the actual savings occurs. It is used for activities involving installation of common end-user equipment. This method applies to: efficient halogen lamps, efficient showerheads, high efficiency clothes washers, high efficiency dish washers, purchase of a new high efficiency refrigerator or freezer, retirement of a refrigerator or freezer built before 1996, commercial lighting, high efficiency motors, and energy savings attributable to the reduced losses from installation of power factor correction equipment.

4. **National Australian Built Environmental Rating System Baseline Method** – This method can be used to calculate energy savings from energy efficiency upgrades to new or existing commercial office buildings, hotels, and shopping centers.

The forms for the calculation methodologies are provided on the ESS website and require a certain level of sophistication to complete. Only the Deemed Energy Savings Method allows for creation of certificates in advance of actual savings.

The ESS legislation calls on the Scheme Regulator to require audits as part of assessing compliance. Audits may be required for any energy efficiency project at the discretion of the Scheme Regulator, including on a random basis. Audits under the ESS are performed by an Audit Services Panel, consisting of parties that the Scheme Administrator has approved to perform audits.

3.1.12 Trading of Energy Savings

Energy Savings Certificates created under the ESS can be sold. Parties interested in buying certificates include:[41]

- scheme participants, who are required to acquire and surrender certificates to meet their energy savings targets;
- intermediary agents, who might subsequently sell the certificates to scheme participants; and
- organisations or individuals interested in voluntarily purchasing offsets to manage their carbon footprint.

The Scheme Administrator operates a registry, which is a web-based database that tracks the creation, ownership transfer, and surrender of certificates. Accredited Certificate Providers are authorised by the Scheme Administrator to create a set number of Energy Savings Certificates, and they can do this through the registry once the eligible energy savings have been achieved. The registration fee is AUD 0.70 per certificate. The registry is not a trading platform and the Scheme Administrator is not involved in operating a trading market. Access to the registry is open to the general public.[42]

The majority of certificate sales take place over the counter through bilateral contracts with no obligation to disclose the prices paid. Other sales occur through spot markets established by various private sector market makers. Some brokers provide regular updates on spot market prices for certificates. There are three types of contracts for trading certificates:[43]

39 New South Wales Legislation, 1995. Section 127.

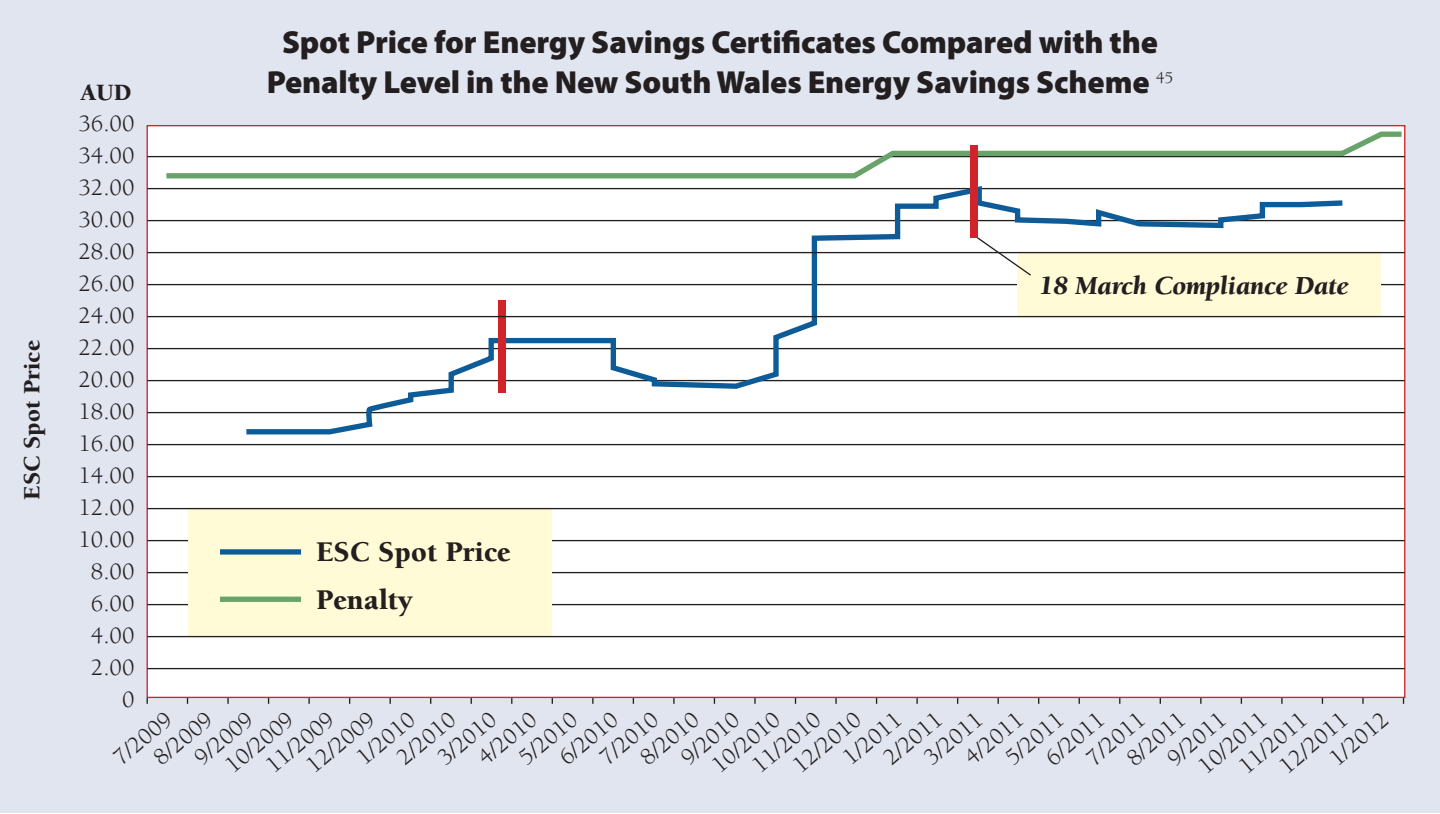
40 New South Wales Government, 2012f

41 New South Wales Government, 2012f

42 New South Wales Government, 2012a

43 New South Wales Government, 2012g

Figure 2



- **Spot contract** – a contract for a physical exchange of a specified quantity of certificates at an agreed price.

- **Forward contract** – a contract for the exchange of a specified quantity of certificates at a predetermined price on a fixed date.

- **Option contract** – the buyer pays the seller a premium to acquire a right, but not the obligation, to buy (call option) or sell (put option) a quantity of certificates at a predetermined price.

The ESS framework does not set a maximum price for Energy Savings Certificates, but it does set a penalty rate for energy savings shortfalls, which provides a theoretical ceiling for the price of certificates. For the 2012 compliance year, the penalty rate is AUD 24.86 per certificate, which is not tax deductible. Once tax impacts are taken into account, the tax-adjusted value of the penalty to a scheme participant is equivalent to AUD 35.51 per certificate.[44]

Figure 2 shows changes in the certificate spot price compared with the tax-adjusted penalty value from the inception of the ESS in July 2009 to January 2012.

3.1.13 Funding

Costs of meeting the ESS targets incurred by scheme participants are implicitly assumed to be costs of doing business and, where possible, are passed on to customers.

3.1.14 Scheme Administration

The Independent Pricing and Regulatory Tribunal of New South Wales oversees the ESS as the Scheme Administrator, according to rules developed by the New South Wales Department of Trade & Investment, Regional Infrastructure and Services.[46] The Tribunal's two basic functions are:

- to ensure compliance by scheme participants with their energy saving targets; and
- to manage the operation of the ESS.

To fulfill its functions in relation to both GGAS and ESS, the Tribunal has established two functional groups, the

44 New South Wales Government, 2012a

45 Sniffin, 2012

46 New South Wales Government, 2012

Scheme Regulator (ensuring compliance) and the Scheme Administrator (overseeing trading).[47] In addition to its role with GGAS and ESS, the Tribunal is the regulator for several industries in New South Wales.

3.1.15 Scheme Results

From the inception of the ESS in July 2009 to late March 2012, 1,978,541 Energy Savings Certificates have been created. This corresponds to the same number of metric tonnes of abated carbon dioxide equivalent. To late March 2012, 1,705,686 certificates have been surrendered.[48]

Prior to the establishment of the ESS, energy savings were achieved under the Demand Side Abatement Rule as part of the Greenhouse Gas Reduction Scheme. Certificates created under that Rule rose from 4.5 percent of all GGAS certificates in 2003 to 43.6 percent of all certificates in 2008. During that time, a total of 29,588,671 certificates, most of which would correspond to tonnes of CO_2-e abated through energy efficiency, were created under the Demand Side Abatement Rule.[49]

The greatest growth in energy efficiency between 2003 and 2008 occurred in the residential sector. GGAS certificates created through energy saving measures in the residential sector rose from 2.4 percent of measures in 2003 to 81 percent of measures in 2008. Most of these certificates were created using deemed energy saving values.

The sources of certificates created under the Demand Side Abatement Rule during the period 2003-2008 are shown in Figure 3.

3.1.16 Areas for Improvement

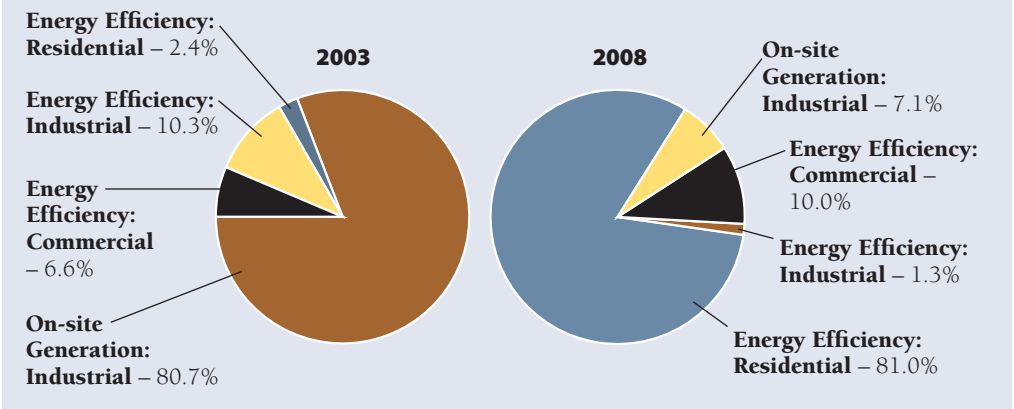
Most of the energy savings in the residential sector under the Demand Side Abatement Rule were created by projects in which compact fluorescent lamps and water-efficient showerheads were sold at a discount or given away free of charge to households by firms that purchased the appliances in bulk and generated a profit by selling the resulting certificates that were assigned to them by householders. Four firms created more than one million certificates each from residential energy efficiency projects in 2006, including one firm that created more than three million. A market survey commissioned by the GGAS Scheme Administrator subsequently indicated that more than half of the compact fluorescent lamps and showerheads given away had not been installed. As a result, the New South Wales Minister for Energy reduced the installation discount factor for giveaways of compact fluorescent lamps and showerheads from 0.9 and 0.8, respectively, to 0.4, with the option for a project proponent to appeal for a higher discount factor where evidence supported a higher installation rate for its project.[51]

In establishing the ESS, particular attention was paid to minimising the opportunities for large-scale distribution of energy efficient appliances with deemed energy saving values. Compact fluorescent lamps were not included as a Recognised Energy Savings Activity. Procedures were established to identify instances in which a large number of showerheads were replaced at a single address, or in which installations were claimed by more than one Accredited

Figure 3

Sources of Certificates Created under the Demand Side Abatement Rule of the New South Wales Greenhouse Gas Reduction Scheme [50]

2003 and 2008



47 New South Wales Legislation, 1995. Division 10, Sections 151-2 creates the Scheme Regulator; Sections 153-4 create the Scheme Administrator.

48 GGAS & ESS Registry available at: https://www.ggas-registry.nsw.gov.au/searching/totalsbytype.aspx?scheme=ESS

49 New South Wales Independent Pricing and Regulatory Tribunal, 2009a

50 New South Wales Independent Pricing and Regulatory Tribunal, 2009a

51 Crossley, 2008

Certificate Provider at a single address. Where duplicates are discovered for an individual address, only the first installation is recognised and all subsequent installations are deemed as invalid.

3.2 Australia – South Australia

The South Australian Residential Energy Efficiency Scheme (REES) went into effect on 1 January 2009 and will initially apply until 31 December 2014. The Scheme is intended to be ongoing and will operate in three-year phases.

The REES is one of three EEO schemes developed at the state level in Australia. It differs from its counterparts – the New South Wales and Victorian schemes – in that it does not include tradable energy efficiency certificates. Rather, obligated energy retailers in South Australia accumulate credits toward their annual targets, and are allowed limited transfer of credits to other obligated retailers.

The REES contributes to achieving the South Australian Government's broader goals to improve energy efficiency and reduce GHG emissions.

In 2002, the South Australian Cabinet approved an *Energy Efficiency Action Plan,* which defines minimum energy efficiency measures in government operations. The measures address construction of new government buildings, major refurbishment projects, operation and maintenance of government assets, equipment procurement policies, and vehicle fleet use. An Energy Efficiency Reference Group, chaired by the Energy Division of the Department for Manufacturing, Innovation, Trade, Resources and Energy, was established to monitor the implementation of the *Energy Efficiency Action Plan*.[52]

The South Australian Government's Strategic Energy Plan was established in March 2004. The Plan is used by the South Australian Government to help shape its direction and investments. It outlines a series of objectives for implementing energy efficiency in South Australia. Two of the objectives are:[53]

- to reduce energy consumption in government buildings by 25 percent within ten years and lead Australia in wind and solar generation within ten years; and
- to increase energy efficiency of dwellings by ten percent within ten years, by such means as the introduction of a five-star energy requirement for new houses by May 2006.

In 2007, South Australia mandated targets to reduce greenhouse emissions when the State Parliament passed the *Climate Change and Greenhouse Emissions Reduction Act 2007*. The legislation contains three targets:[54]

- to reduce GHG emissions within South Australia by at least 60 percent to an amount that is equal to or less than 40 percent of 1990 levels as part of a national and international response to climate change by December 31, 2050;
- to increase the proportion of renewable electricity generated so it comprises at least 20 percent of electricity generated in South Australia by December 31, 2014; and
- to increase the proportion of renewable electricity consumed so that it comprises at least 20 percent of electricity consumed in South Australia by December 31, 2014.

3.2.1 Policy Objectives

The South Australian Government stated three objectives for the REES:[55]

- to improve residential energy efficiency and reduce GHG emissions;
- to assist households, particularly low-income households, to prepare for likely increases in energy prices associated with policy responses to reduce GHG emissions; and
- to reduce energy costs for households, but particularly low-income households.

3.2.2 Legal Authority

The REES is given statutory effect through Parts 2AA of the *Electricity (General) Regulations 1997* and *Gas Regulations 1997*. The Regulations establish the Essential Services Commission of South Australia as the Scheme Administrator of the REES. The Commission created the *Residential Energy Efficiency Scheme Code*[56] in December 2008. The Code went into effect on 1 January 2009 as an

52 Government of South Australia, 2002

53 Government of South Australia, 2004

54 Government of South Australia, 2007

55 Essential Services Commission of South Australia, 2011

56 Essential Services Commission of South Australia, 2012a

industry code pursuant to the powers of the Commission under section 28 of the Essential Services Commission Act 2002. The Code is binding upon licensed energy retailers pursuant to Part 4 of the Act.

3.2.3 Fuel Coverage

Electricity and natural gas.

3.2.4 Sector and Facility Coverage

Residential sector dwellings only.

3.2.5 Energy Saving Target

For each year of the REES, obligated parties are required to achieve two types of targets[57]:

- GHG emissions reductions, achieved by undertaking approved energy efficiency measures in households; and
- energy audits, achieved by conducting a target number of energy audits in priority group households[58] for each compliance period.

A sub-target of 35% of the GHG emissions reduction target must be achieved in priority group households.

Table 2 shows the REES targets set by the South Australian Minister for Mineral Resources and Energy.

3.2.6 Obligated Parties

Obligated parties under the REES are licensed energy retailers with 5,000 or more electricity or natural gas residential customers in South Australia.[60]

The individual REES targets for each obligated energy retailer vary depending upon the number of residential customers the retailer supplies and how much electricity and/or gas they sell. The formulae for calculation of REES targets for both GHG emissions reductions and for energy audits allocate a proportion of the overall target to each obligated energy retailer for each licence (electricity and/or gas) held by that retailer.[61]

For the GHG emissions reduction targets, the proportion of the overall target allocated to an individual retailer is the ratio of the annual GHG emissions from the electricity or gas consumed by residential customers supplied by that retailer to the total annual GHG emissions for all residential customers (both electricity and gas) for all the REES obligated retailers.

The assessment of GHG emissions is based on reported annual electricity sales (less accredited GreenPower sales) or gas sales for the financial year prior to the calendar year for which targets are being set, multiplied by the relevant emissions factor for electricity or gas.

Table 2

Targets for the South Australian Residential Energy Efficiency Scheme[59]

	2009	2010	2011	2012	2013	2014
Greenhouse gas emissions reductions (tCO_2-e)	155,000	235,000	255,000	255,000	335,000	410,000
35% of greenhouse gas emissions reductions to be achieved in priority group households (tCO_2-e)	54,250	82,250	89,250	89,250	117,250	143,500
Energy audits in priority group households (number)	3,000	5,000	5,000	5,667	5,667	5,667

57 Essential Services Commission of South Australia, 2012b

58 Priority group household are defined as households that include a person who is a recipient of one of a range of specified welfare benefits, or who falls within a class of persons who are experiencing hardship determined or approved by the Essential Services Commission.

59 Essential Services Commission of South Australia, 2012b

60 Essential Services Commission of South Australia, 2011

61 Essential Services Commission of South Australia, 2011

An obligated retailer's GHG emissions reduction target is directly proportional to the product of annual electricity sales (less accredited GreenPower sales) or gas sales for the previous financial year and the relevant emissions factor. The electricity emissions factor is much greater than that for gas and, as a consequence, the average electricity customer makes about three times the contribution to a retailer's total GHG emissions reduction target (i.e., arising from both its electricity and gas licences) than does the average gas customer.[62]

For the energy audit target, the allocated proportion of the overall target is the ratio of the number of residential electricity or gas customers supplied by the retailer to the total number of residential customers (both electricity and gas) for all the REES obligated retailers. The assessment of customer numbers is based on reported customer numbers for the financial year prior to the calendar year for which targets are being set.

An obligated retailer's total energy audit target arising from both its electricity and gas licences is directly proportional to the number of electricity and gas customers it supplied in the previous financial year, with electricity and gas customers counting equally toward determination of the overall target.[63]

Table 3 shows the 2010 targets allocated by the Essential Services Commission to the obligated energy retailers:

3.2.7 Compliance Regime

The Minister has the task of setting the overall GHG emissions reduction and energy audit targets for the REES each year. Individual targets are then allocated to each obligated energy retailer by the Essential Services Commission, as the Scheme Administrator. Obligated energy retailers achieve compliance under the REES by undertaking sufficient activities to meet their individual annual targets. Through undertaking these activities, retailers accumulate toward their targets.

An obligated retailer must collect and record information in relation to all energy efficiency and energy audit activities that are performed at residential dwellings. All records must be maintained according to requirements in section 5.3 of the REES Code. The Essential Services Commission determines compliance with the annual targets based on each obligated retailer's reporting statements.[65] An obligated retailer must provide the Commission with a REES reporting statement on a quarterly basis. The statement must truthfully, accurately, and verifiably represent the records maintained in accordance with clause 5.2 of the REES Code, comply with the data and form requirements as specified in the Code, and contain a responsibility statement signed by the Chief Executive Officer or person of equivalent responsibility. The statement must report the substance of transactions and events taken by the energy retailer in compliance with the REES, and the items reported must be verifiable.[66]

Table 3

Targets for Obligated Energy Retailers in the South Australian Residential Energy Efficiency Scheme, 2010[64]

Electricity Retailers	Total Greenhouse Gas Reductions (tCO_2-e)	Greenhouse Gas Reductions in Priority Group Households (tCO_2-e)	Energy Audits (number)
AGL SA	108,200	36,090	2,123
Origin Energy	43,073	9,721	1,528
TRUenergy	30,679	9,216	675
Simply Energy	34,748	10,936	405
Lumo Energy	10,780	3,972	141
Powerdirect	5,850	2,047	84
Red Energy	3,328	1,165	49
Total	**236,657**	**73,148**	**5,000**

62 Essential Services Commission of South Australia, 2011

63 Essential Services Commission of South Australia, 2011

64 Essential Services Commission of South Australia, 2011

65 Essential Services Commission of South Australia, 2012a, Section 6.2

66 Essential Services Commission of South Australia, 2011

In addition to the quarterly reporting statements, each obligated retailer is required to submit a Compliance Plan to the Essential Services Commission by March of each compliance year. The compliance plan must include:[67]

- a statement from the Chief Executive Officer of the obligated retailer acknowledging their obligations and responsibilities under the REES for the coming year;
- a description of the obligated retailer's internal allocation of responsibilities in accordance with their obligations and responsibilities under the REES; and
- a description of the resources, systems, and processes which the obligated retailer intends to use to ensure that their obligations and responsibilities under REES are met for the coming year.

Obligated energy retailers are able to bank an unlimited number of credits toward their targets, providing some flexibility in the REES. This means that if a retailer delivers energy saving measures and/or energy audits in excess of their targets in any one year, they can carry those credits over to help meet targets in later years. However, energy retailers are not able to borrow credits from future years to meet targets in the current year.

If an obligated energy retailer does not meet their targets in any year, they must pay a penalty. Amendments to the *Electricity Act 1996*, the *Gas Act 1997*, and the Regulations under the Acts have created a penalty regime for non-compliance with the REES. If the Essential Services Commission determines that an obligated retailer did not meet their respective targets, it may issue a shortfall notice advising the retailer of the penalty amount applicable, and allow the retailer to either pay the penalty or be prosecuted for a breach of licence. Each shortfall penalty has two components: a "base penalty" that applies regardless of the size of the shortfall, and a "per unit penalty," which is a dollar value applied to each tonne of CO_2-e not reduced, or per energy audit not undertaken.[68]

Shortfall penalties are set by taking into consideration the costs of compliance with the REES. The penalties are:[69]

- base penalty amount of AUD 10,000 for a REES shortfall, applicable to each target;
- shortfall penalty for GHG emissions reduction target of AUD 70 per tCO_2-e not reduced;
- shortfall penalty for GHG emissions reduction target in priority groups of AUD 70 per tCO_2e not reduced; and
- shortfall penalty of AUD 500 per energy audit not achieved.

In addition to paying the shortfall penalty for energy audits, energy retailers are also required to carry out, in the subsequent year, their shortfall number of energy audits in addition to their annual target for that year.[70]

Any monies recovered by the Essential Services Commission under the penalty regime must be applied under a scheme established by the Commission for one or more of the following purposes:[71]

- to assist persons who may have failed to benefit from activities relating to energy efficiency on account of any retailer's energy efficiency shortfall; and
- to support other programmes or activities to promote or support energy efficiency or renewable energy initiatives within South Australian households.

3.2.8 Performance Incentives

No performance incentives are available.

3.2.9 Eligible Energy Savings

Obligated retailers can determine how, when, and to which customers energy efficiency activities and energy audits are offered and also whether customers are charged for these activities or whether incentives are provided.

Energy efficiency activities and/or energy audits that contribute to REES targets can be undertaken by an employee, agent, or contractor of an obligated retailer, or any other person, provided that person permits the activity to count toward the retailer's REES targets.[72] In 2009 and 2010, obligated retailers generally chose to engage contractors to undertake energy efficiency activities and energy audits. Although the conduct of energy efficiency activities and energy audits may be outsourced, the REES obligations continue to rest with the obligated retailers, not with their engaged contractors or other third parties.[73]

67 Essential Services Commission of South Australia, 2012a, Section 5

68 Essential Services Commission of South Australia, 2011

69 Essential Services Commission of South Australia, 2011

70 Essential Services Commission of South Australia, 2011

71 Essential Services Commission of South Australia, 2011

72 Essential Services Commission of South Australia, 2012a, Sections 3.3.2 and 4.3.2

73 Essential Services Commission of South Australia, 2011

The provision allowing obligated retailers to engage contractors creates opportunities for the development of independent energy efficiency installers and energy service companies to undertake energy efficiency activities that contribute to REES targets.

3.2.10 Eligible Energy Efficiency Measures

Obligated energy retailers must meet their GHG emissions reduction targets by implementing energy efficiency measures in residential households. Retailers may choose the energy efficiency measures they elect to provide to their residential customers from a list of measures approved by the Minister. Further measures are added to the list from time to time.

Table 4 shows some of the eligible energy efficiency measures in the REES.

Each eligible energy efficiency measure has a deemed value listed in the REES Code, which specifies the amount of GHG emissions reduction (in tCO_2-e) that energy retailers may claim for the measure. For example, Table 5 lists the deemed values that may be claimed for selected draught-proofing activities.

A number of factors are taken into account in determining deemed values. A base case reflecting business as usual is established for each measure, with expected lifetime energy savings calculated as savings above the baseline. The lifetime of a measure is generally not to exceed 20 years. The energy savings value may be adjusted for certain reasons, including changes in business-as-usual projections and planned future regulation. Deemed values also take account of climate zones, where there is a material difference in energy savings achieved in different zones. Finally, GHG coefficients for translating energy savings into CO_2-e are set for each energy efficiency measure, using emissions factors published by the Commonwealth Department of Climate Change and Energy Efficiency.[76]

Energy retailers that claim the deemed value for an eligible energy

Table 4

Selected Eligible Energy Efficiency Measures in the South Australian Residential Energy Efficiency Scheme[74]

Lighting	Replace existing light bulbs with energy efficient models.
Showerheads	Replace an existing showerhead with an efficient model that saves water and costs less to heat the water.
Ceiling insulation	Install ceiling insulation in uninsulated dwellings.
Draught proofing	Seal gaps in doors, windows, fireplaces, and exhaust fans to stop draughts.
Fridges and freezers	Retire inefficient fridges and freezers, particularly second fridges and freezers.
Heating and cooling systems	Upgrade heating and cooling systems to more efficient systems, or install ductwork that makes them work more efficiently and with less energy.
Water heaters	Install a more efficient water heater where this is not already required under the new water heater standards for South Australia.

Table 5

Deemed Values for Selected Draught-Proofing Activities in the South Australian Residential Energy Efficiency Scheme[75]

Draught-Proofing Activity	Deemed Value (tCO_2-e)
Door (per door)	0.2
Window (per linear meter of product)	0.02
Chimney (per chimney)	2.9
Exhaust fan (per fan)	0.1

The deemed value applies to a single door or window, regardless of the number of draught-proofing products that are fixed to that door or window in undertaking the activity.

74 Essential Services Commission of South Australia, 2011

75 Essential Services Commission of South Australia, 2012a

76 Essential Services Commission of South Australia, 2012a, Schedule 7: Ministerial Protocol, Specific principles for calculating deeming values.

efficiency measure must meet minimum requirements in relation to the installation of that measure. The Essential Services Commission is responsible for monitoring, reviewing, and modifying the list of eligible energy efficiency measures and the corresponding deemed values and minimum requirements.[77]

3.2.11 Measurement, Verification, and Reporting

The Essential Services Commission periodically evaluates claimed GHG emissions reductions based on an obligated retailer's quarterly reporting statements, and determines compliance with REES targets upon receipt of the final quarterly reporting statement in any given year. The Commission determines whether the obligated retailer has fallen short or exceeded their targets and, if necessary, determines whether there is an energy saving credit that may accrue toward future targets.[78]

In addition, the Commission may require an obligated retailer:[79]

- to undertake an audit of its operations in relation to its compliance with its obligations under the REES;
- to use an independent expert approved by the Commission to conduct the audit; and
- to report to the Commission the results of the audit.

3.2.12 Trading of Energy Savings

There is no energy efficiency certificate scheme under the REES. Energy retailers accumulate credits toward their annual targets, and limited trading of these credits among obliged retailers is allowed. Retailers that have exceeded their targets may transfer any excess credits to another obliged retailer.[80]

3.2.13 Funding

Implementation of the REES has resulted in increased costs for obligated retailers that will be passed on to customers. Previous determinations by the Essential Services Commission provided that obligated retailers may apply to the Commission for the pass through to standing contract prices of costs associated with the legislated imposition of an energy efficiency scheme such as the REES. In the gas price determination effective from 1 August 2011, the REES component was set at AUD 2.50 per customer per annum to be increased each year by the Consumer Price Index. The electricity price determination provides a starting estimation for the REES component of AUD 12.55 per customer per annum.[81]

The REES pass through allowances are provided to AGL SA and Origin Energy for their standing contract customers. It would be expected that similar amounts would be passed on by all obligated retailers to customers with market contracts, so that all residential customers will have to pay amounts of the order indicated.

Based on the numbers of small customers in South Australia (in 2010, approximately 805,000 for electricity and 380,000 for gas), and assuming that all obligated retailers are recovering similar REES cost amounts, the Essential Services Commission estimates the total annual cost of REES for small customers as being on the order of AUD 11 million.[82]

3.2.14 Scheme Administration

The REES Code establishes requirements in relation to the conduct and operations of the REES. These requirements include:[83]

- the allocation and notification to obligated retailers of their GHG emissions reduction targets, energy audit targets, and priority group GHG emissions reduction targets;
- record-keeping and reporting requirements (including data integrity assurance mechanisms) in relation to GHG emissions reduction targets, energy audit targets, and priority group GHG emissions reduction targets; and
- compliance and audit obligations (including provisions for Annual Compliance Plans) in relation to GHG emissions reduction targets, energy audit targets, and priority group GHG emissions reduction targets.

Information about services and products available to households under the REES is made available to the public on the REES website, and the South Australian Government has distributed informational flyers on the various energy

77 Essential Services Commission of South Australia, 2011

78 REES Code, Section 6.

79 REES Code, Section 5.9.1.

80 Essential Services Commission of South Australia, 2010

81 Essential Services Commission of South Australia, 2011

82 Essential Services Commission of South Australia, 2011

83 Essential Services Commission of South Australia, 2012a

savings available. The REES website contains a link to a telephone number and email where the public may obtain more information.[84] Each obligated energy retailer has their own informational website with contact information for the public on the various measures being employed.

3.2.15 Scheme Results

Table 6 shows the results against the REES targets in 2009. All the targets were exceeded by substantial margins.

Table 6

Results Against Targets for the South Australian Residential Energy Efficiency Scheme, 2009[85]

	Target	Result
Greenhouse gas emissions reductions (tCO_2-e)	155,000	208,333
35% of greenhouse gas emissions reductions to be achieved in priority group households (tCO_2-e)	54,250	83,852
Energy audits in priority group households (number)	3,000	3,674

The Essential Services Commission has estimated that the average cost per tCO_2-e emissions abated under the REES is approximately AUD 35 per tonne.[86]

3.2.16 Areas for Improvement

Based on operational experiences and stakeholder feedback during the first year of operation, the Essential Services Commission undertook a review of the format and content of the REES Code and recommended amendments. The Commission publicly released an amended REES Code on its website for stakeholder consultation, and the amended REES Code came into effect on 30 August 2010. A further revision of the REES Code came into effect on 1 January 2012.[87]

3.3 Australia – Victoria

The Victorian Energy Efficiency Target (VEET) Scheme commenced operation on 1 January 2009 and is scheduled to end on 31 December 2029. During this period, VEET will operate in three-year phases, with energy efficiency targets expected to increase in stringency over time. Obligated parties meet their individual targets by surrendering Victorian Energy Efficiency Certificates created by installing energy efficient products. The scheme is one of two energy efficiency certificate trading schemes in Australia (the other one is the New South Wales Energy Saving Scheme).[88]

The Victorian Essential Services Commission is responsible for administration of the VEET Scheme. The Commission is Victoria's independent economic regulator of essential services, including those supplied by electricity and gas. The Commission must also report annually to the Minister on the performance of the VEET Scheme.

The VEET Scheme comprises part of Victoria's climate change policy and was designed, in part, to help Victoria reach its goal of reducing its GHG emissions by 20 percent by 2020 and by 60 percent by 2050 compared to 2000 levels.[89] Victoria has placed particular focus on abating GHGs in the energy sector, which is responsible for 70 percent of the state's GHG emissions. The VEET Scheme reduces energy sector emissions by reducing demand. It further addresses persistent barriers to energy efficiency and promises to lower household energy bills through reduced rates and lower usage.

3.3.1 Policy Objectives

The stated objectives of the VEET Scheme are:[90]

- to reduce GHG emissions;
- to encourage the efficient use of electricity and gas; and
- to encourage investment, employment, and technology development in industries that supply

84 Government of South Australia, 2010

85 Essential Services Commission of South Australia, 2011

86 Essential Services Commission of South Australia, 2011

87 Essential Services Commission of South Australia, 2012a

88 South Australia also has an energy efficiency obligation scheme in place, but without a system for trading white certificates.

89 In March 2012, the Victorian Government announced that it intended to abolish the Victorian GHG emission reduction targets.

90 Victorian Legislation, 2012a

goods and services that reduce the use of electricity and gas by consumers.

3.3.2 Legal Authority

The VEET Scheme was enacted pursuant to the *Victorian Energy Efficiency Target Act 2007*.[91] Details of the scheme are set forth in regulations, issued by the Governor in Council,[92] and the Guidelines, made by the Essential Services Commission, pursuant to the Act.

3.3.3 Fuel Coverage

Electricity and natural gas.

3.3.4 Sector and Facility Coverage

The VEET Schemes originally covered only residential sector dwellings. From 1 January 2012, the Scheme was extended to also cover commercial and other non residential premises.

3.3.5 Energy Saving Target

The VEET Scheme operates in three-year phases, with Phase 1 running from January 2009 to December 2011 and Phase 2 from January 2012 to December 2014. The target during Phase 1 is set at 2.7 megatonnes of CO_2-e avoided per annum and the target during Phase 2 is 5.4 $MtCO_2$-e per annum.[93]

3.3.6 Obligated Parties

Obligated parties under the scheme are referred to as "relevant entities." Relevant entities are energy retailers who sell electricity and/or gas to 5,000 or more customers in Victoria and who purchase electricity or gas from specified sources (called making a "scheme acquisition"). A scheme acquisition for electricity retailers means the purchase of electricity for on-sale from the Australian Energy Market Operator. For gas retailers, a scheme acquisition means the purchase of gas for on-sale from a producer, storage provider, or interconnected pipeline operator, or from the Australian Energy Market Operator.[94]

Each obligated energy retailer's individual target is set based on their shares of electricity and gas sales in the previous year. An individual target is calculated by multiplying the amount of electricity or gas purchased by the retailer under scheme acquisitions in that year by a GHG reduction rate for that year.[95] Separate GHG reduction rates for electricity and gas are determined each year by the Governor in Council and their levels are set so as to deliver the VEET target for that year. The GHG reduction rate for electricity for the 2011 compliance year (1 January to 31 December 2011) has been set at 0.13767 and the GHG reduction rate for gas for the 2011 compliance year has been set at 0.00819.

3.3.7 Compliance Regime

Each obligated energy retailer must each year surrender the number of Victorian Energy Efficiency Certificates that corresponds to its VEET Scheme target for the year. Each certificate represents one metric tonne of tCO_2-e abated by specified energy saving activities.[96]

Certificates offered for surrender must comply with two criteria:[97]

- the certificates must not have expired, that is, the energy efficiency project from which the certificates were created must have been completed within six years before the date on which the obligated energy retailer makes its surrender; and
- the certificates must have been created by 30 January of the year following the relevant compliance year, for example, certificates created after 30 January 2012 cannot be used by retailers to meet their 2011 target, but can be used to meet their 2012 compliance year liability.

Each obligated energy retailer must submit an annual energy acquisition statement that sets forth the amount of electricity or gas acquired for on-sale for the year, the number of certificates being surrendered for the year, and any surplus certificates carried forward from the previous year or into the following year. The acquisition statement must be audited by an independent third party before submission to the Essential Services Commission.[98]

91 Victorian Legislation, 2012a

92 The State Governor with the advice of the Executive Council, comprised of all Ministers, but requiring only a quorum of the Governor and two Ministers for a meeting.

93 Victoria Essential Services Commission, 2012a

94 Victorian Legislation, 2012a

95 Victorian Legislation, 2012a

96 Victorian Legislation, 2012a

97 Victoria Essential Services Commission, 2012b

98 Victoria Essential Services Commission, 2012a

An obligated retailer that has a certificate shortfall for a year is liable to pay to the Consolidated Fund[99] an energy efficiency shortfall penalty. The penalty payable is determined by multiplying the retailer's certificate shortfall (in tCO_2-e) by a prescribed shortfall penalty rate.[100] The penalty rate for the 2011 compliance year was AUD 41.23 per tCO_2-e shortfall, and the rate is adjusted annually to reflect changes in the consumer price index.[101] The tax-adjusted penalty level sets a theoretical ceiling price for Victorian Energy Efficiency Certificates in trading.

3.3.8 Performance Incentives

No performance incentives are available.

3.3.9 Eligible Energy Savings

Energy savings that can be used to meet VEET Scheme targets are created through installing energy efficient products in end-use customers' premises. Products can be installed by obligated energy retailers and by non obligated parties who must have been assessed successfully in an accreditation process. Accredited parties are known as Accredited Persons. There are no restrictions on who can apply for accreditation, but applicants have to supply the Essential Services Commission with detailed information about their business model. The Commission uses that information to decide whether the applicant has the policies, processes, and expertise needed to operate within the VEET Scheme. There is an AUD 500 fee to become accredited.[102]

Under the VEET legislation, the right to create Victorian Energy Efficiency Certificates technically lies with the energy consumer for whom energy efficient products have been installed (although they cannot personally create the certificates unless they themselves become accredited). It is only when the energy consumer assigns those rights to an Accredited Person that the Accredited Person then has the ability to create certificates as a result of installing energy efficiency products.[103]

Through enabling non-obligated parties to create certificates, the VEET Scheme has stimulated the development of an energy services industry in Victoria, thereby achieving one of the stated objectives of the scheme.

3.3.10 Eligible Energy Efficiency Measures

Activities that install energy efficiency products to generate Victorian Energy Efficiency Certificates are known as "prescribed activities." To qualify as a prescribed activity, the activity must result in a reduction in GHG emissions that would not otherwise have occurred if the activity was not undertaken. The activity must also take place in Victoria.[104,105] Initially prescribed activities could only be carried out in residential dwellings, but from early 2012, most prescribed activities can also be carried out in commercial and other non-residential premises.

Victorian Energy Efficiency Certificates can only be created from prescribed activities when VEET-approved products are installed. Some types of products are preapproved for use in the VEET Scheme and are listed on a Register of Products[106] maintained by the Essential Services Commission. Other types of products must be approved by the Commission on a case-by-case basis for each Accredited Person. The Register of Products is updated on a regular basis to capture eligible products. Accredited Persons are required to apply to the Commission for approval of products not listed in the Register before installing the products for the purposes of creating certificates.[107]

The VEET Regulations establish about 30 prescribed activities and the deemed GHG emissions reduction attributed to each activity. Table 7 (page 25) shows the 11 broad categories of prescribed activities. This will expand to include four commercial sector-specific activities, probably in May 2012.

99 The Consolidated Fund is a term used in Australia to describe the accounting location where a government's unallocated revenue is held.

100 Victoria Essential Services Commission, 2012a

101 Victoria Essential Services Commission, 2012b

102 Victoria Essential Services Commission, 2012c

103 Victoria Essential Services Commission, 2012d

104 Victoria Essential Services Commission, 2012a

105 The VEET legislation also allows prescribed activities to take place in another state or Territory in which an approved interstate energy efficiency regime is in force. However, this provision has not been operationalised.

106 The register includes water heating products, space heating products, thermally efficient windows, refrigerators and freezers, televisions, clothes dryers, and heat pumps. See more information at: https://www.veet.vic.gov.au/Public/Public.aspx?id=Products

107 Victoria Essential Services Commission, 2012e

Table 7

Categories of Prescribed Activities in the Victorian Energy Efficiency Target Scheme[108]

Water heating. Decommissioning low-efficiency water heating products and installing high-efficiency water heating products. This category also includes the installation of solar pre-heaters or solar retrofit kits.
Space heating and cooling. Decommissioning low-efficiency ducted heating products or central electric resistance heaters and installing high-efficiency ducted heating products; installing high-efficiency ducted heating products in new homes; installing high-efficiency space heating products, decommissioning refrigerative air conditioners and installing evaporative coolers, and decommissioning existing gas ductwork and installing new gas ductwork.
Space conditioning. Installing insulation, thermally efficient windows, and weather sealing products.
Lighting. Decommissioning high-energy lamps, including incandescent lamps, and installing low-energy lamps.
Shower roses. Decommissioning non-low-flow shower roses and installing low-flow shower roses.
Refrigerators/freezers. Purchasing high-efficiency refrigerators or freezers (refrigerator purchase) and destruction of pre-1996 refrigerators or freezers (refrigerator destruction).
Televisions. Purchasing high-efficiency televisions.
Clothes dryers. Purchasing high-efficiency electric clothes dryers or installing high-efficiency gas clothes dryers.
Pool pumps. Purchasing high-efficiency pool pumps.
Standby power controllers. Installing standby power controllers.
In-home displays. Installing an in-home display.

3.3.11 Measurement, Verification, and Reporting

The GHG emissions reduction attributed to each prescribed activity is calculated by comparing the difference between the energy use of the new high-efficiency product installed during the activity and the baseline energy use, which refers to the amount of energy that would have been used if the new product had not been installed. The VEET Regulations provide the methodology and values for calculating the CO_2-e abatement (and therefore the number of certificates eligible for creation) for each prescribed activity. The volume (in tCO_2-e) of abatement for each activity is calculated by multiplying the deemed energy saving by an abatement factor, times a regional factor (if any) applying to the location where the product is installed.[109]

The calculation may include a discount factor. Under the VEET Act, the responsible Minister may make a declaration specifying a discount factor that alters the number of Victorian Energy Efficiency Certificates that can be created as a result of a prescribed activity or specified class of prescribed activities.[110]

Accredited Persons must keep records that provide evidence that each prescribed activity has been undertaken in accordance with the VEET Regulations. This includes evidence of both installation and decommissioning (where replacement has occurred). These records are the subject of periodic audits commissioned by the Essential Services Commission.

3.3.12 Trading of Energy Savings

The process by which Victorian Energy Efficiency Certificates are bought and sold (traded) is known as a transfer. When an Accredited Person authorised to create certificates wants to transfer its certificates, it must find a buyer in the certificate market. The buyer may be an obligated energy retailer, another Accredited Person, or any other individual or organisation that holds a VEET Account.[111] The transferor must complete and submit a transfer request form to the Essential Services Commission via e-mail to effect a transfer of certificates. [112]

The Essential Services Commission does not provide a trading platform for the certificate market, but instead merely facilitates access to information about current owners

108 Victoria Essential Services Commission, 2012d

109 Victoria Essential Services Commission, 2012b

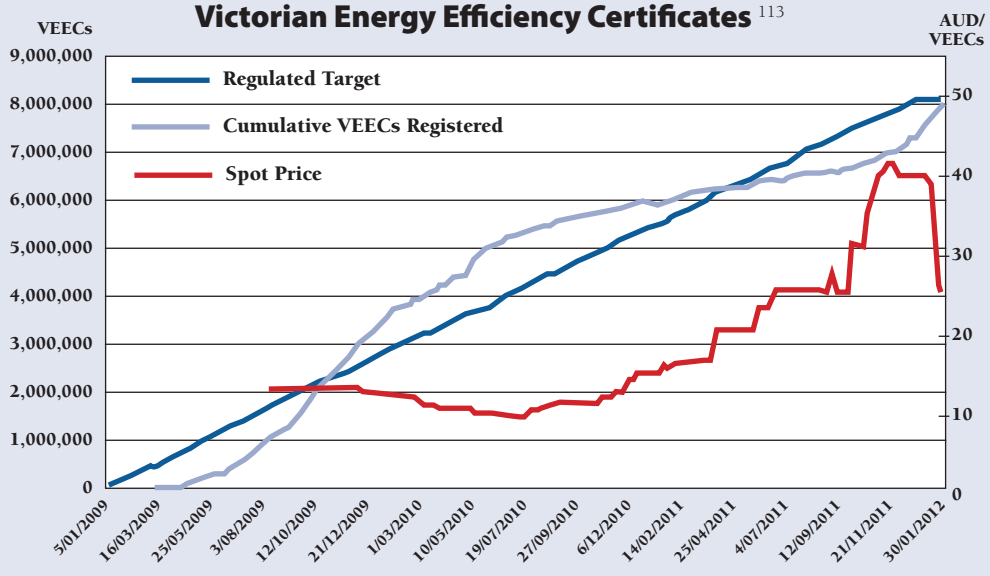
110 Victoria Essential Services Commission, 2012d

111 Holding a VEET account is different from accreditation as an Accredited Person under the scheme. A person or organisation with a VEET account may offer certificates for transfer or surrender, accept certificates into the account, and make payment for any liabilities associated with the VEET Scheme.

112 Victoria Essential Services Commission, 2012b

Figure 4

Historic Spot Price and Cumulative Registrations of Victorian Energy Efficiency Certificates [113]



Source: Nextgen

of certificates and records details of change of title resulting from certificate transfers. Any terms and conditions of sale, including certificate delivery and financial settlement, must be negotiated between the parties involved.

Figure 4 shows the historic spot price compared with the cumulative numbers of Victorian Energy Efficiency Certificates registered.

Victorian Energy Efficiency Certificates are not valid and cannot be bought, sold, or surrendered until they have been registered. When the Essential Services Commission is notified that an Accredited Person has created some certificates, it must then decide whether to register them. To make its decision, the Commission uses a range of assessment methodologies to evaluate whether the certificates have been properly created. Once it is satisfied that the certificates have been properly created, the Commission levies a registration fee of AUD 1 per certificate. Once payment is received, the Commission registers the certificates and notifies the Accredited Person that the certificates are now valid.[114]

3.3.13 Funding

Costs of meeting the VEET Scheme targets incurred by obligated energy retailers are implicitly assumed to be costs of doing business and, where possible, are passed on to customers.

3.3.14 Scheme Administration

The VEET Scheme is promoted to the public as the "Energy Saver Incentive." Information on the Energy Saver Incentive programme is available through Victoria's Save Energy website, launched in 2007.[115] The Energy Saver Incentive is marketed to residents of Victoria as a suite of discounts and special offers available for selected energy saving products and appliances from participating businesses. Residents can access savings from a range of participating businesses, including their energy retailer, local sustainability companies, local appliance retail stores, plumbers, builders, and other tradespeople.

3.3.15 Scheme Results

Table 8 shows the number of Victorian Energy Efficiency Certificates in circulation through 29 March 2012.

Table 8

Victorian Energy Efficiency Certificates in Circulation as of 29 March 2012 [116]

Certificates currently registered	3,727,604
Certificates pending registration	577,581
Certificates invalid due to voluntary surrender	80,283
Certificates invalid due to surrender	5,488,732

113 James Clinch, Victoria Essential Services Commission, personal communication.

114 Victoria Essential Services Commission, 2012b

115 State Government of Victoria, 2012

116 Victoria Essential Services Commission, 2012f

3.3.16 Areas for Improvement

The VEET Act and Regulations have been amended since the commencement of the scheme. Significant changes include:

- expansion of the scheme to apply to commercial sector premises;
- doubling the VEET scheme target to 5.4 megatonnes of CO_2-e per annum;
- adding several new prescribed activities, including installing standby power controllers and in-home displays; and
- significant expansion of the compliance powers of the Essential Services Commission by an Act amendment on 1 January 2012.

3.4 Belgium – Flanders

Belgium is divided into three regions: the Flemish region, the Walloon region, and the Brussels-Capital region. In Belgium, responsibility for crafting energy policy relating to the rational use of energy[117] falls to these regions. The Flemish region of Belgium introduced an EEO in 2002. The Flemish regional government's Decision of 29 March 2002 concerning public service obligations for the promotion of rational use of energy (RUE Law) placed an obligation on electricity distributors to meet annual primary energy savings targets.[118] The RUE Law was fully replaced by amendments made in 2007[119] and again in 2011.[120] These last amendments changed the RUE obligations completely. As of 2012, the energy saving targets for electricity distributors were eliminated and replaced by specific "action obligations," specific actions set forth by the Flemish Government that distributors must implement.

The Flemish EEO helps meet the climate obligations that Belgium has agreed to under the Kyoto Protocol, as well as to meet energy efficiency goals under Europe's Directive on energy end-use efficiency and energy services.[121]

Under the Kyoto Protocol, Belgium is required to reduce its GHG emissions in covered sectors 7.5 percent below 1990 levels by 2012. Responsibility for climate change and environmental and energy policies in Belgium is shared among the federal government and regional governments. The regions are responsible for, among other things, rational use of energy, renewable energy, and environmental legislation. In 2001, the federal government entered into a Cooperation Agreement with the regions to facilitate climate action and established the National Climate Commission. The Commission is composed of representatives of participating levels of government and is tasked with, among other things, the internal coordination and evaluation of the National Climate Plan.

The framework for implementing Flanders' climate goals includes reduction in GHG emissions, the promotion of rational energy use, the use of renewable energy sources, and application of the flexibility mechanisms of the Kyoto Protocol.[122] The 2004 *Act on the Rational Use of Energy* formed the legal basis for Flemish climate policy. It set forth the framework for meeting Flanders' Kyoto target of reducing emissions annually by 83.436 $MtCO_2$-e for the period 2008-2012, and further aimed to shape Flemish climate policy beyond 2012. The RUE Act was incorporated into the global Energy Act as of 2009.

Under the 2006 European Union Directive on Energy End-use Efficiency and Energy Services,[123] all European Member States have to produce an Energy Efficiency Action Plan showing how they plan to save nine percent of final energy consumption between January 2008 and December 2016. Under the Action Plan, Flanders is expected to save 16,959 GWh of energy by 2016.[124] The EEOs in the residential sector are expected to deliver more than half of the energy savings achieved by 2016 in the region.[125]

117 Rational use of energy (RUE) is a term commonly used in Europe, particularly by the European Commission, to describe energy efficiency.

118 B.S. 04.05.2002

119 B.S. 20.04.2007, p. 21360

120 B.S. 31.10.2011

121 European Parliament and the Council of the European Union, 2006

122 Flemish Government Department of Environment, Nature, and Energy, 2006

123 Directive 2006/32/EC sets an "indicative" (i.e., non-binding) target of nine percent of average annual energy consumption to be met by each Member State by the ninth year of application of the Directive. Average annual energy consumption is based on the most recent five-year period previous to implementation of the directive for which data are available.

124 Flemish Government, 2011

125 Flemish Government Department of Environment, Nature, and Energy, 2006

3.4.1 Policy Objectives

The objective of the RUE obligation is "to encourage the efficient use of energy in a liberalised market."[126] The RUE obligations came into force shortly after restructuring of the Belgian electricity sector, which legally unbundled transmission, distribution, and generation, and led to the creation of the Flemish Regulation Entity for the Electricity and Gas Market.[127] After restructuring, responsibility for oversight of the electricity and gas sectors was divided among the federal and regional authorities, with regional authorities overseeing the rational use of energy.[128]

Prior to the establishment of the RUE obligations, Belgian electricity grid companies and electricity suppliers faced federal public service obligations aimed at helping reduce demand growth in Belgium by 8 TWh in the period 1995 to 2005. The following reasons have been cited as driving the decision to go further by developing a RUE obligation in 2002: "limited control by the Flemish Government of the existing initiatives on energy efficiency; no clear energy saving target associated with these initiatives; and limited evaluation carried out of these initiatives."[129]

3.4.2 Legal Authority

The RUE obligations were introduced pursuant to the Flemish regional government's Decision of 29 March 2002 concerning public service obligations for the promotion or rational use of energy. Since 2002, a number of legislative amendments have introduced changes into the programme.[130]

3.4.3 Fuel Coverage

Electricity distributors are the obligated parties, but energy savings made for any fuel can contribute to meeting the energy saving targets.

3.4.4 Sector and Facility Coverage

The RUE obligation applies to energy saving measures in the household and non-energy intensive industry and service sectors.

3.4.5 Energy Saving Target

Since the introduction of the RUE obligation in 2002, the energy saving target has been changed several times. Prior to 2012, electricity distributors had to provide both direct and indirect support to energy efficiency measures undertaken. That is, they had to both financially support or promote the implementation of energy efficiency measures and provide information on energy saving opportunities to end-users. From 2008 until 2010, there were two sets of targets under the distributor obligation, one for primary[131] energy supplied to residential users, and another for primary energy supplied to non-residential users. In 2010 and 2011, electricity distributors had to comply with one single target, but with the obligation to undertake actions for both residential and non-residential users. As of 2012, electricity distributors have no energy saving target. Instead, they face specific "action obligations."

Before 2008, targets were differentiated for energy supplied to low- and high-voltage end-users. From 2003 to 2007, the primary savings goal for supply to high-voltage users was one percent of the electricity consumed two years earlier. The target for low voltage end-users started at one percent, and by 2007 grew to 2.2 percent of electricity consumed two years earlier. The more stringent low-voltage target was a response to the active promotion of compact fluorescent lamps in households being carried out at the time. Electricity distributors for whom household electricity consumption was less than ten percent of the electricity consumption of all low-voltage end-users were exempted from these higher targets.

126 Lees, 2007

127 Vlaamse Reguleringsinstantie voor de Electriciteits- en Gasmarkt became operational on 1 December 2001. See more information at: http://www.vreg.be/en

128 Restructuring of the electricity and gas sectors resulted in a division of responsibilities for oversight of the electricity and gas sectors between the federal and regional authorities. Federal authorities oversee electricity and natural gas tariffs, the high-voltage electricity grid (over 70 kilovolt), the storage and transport of natural gas, the production of electricity from traditional sources, and nuclear power. The regions, including Flanders, oversee distribution of electricity via voltage networks of 70 kV or less, the distribution of natural gas, the production of electricity from renewable energy sources and combined heat and power systems, rational use of energy, and social public service obligations. See more information at: http://www.vreg.be/en

129 Labanca, 2006

130 Couder, 2007

131 To determine primary energy savings for electricity, end-use electricity savings are multiplied by 2.5, compared to end-use savings from other fuels.

In 2008 and 2009, targets were set for residential and non-residential users (instead of low- and high-voltage users). Primary energy saving targets rose to two percent of electricity consumption two years earlier for residential users, and 1.5 percent for non-residential users. In 2010 and 2011, the combined single target was set at 3.5% of electricity consumption two years earlier for most electricity distributors and at 2.5% for those distributors with 2,500 end-users or fewer. As of 2012, the energy saving target has been replaced with specific "action obligations."

3.4.6 Obligated Parties

EEOs apply to the 16 electricity distributors in Flanders. Although the obligations placed on electricity distributors have changed several times since 2002, the obligated parties have remained the same.

3.4.7 Compliance Regime

From 2003 until 2011, the Flemish Energy Agency approved annual energy efficiency programmes and calculation methods for energy savings for the next year. Compliance with the targets from the previous year was evaluated annually. As of 2012, action obligations are determined by the Flemish government. Electricity distributors no longer need to submit annual action plans; however, compliance with the action obligations will still be based on evaluation of annual reports prepared by the distribution system operators.

From the beginning of the RUE scheme, the Flemish Regulation Entity for the Electricity and Gas Market was responsible for imposing fines on non-compliant parties. A penalty of EUR 0.10/kWh (or 10 eurocents) applied to any shortfall in meeting the obligation. The fine was not eligible for recovery through electricity tariffs.[132]

Other fines were also possible, for example

- if RUE action plans, RUE evaluation reports, list of actions, list of reserve actions, or application forms were not on time: EUR 1,000 per day;
- if RUE obligatory actions were not executed: between EUR 1,000 and 1% of annual turnover of the obligated distribution company (the Flemish Energy Agency determines the fine); and
- if RUE action plans or RUE evaluation reports did not comply with regulations: reminder to make adjustments and EUR 1,000 per day.

Electricity distributors complied with their obligations by meeting their annual targets. There was some flexibility built into the RUE targets. Distributors could carry over surplus from a given year to aid in compliance for the same user category in the following years. They could also apply for a change in the baseline for a given year if the total electricity supplied to non-domestic end-users had decreased by more than five percent due to disconnections by non-domestic users from the grid. No applications have been made since the introduction of the system. From 2008 until 2011, the Minister of Energy could loosen the RUE target for grid operators with fewer than 2,500 end-users, provided that the electricity distributors proposed actions or a financing commitment that compensates for the more relaxed target.[133] No such requests were ever made.

Electricity distributors were required to submit their energy savings plans and calculation methods to the Flemish Energy Agency for preapproval. They had to submit a description of all actions to be carried out by them to meet the target and include the method of calculation for primary energy savings. The Energy Agency approved the method of calculation, any financial contribution provided to end-use customers, and conditions attached to the financial contribution before energy saving activities could commence.[134]

In 2010, the Energy Agency was required to prepare a detailed report to the Flemish Government on the results, costs, and effectiveness of energy savings under the RUE scheme.[135] The report was submitted together with the global evaluation of the RUE obligations to the Flemish Government and led to the changed legislation as of 2012.[136] The new RUE obligation legislation no longer includes a predefined evaluation period. Evaluation will, however, take place along the way, largely motivated by the fact that the Flemish Government decided to compensate electricity distribution system operators for executing the obligatory actions (and paying premiums to the end-users) partially out of the Flemish Government's Budget. Because of this direct link with the Flemish Government's Budget, continuous evaluation of RUE obligations will be necessary.

132 Lees, 2007

133 Couder, 2007

134 Bertoldi, et al., 2010

135 Couder, 2007

136 Final decision by Flemish Government on September 23, 2011

3.4.8 Performance Incentives

No performance incentives are available.

3.4.9 Eligible Energy Savings

Only obligated electricity distributors can produce eligible energy savings.

3.4.10 Eligible Energy Efficiency Measures

Until 2011, the RUE Law specified, in addition to the energy saving target, "action obligations." Action obligations are specific actions, set forth by the Flemish Government, that electricity distributors must implement.[137] The energy savings from some action obligations counted toward meeting the RUE energy savings targets, while others did not.

Before the 2007 amendments, almost any energy saving measure was eligible to count toward meeting the energy saving target. Since 2007, most soft measures no longer counted toward achieving the primary energy saving target. For example, energy savings from measures implemented pursuant to energy scans (simple energy audits), required of some residential homes, counted toward the energy savings target. Energy savings resulting from the introduction of energy accounting schemes to track energy use of schools and health care facilities did not.

As of 2012, no energy saving targets are set; they were replaced entirely by specific action obligations.

Since the beginning of the Flemish RUE scheme, electricity distributors have been required to pay attention to "protected clients" (i.e., mostly low-income households). They do this through targeted actions such as giving protected customers higher financial incentives ("premiums") than those given to other customers in the form of "discount coupons" for the purchase of A+ or A++ refrigerators or AAA washing machines, or for organising special information sessions.

Following are some of the action obligations introduced since the commencement of the Flemish EEO scheme:

- In 2004-2005 electricity distributors were required to send to households in their service area a coupon that could be exchanged for a compact fluorescent lamp, energy-saving shower head, or energy meter.
- In 2006-2007, electricity distributors were required to send a voucher for a free energy-saving light bulb to every other member of the household.[138]
- As of 2007, electricity distributors were required to carry out each year a certain number of energy scans for every 100 household connections. "During these scans, energy-saving light bulbs, water-economy showerheads, pipe insulation and radiator foil are to be installed where advisable."[139]
- Electricity distributors must disseminate informational brochures and personalised energy-saving advice to households.
- From 2006 until 2011, electricity distributors have been required to help set up "energy accounting schemes" for schools and health care facilities, with costs shared between the buildings and network operators.
- Electricity distributors are required to support municipalities in their planning and implementation of local energy policies.[140]

3.4.11 Measurement, Verification, and Reporting

The Flemish Energy Agency has not made public its approved energy saving calculation methods.[141] Only first-year primary energy savings were credited toward energy saving targets.[142] From 2007, energy audits did not count toward the energy saving target, based on the finding that energy audits themselves do not lead to a predictable level of energy savings. The only exception to this are mandatory energy audits required from 2007 on, which are seen as yielding some level of concrete savings as they require installation of certain energy savings measures where deemed appropriate.[143]

3.4.12 Trading of Energy Savings

The Flemish EEO scheme does not provide for trading of energy savings. Electricity distributors have been able to carry forward excess savings from one year to the target for the next years.

137 Couder, 2007

138 Lees, 2007

139 Bertoldi, et al., 2010

140 Couder, 2007

141 Lees, 2007

142 Bertoldi, et al., 2010

143 Couder, 2007

3.4.13 Funding

Electricity distributors must submit an annual budget for compliance with their energy saving obligation, which must be approved by the federal regulator in charge of electricity tariffs. Cost recovery through tariffs is based on approved annual action plans for compliance.[144] In 2009, the total budget for all electricity distributors was EUR 60 million.

3.4.14 Scheme Administration

The main tools that electricity distributors have employed to stimulate energy savings have been rebates/premiums and financial assistance to municipalities to invest in energy saving measures,[145] combined with informational campaigns via brochures and the internet, and energy audits/scans.

3.4.15 Scheme Results

In general, Flemish electricity distributors have met or exceeded their targets, as demonstrated in Table 9. During the years 2003 to 2010 the energy saving targets were always met (taking into account the carried-over surplus from previous years), and no fines have been necessary. The sole exception has been that the specific "obligatory action" for energy scans has not always been met by all distributors. Fines were imposed on those distributors that did not meet the set scan quota.

From 2003 to 2005 the total expenditures used to meet energy savings targets were less than the amount budgeted for energy efficiency. In 2003 the cost of energy efficiency programmes was EUR 11.8 million compared with a EUR 24.8 million budget. Similar results were repeated in 2004 (EUR 18.3 million spent out of EUR 30.2 million budgeted) and 2005 (EUR 18.7 million spent out of EUR 24.5 million budgeted).

Typical measures undertaken in the residential sector have included introduction of compact fluorescent lamps, condensing boilers, high-performance glazing, heat pumps, attic/roof insulation, low-flow showerheads, and solar water heating. Typical measures in the non-residential sector include energy efficient lighting, variable speed drives, attic/roof insulation, and energy efficient boilers.

3.4.16 Areas for Improvement

Because of a lack of publicly accessible information, it is difficult to analyse many details of the Flemish EEO scheme, such as the potential to improve measurement and verification, or whether targets could have been set at more stringent levels. It is clear that, before 2012, there were no uniform actions within the Flemish region and that there was overlap with other policy instruments such as tax deductions for energy efficiency. As of 2012, actions are uniform over the whole region. Overlap with the tax deduction scheme for residential end-users has been reduced to a minimum, because these tax deductions (with the exception of roof insulation for 2012) have been eliminated.

Table 9

Results of the Flemish Efficiency Obligation Scheme [146]

Year	Savings of Primary Energy (GWh)		Total Expenditures (EUR million)	Cost Effectiveness* (EUR/kWh)
	Target	Realised		
2003	381	763	11.77	0.015
2004	551	790	17.37	0.022
2005	583	982	18.67	0.019
2006	606	573	18.51	0.032
2007	605	1,258	32.56	0.026
2008	646	1,773	48.07	0.027
2009	641	2,581	60.11	0.023
2010	1,318	2,308	61.78	0.027

**Calculated as the total budget divided by total energy savings*

144 Bertoldi, et al., 2010

145 Lees, 2007

146 Flemish Energy Agency, 2012

3.5 Canada – Ontario

In 1998, the Legislative Assembly of Ontario passed Bill 35, called the *Energy Competition Act*, which restructured Ontario's electricity market by enacting the *Electricity Act, 1998* and the *Ontario Energy Board Act, 1998*.[147] This established the Ontario Energy Board as the province's electricity and natural gas sectors regulator. The Ontario Energy Board protects consumer interests, promotes economic efficiency in the entire electricity sector, promotes energy efficiency, facilitates implementation of the smart grid, and promotes renewable energy.[148] The Acts also set the legal framework for restructuring Ontario Hydro into successor companies, commercialising the distribution industry, and opening the competitive wholesale market in electricity on 1 May 2002.[149]

The *Electricity Act* required all municipal electricity utilities to be incorporated as local electricity distribution companies (electricity distributors), which operate on a commercial basis with the option of earning a profit. The electricity distributors, which are mostly owned by municipal shareholders, are responsible for maintaining the local distribution network and retain a monopoly on the delivery of electricity. The Act opened the retailing of electricity to competition, allowing any number of licensed standalone electricity retailers to sell electricity to consumers. Electricity distributors are responsible for supplying electricity to customers who choose not to sign a contract with an electricity retailer.[150]

Beginning in 2003, the Ontario government began to tackle a number of energy challenges, including a shortfall in supply, a system reliant on coal-fired generation, and a lack of energy efficiency programmes. To address these issues, the government shut down its coal-fired plant, planning to phase out coal-fired electricity by 2014. It introduced 8,400 MW of cleaner power including renewables and invested CAD 7 billion in transmission. In 2005, the government reintroduced public energy efficiency programmes to encourage and provide incentives for families, businesses, and industry to consume less energy.[151]

Since 2003, Ontario has updated building codes and created programmes that provide home audits and retrofits, remove old appliances, retrofit schools, install thermal heating, reduce consumption in government buildings, and institute Time of Use pricing.

In 2004, the government established the Ontario Power Authority as the province's long-term energy planner. In 2007, the Ontario Power Authority prepared a 20-year energy plan, which included the goal of reducing demand by 6,300 MW by 2025. By 2011, more than 1,700 MW had been achieved. Aside from its duties as long-term energy planner, the Ontario Power Authority manages province-wide energy efficiency programmes, which can be additionally funded by electricity distributors who then receive credit for the additional energy savings. Between 2006 and 2010, Ontario invested about CAD 1.7 billion in energy efficiency programmes, saving ratepayers CAD 3.8 billion in avoided costs.[152]

In 2009, the government of Ontario passed the Green Energy Act in order to foster the growth of renewable energy projects and to promote and expand energy efficiency for all Ontarians. One goal of the Act is to spark growth in clean and renewable sources of energy, including wind, solar, hydro, and bioenergy. The Act is also meant to help create 50,000 clean energy jobs across the province. The Green Energy Act introduced mandatory home efficiency disclosure and appliance standards and labeling as well as gave the Lieutenant Governor in Council the authority to create mandatory energy efficiency targets for public agencies.[153]

On September 16, 2010 the Board issued a Conservation and Demand Management Code for Electricity Distributors (CDM). On March 31, 2010, the Minister of Energy issued a CDM Directive that requires electricity distributors to meet targets for both demand reduction (MW) and energy savings (GWh). Electricity distributors may achieve these targets by implementing their own energy efficiency programmes, which must be approved by the Ontario Energy Board, or by contracting with the Ontario Power Authority. The Government also announced a separate set of energy savings targets to be achieved province-wide

147 Legislative Assembly of Ontario, 1998

148 Ontario Energy Board, 2012

149 Electricity Distributors Association, 2012

150 Ontario Municipal Electric Association, 2000

151 Ontario Ministry of Energy, 2010

152 Ontario Ministry of Energy, 2010

153 Ontario Legislature, 2009

from activities of all organisations responsible for energy efficiency—electricity distributors, the Ontario Power Authority, and others, for milestone years 2015, 2020, 2025, and 2030.[154]

3.5.1 Policy Objectives

The government passed the Green Energy Act, 2009 in order to promote and expand "energy conservation by all Ontarians and to encourag[e] all Ontarians to use energy efficiently." The Act is also meant to ensure that the government and the broader public sector, including government-funded institutions, conserve energy and use energy efficiently in conducting their affairs as well.[155]

The CDM Directive, which establishes the savings goals for the province, states as its main goal to achieve reductions in electricity consumption and peak provincial electricity demand. The CDM Directive also instructs that lost revenues that result from CDM Programmes should not act as a disincentive to a distributor.[156]

3.5.2 Legal Authority

Section 27.1 of the Ontario Energy Board Act authorises the Minister of Energy to issue directives that have been approved by the Lieutenant Governor in Council that require the Ontario Energy Board to take steps to promote energy efficiency and load management or the use of cleaner energy sources, including alternative and renewable energy sources. Section 27.2 of the same Act authorises the Minister to issue directives that require the Board to take steps to establish energy efficiency and demand management targets to be met by electricity distributors and other licensees. A directive may require the Ontario Energy Board to specify energy efficiency targets as a condition of a license. A directive may further specify that a distributor meet any portion of its energy efficiency target by seeking the approval of the Board for energy efficiency and demand management programmes to be offered in its service area or by contracting with the Ontario Power Authority to meet the target through province-wide programmes.[157]

The Green Energy Act, 2009 gave the Lieutenant Governor in Council the authority to require a public agency to achieve prescribed targets and meet prescribed energy and environmental standards, including standards for energy efficiency and demand management.[158]

The CDM Directive, issued by the Minister of Energy in March 2010, establishes provincial energy saving targets and requires that the Ontario Energy Board specify a CDM target for the reduction of provincial peak electricity demand and a CDM target for the reduction of electricity consumption for each local distribution company. The CDM targets must be greater than zero. The CDM Directive also requires that, as a condition of its license, each distributor must meet its CDM targets through Board-approved programmes, programmes contracted through the Ontario Power Authority, or any combination of the two. [159]

3.5.3 Fuel Coverage

Electricity.

3.5.4 Sector and Facility Coverage

The CDM Directive establishes province-wide energy saving targets for peak demand and total consumption, which include usage and consumption by residential, commercial, and industrial consumers. The Directive requires that electricity distributors must deliver a mix of CDM Programmes to all consumer types in their service areas and, as far as is appropriate and reasonable, having regard to the composition of the distributor's consumer base.[160] The Ontario Power Authority-contracted province-wide CDM programmes consist of four programmes that each target a different customer sector: industrial, commercial and institutional, residential, and low income.[161]

3.5.5 Energy Saving Target

In the 2010 CDM Directive, the Minister of Energy announced a two-fold energy savings target (in MW and GWh), called the CDM target, to be met by electricity distributors in the period 2010 to 2014. The CDM

154 Environmental Commissioner of Ontario, 2010

155 Ontario Legislature, 2009

156 Environmental Commissioner of Ontario, 2010

157 Ontario Legislature, 1998

158 Ontario Legislature, 2009

159 Ontario Executive Council, 2010

160 Ontario Executive Council, 2010

161 Ontario Power Authority, 2011

Directive calls for electricity distributors to collectively achieve a 1,330-MW reduction in system-wide peak demand persisting in 2014 and 6,000 GWh of energy savings persisting at the end of 2014 to be accumulated between January 1, 2011 and December 31, 2014. These targets represent approximately five percent of Ontario's peak demand and four percent of annual electricity consumption, respectively. [162]

The CDM targets, assigned to each electricity distributor by the Ontario Energy Board, stipulate amounts of demand reduction (MW) and energy savings (GWh) that are essentially proportional to each distributor's share of provincial peak demand and annual electricity consumption. The Ontario Power Authority furnishes analysis to the government and the Ontario Energy Board for the establishment of individual targets for each electricity distributor.[163] The CDM Directive requires that the Ontario Energy Board not preclude consideration of CDM programmes or funding for CDM programmes on the basis that an individual distributor's CDM targets have been or are expected to be exceeded. [164]

The electricity distributors' CDM targets for demand and energy savings are based on estimates of achievable energy efficiency. First, a projection of electricity demand is made. The initial gross demand curve assumes no new energy efficiency and only considers current regulations, codes, standards, and programmes. Then, an achievable energy efficiency potential is estimated by adding the sum of the expected electricity savings from programmes, technologies, regulations, and behavioural activities of consumers. Finally, the expected savings are subtracted from the gross demand curve, resulting in an estimated net demand curve. The difference between the gross and net demand equals the expected savings from energy efficiency, essentially equivalent to the target amount. The forecast includes energy and demand savings from Ontario Power Authority-contracted programmes as well as other activities that are outside the control of the electricity distributors. These "other" activities were excluded from the estimate of achievable savings, except for time of use rates. Only savings expected during the period from 2011 to 2014 were counted in achievable energy efficiency. [165]

3.5.6 Obligated Parties

As a condition of their license, the Ontario Energy Board assigns each Ontario electricity distributor a CDM target.[166] The requirement for CDM targets does not apply to electricity distributors that are not connected to the Independent Electricity System Operator-controlled grid or to distributors whose rates are not regulated by the Board.[167]

3.5.7 Compliance Regime

Electricity distributors must file for Ontario Energy Board approval a CDM Strategy that provides a high level description of how the distributor intends to achieve its CDM targets. The CDM Strategy must include:

- a high level description of the distributor's year-by-year plan, including annual milestones, for achieving its CDM targets;
- a description of each of its CDM programmes, divided into Ontario Power Authority-Contracted Province-Wide programmes and Ontario Energy Board-approved programmes; and
- a section detailing how the distributor will pursue administrative efficiencies and coordinate its CDM activities with other electricity distributors, natural gas distributors, government agencies, and other organisations.

Each electricity distributor must file an Annual Report, which includes participation levels for each programme, funds spent, verified electricity savings and peak demand savings, and the progress the distributor has made toward meeting its CDM target. [168]

The CDM Code requires that prior to applying for Ontario Energy Board approval of any CDM programmes, an electricity distributor must review the existing Ontario Power Authority-contracted Province-wide CDM Programmes. Electricity distributors may not apply for approval of any CDM Programmes that duplicate programmes administered by the Ontario Power Authority. Programmes that make minor adjustments to

162 Environmental Commissioner of Ontario, 2010

163 Environmental Commissioner of Ontario, 2010

164 Environmental Commissioner of Ontario, 2010

165 Environmental Commissioner of Ontario, 2010

166 Environmental Commissioner of Ontario, 2010

167 Ontario Energy Board, 2010a

168 Ontario Energy Board, 2010b

Ontario Power Authority-contracted Province-Wide CDM Programmes, such as adjusting customer incentive levels or instituting different specifications will be considered duplicative.[169]

Ontario Energy Board-approved CDM programmes must end by December 31, 2014. When applying for Board approval of a CDM programme, an electricity distributor must include: a programme evaluation plan, a benefit-cost analysis of each programme, a detailed explanation of the programme's objective and method of delivery, the types of customers targeted by the programme, the number of expected participants, the total projected peak demand savings and electricity savings per year, and a complete annual budget. [170]

3.5.8 Performance Incentives

Table 10 shows the performance incentives that the CDM Code allows an electricity distributor to claim in relation to CDM programmes initiated by the distributor or for which it contributed 50 percent or more of the funding. Distributors may also apply for attribution of benefits for a percentage of a CDM programme. A distributor may accrue a performance incentive once it meets 80 percent of each of its CDM targets, but shall not accrue an incentive for performance that exceeds 150 percent of each target. The performance incentive is calculated across the distributor's entire portfolio and has six ranges.

An electricity distributor is only eligible for a performance incentive when it has reached 80 percent of both of its CDM targets. Once this occurs, the performance incentive will be calculated based on the range the distributor achieves in either of its electricity (kWh) or peak demand (kW) targets. For example, if a distributor has achieved 145 percent of its peak demand target but only 100 percent of its electricity target, the distributor will earn a performance incentive from Range 6 for its peak demand target and a performance incentive from Range 2 for its electricity target.[172]

3.5.9 Eligible Energy Savings

Electricity distributors must fulfill their CDM Targets through the delivery of programmes approved by the Ontario Energy Board to be offered in the distributor's service area, by contracting with the Ontario Power Authority to meet the target through province-wide programmes offered by the Authority, or a combination of the two options.[173] A distributor may also use a competitive procurement process to appoint a third party to implement CDM programmes.[174]

A directive dated April 23, 2010 from the Minister of Energy and Infrastructure required the Ontario Power Authority to design, deliver, and fund province-wide CDM programmes to be made available for participation by electricity distributors. The Ontario Power Authority has designed the Ontario Power Authority-contracted province-wide CDM programmes to assist electricity distributors in meeting their CDM targets.[175]

3.5.10 Eligible Energy Efficiency Measures

The CDM Directive requires that Ontario Energy Board-approved CDM programmes shall not duplicate province-wide CDM programmes available from Ontario Power

Table 10

Performance Incentives Under the Conservation and Demand Management Code for Electricity Distributors in Ontario[171]

Performance Tiers			Performance Incentive	
Range	Range Begins	Range Ends	¢/kWh	CAD/kW
1	80%	Up to 100%	0.30	13.50
2	100%	Up to 110%	0.45	20.25
3	110%	Up to 120%	0.75	33.75
4	120%	Up to 130%	1.05	47.25
5	130%	Up to 140%	1.35	60.75
6	140%	Up to 150%	1.80	81.00

169 Ontario Energy Board, 2010b

170 Ontario Energy Board, 2010b

171 Ontario Energy Board, 2010b

172 Ontario Energy Board, 2010b

173 Ontario Executive Council, 2010

174 Ontario Power Authority, 2011

175 Ontario Power Authority, 2011

Authority at the time of Board Approval. The Directive also states that electricity distributors must use the Ontario Power Authority cost-effectiveness tests for assessing Board-approved CDM programmes. The Ontario Energy Board must consider the definition of CDM to include load reduction from initiatives, such as geothermal heating and cooling, solar heating, and fuel switching, but exclusive of initiatives associated with the Ontario Power Authority Feed-in Tariff Program and Ontario Power Authority Micro Feed-in Tariff Program. The Ontario Energy Board must also permit electricity distributors to meet a portion of the CDM targets through the delivery of CDM programmes targeted to low-income customers.[176]

The Ontario Power Authority-contracted province-wide CDM programmes consist of four programmes that each target a different customer sector: industrial, commercial and institutional, residential, and low income. Each programme consists of several initiatives.[177]

3.5.11 Measurement, Verification, and Reporting

The CDM Code requires that an electricity distributor's results for its Ontario Energy Board-approved CDM programmes must be evaluated through an independent third-party review. The third party must be selected from the Ontario Power Authority's third-party vendor of record list and must use Ontario Power Authority evaluation, measurement, and verification protocols when assessing Board-approved programmes. The assessment report must be filed with the Board at the same time the distributor's annual report is filed.[178]

The Ontario Energy Board must conduct, or cause to be conducted, targeted audits of evaluation, measurement, and verification carried out by the electricity distributor or third parties. The Ontario Energy Board must review and publish annually the verified results of each distributor's CDM programmes as well as the consolidated results of all distributor CDM programmes, both Ontario Energy Board-approved and Ontario Power Authority-contracted province-wide programmes.[179]

3.5.12 Trading of Energy Savings

No trading of energy savings between electricity distributors is currently allowed.

3.5.13 Funding

The Ontario Power Authority recovers its costs from consumers with approval of the Ontario Energy Board. The CDM Directive also requires the Ontario Power Authority to assume responsibility for funding energy efficiency and demand-side management programmes implemented by electricity distributors.[180] These costs, including programme costs and electricity distributors' incentives, are recovered as a part of the customer's bill through the Global Adjustment mechanism, which is calculated and paid each month based on electricity usage. This means that all electricity consumers in Ontario pay for CDM Programmes, regardless of participation.

The Global Adjustment includes the costs (net of earnings from sales) of Ontario Power Authority generation and conservation contracts, nuclear generation by Ontario Power Generation, non-utility generation, and certain hydroelectric generation.[181] Until 2011, the Global Adjustment was allocated to customers based on their energy use. Starting in 2011, two consumer classes were established: Class A consumers with average monthly demand greater than 5MW; and Class B consumers. Class A consumers contribute to the Global Adjustment proportionate to their contribution to system peak demand. Class B consumers contribute based on their energy use during the billing period. The Global Adjustment has been positive and negative.[182] The Global Adjustment can change based on Ontario Power Authority contracts and sales. The estimated Global Adjustment for Class B customers in 2012 is CAD 0.0467/kWh.[183]

Because funding for the Ontario Power Authority-contracted province-wide CDM programmes is recovered from electricity consumers, they are required to be delivered on a cost-effective basis. An electricity distributor that receives funds from the Ontario Power Authority must use the funds solely for purposes related to the Ontario Power Authority programmes. If a third party will be

176 Environmental Commissioner of Ontario, 2010

177 Ontario Power Authority, 2011

178 Ontario Energy Board, 2010b

179 Environmental Commissioner of Ontario, 2010

180 Minister of Energy and Infrastructure, 2009

181 Ontario Power Authority, 2012

182 Navigant Consulting, 2011

183 Independent Electricity System Operator, 2012

used, the electricity distributor must follow a competitive procurement process unless it is not required for the specific transaction. The Ontario Power Authority will pay the distributor monthly in accordance with the schedule of Participant Based Funding Amount and Participant Incentives, if any. For each programme, the distributor is entitled to retain funds that remain unspent and not payable at the end of the term. This should provide an incentive for each distributor to improve cost efficiency.[184]

CDM programmes must be cost effective but there is no other spending restriction. Electricity distributors are not restricted to a spending limit for CDM programmes or in the number of programmes permitted. The Ontario Energy Board assesses the reasonableness of the budgets requested.[185]

As of December 2011, no results or spending levels for CDM programmes were available. For the period from 2006 to 2009, the Minister of Energy authorised up to CAD 400 million in funding to be spent on electricity distributor energy efficiency and demand-side management programmes. After the passage of the *Green Energy Act, 2009,* the Minister of Energy and Infrastructure increased the funding by CAD 50 million and made the funds available through December 31, 2010.[186]

3.5.14 Scheme Administration

Electricity distributors can fulfill their CDM targets through the delivery of Ontario Energy Board-approved CDM Programmes, the delivery of programmes contracted through the Ontario Power Authority, or a combination of the two. Distributors may also use a competitive procurement process to appoint a third party to implement CDM Programmes.[187]

3.5.15 Scheme Results

As of December 2011, no programme results were available for reasons discussed below.

3.5.16 Areas for Improvement

The Environmental Commissioner of Ontario is concerned that the electricity distributor energy efficiency targets will not be met. The concern is based on the late start in launching province-wide energy efficiency programmes as well as the lack of programmes designed by electricity distributors and approved by the Ontario Energy Board. The Ontario Power Authority estimates that Ontario Power Authority-contracted province-wide programmes will provide only 78 percent of the savings toward the 1,330-MW demand target and 91 percent of the 6,000-GWh energy target. As of December 2011, only two electricity distributors had applied for Ontario Energy Board-approved programmes and both applications were later withdrawn following unfavourable decisions by the Board. This may undermine the credibility of the targets and energy efficiency efforts.

The Environmental Commissioner has urged the government and the Ontario Energy Board to implement options to ensure the CDM target is met or to reconsider the target. The Environmental Commission of Ontario has also requested clarity on whether savings from time-of-use pricing will be counted toward electricity distributor energy efficiency targets. The Ministry of Energy stated that it is not considering a change of target amounts at this time. It did indicate that further assistance provided by Ontario Power Authority to the electricity distributors is being assessed as a way to help meet the target as well as solutions involving the regulatory framework of the Ontario Energy Board.[188]

The Environmental Commissioner has also criticised the lack of transparency in setting the province-wide as well as the individual electricity distributor targets. The Commission asserts that the government did not make enough information available about the method and assumptions underlying the targets and as a result, the public could not assess whether these target amounts would deliver the optimal amount of energy efficiency.[189]

Finally, the Environmental Commissioner has expressed concerns that greater Ontario Power Authority involvement in the electricity distributors' custom programmes could amount to an abandonment of the spirit of the Green Energy and Green Economy Act, 2009 and that electricity distributors should play a prominent role in programme design.[190]

184 Ontario Power Authority, 2011

185 Environmental Commissioner of Ontario, 2010.

186 Minister of Energy and Infrastructure, 2009.

187 Ontario Power Authority, 2011.

188 Environmental Commissioner of Ontario, 2010.

189 Environmental Commissioner of Ontario, 2010.

190 Environmental Commissioner of Ontario, 2010.

3.6 China

DSM was first introduced in China in the early 1990s when there was growing recognition of energy and environmental problems resulting from increasing electricity consumption driven by rapid economic growth. During the early years, DSM in China was mainly supported by government funding and targeted load management rather than energy efficiency. DSM was seen as a systematic way to balance economic, environmental, and social development.

After ten years' experience with DSM, the central government in China realised that energy providers can take an important role in achieving energy savings through end use energy efficiency measures. In November 2010, the government issued a national DSM Rule *Guidance on Electricity Demand-Side Management Regulations* (发改运行 [2010] 2643号)[191]. This rule for the first time placed an EEO on the State Grid Corporation of China and China Southern Grid Company, the two large government-owned entities that operate electricity transmission and distribution networks and sell electricity directly to end use customers in the majority of China.

The obligation requires the grid companies to achieve energy savings of at least 0.3 percent in sales volumes and 0.3 percent in maximum load compared with the previous year. The DSM Rule, which went into effect on January 1, 2011, also lays a foundation for the expansion of demand response programmes by requiring the installation of load monitoring equipment on 70 percent of the peak load, and load control equipment on ten percent of the peak load, in any locality.[192]

Evaluation of the results of energy efficiency activities undertaken by the grid companies will start in 2012 following the procedures specified in the draft Compliance Evaluation Scheme *DSM Regulation Compliance Evaluation Scheme* (Draft) (发改运行 [2011] 2407号).[193] The first evaluation report is expected to be published at the end of June 2012.

3.6.1 Policy Objectives

Energy use in China is still dominated by coal, which is used both as a primary fuel and to generate secondary energy such as electricity. In 2011, industry used over 70 percent of the total electricity generated. China is facing severe power shortages in most of its central and southern areas. It is estimated that there will be a 20-GW shortfall in electricity generating capacity in 20 or 21 central and southern provinces in 2012.[194]

The DSM Rule stated that DSM should be prioritised to meet electricity demand in the tight supply situation. DSM is currently considered to be a competitive energy resource that will help to deal with power shortages as well as long-term sustainability issues, such as:

- achieving end-use energy efficiency at lowest cost;
- reducing GHG emissions;
- improving environmental quality;
- integrating demand-side resources into energy, social, and economic planning; and
- enhancing grid security and reliability.

3.6.2 Legal Authority

The DSM Rule was issued by six central government agencies under the auspices of the State Council. The lead agency is the National Development and Reform Commission, the central government agency responsible for planning economic and social development in China.

The DSM Rule designates the National Development and Reform Commission as the responsible party for DSM in China; the other five agencies are to carry out DSM related work within the scope of their existing general duties and responsibilities.[195] The Commission is the main authority responsible for DSM short-term and long-term planning, strategic policy design, and electricity pricing regulation. The Ministry of Finance takes responsibility for DSM financing issues, such as funding, budget approval, and expense supervision. The role of the Ministry of Industry and Information Technology is to propose clean products and technologies, set up industrial plans, and promote the implementation of the DSM Rule in industrial enterprises. The State-owned Assets Supervision and Administration Commission is responsible for overseeing public assets and evaluating the grid companies' performance in general. The State Electricity Regulatory Commission ensures that DSM

191 National Development and Reform Commission, 2010.

192 National Development and Reform Commission, 2010.

193 National Development and Reform Commission, 2011a.

194 Zhou, 2012.

195 National Development and Reform Commission, 2010.

is included as a resource in power generation, transmission, and distribution development, and that the grid companies produce good results in reducing electricity consumption and improving end-use energy efficiency. The National Energy Council is involved in energy policy design and coordination of the various central government agencies.

At the provincial level, some provinces have not yet completed their detailed implementation rules. In general, provincial Development and Reform Commissions or Economic and Information Commissions are responsible for implementing the DSM Rule in their jurisdictions. Other provincial agencies will assist in specific fields, including: DSM planning; setting annual DSM targets for provincial grid companies and reviewing their DSM implementation plans; and investigating and analysing the DSM resource potential in their respective provinces.

3.6.3 Fuel Coverage

The obligation imposed by the DSM Rule covers electricity. In addition, energy savings from other fuel types may be converted to the equivalent electricity saving using standard coefficients published by the National Statistics Bureau and can then be counted toward the energy saving target.

3.6.4 Sector and Facility Coverage

The energy targets set by the DSM Rule can be met with energy savings from all economic sectors and from any facility. In addition, reduction of losses in the transmission and distribution networks can also be used to meet a proportion of the targets (see section 3.6.9).

3.6.5 Energy Saving Target

The DSM Rule requires the grid companies to produce energy savings equivalent to at least 0.3 percent of electricity sales in the previous year and to reduce load by at least 0.3 percent of maximum load in the previous year.

The DSM Rule also establishes a sub-target that requires the installation of load monitoring equipment on 70 percent of the peak load, and load control equipment on ten percent of the peak load, in any locality.

3.6.6 Obligated Parties

The DSM Rule places an EEO on the State Grid Corporation and China Southern Grid, the two large government-owned entities that operate electricity transmission and distribution networks and supply electricity directly to end use customers in the majority of China.

3.6.7 Compliance Regime

Grid company compliance with the DSM Rule obligation is assessed by a points system using both quantitative and qualitative measures specified in the draft Compliance Evaluation Scheme.[196] The maximum achievable score is 100 points, with measures related to the energy saving target receiving a maximum of 60 points and DSM implementation receiving a maximum of 40 points. The detailed evaluation criteria and standards are shown in Table 11 (page 40).

There are four defined performance levels in the draft Compliance Evaluation Scheme: Excellent (>90 points), Good (80-90 points), Qualified (70-79 points), and Failed[197] (<70 points). At present, no sanction is applied to grid companies that fail to meet their targets, but details of non-compliance are published by the National Development and Reform Commission.

3.6.8 Performance Incentives

The draft Compliance Evaluation Scheme[198] states that the National Development and Reform Commission will reward those grid companies that achieve an "Excellent" result. There are no further details about how performance incentives will be provided.

3.6.9 Eligible Energy Savings

In practice, there are five types of activities that the grid companies can undertake to produce eligible energy savings that contribute to meeting their DSM Rule energy saving targets, subject to constraints specified in the draft Compliance Evaluation Scheme:[199]

- directly implement energy efficiency projects in their own and their end-use customers' premises;
- establish energy service companies affiliated with the grid company to implement energy efficiency projects;
- purchase energy saving by means of business transactions/trading[200] (not to exceed 40 percent of total eligible energy savings);
- promote energy efficiency to their end-use customers (grid companies may claim only ten percent of any energy savings made by customers as a result of energy efficiency promotions and these savings must not exceed five percent of total eligible energy savings[201]); and

Table 11

Compliance Evaluation Scheme for the DSM Rule in China[202]

Criteria	Points	Evaluation Standard
Electricity Savings (60 points)		
*Electricity consumption saving	30	Achieve 100% of target: 30 points Achieve 50%-90% of target: 15-27 points Achieve less than 50% target: 0 points For each 0.01% of additional savings, add 1 point; the maximum extra points is 5.
*Electricity load reduction	30	Achieve 100% of target: 30 points Achieve 50%-90% of target: 15-27 points Achieve less than 50% target: 0 points For each 0.01% of additional savings, add 1 point; the maximum extra points is 5.
DSM Implementation Performance (40 points)		
System design	3	Develop DSM regulation and policy: 2 points Develop DSM regulation working plan: 1 point
Institutional management	2	Establish DSM management position: 1 point Allocate DSM experts: 1 point
Communication and training	3	Conduct at least four communication activities each year: 1 point Hold at least two training activities: 1 point Develop training plans for related employees: 1 point
Technical assistance	5	Load monitoring capacity reaches 70% of peak load in the region: 3 points Load control capacity reaches 10% of peak load in the region: 2 points
Financial input	5	Establish and operate DSM special fund: 5 points
Implementation of DSM rules	6	Establish at least one energy service company and carry out energy contract management projects: 3 points Participate in the regional energy efficiency network and organise activities: 3 points
Key project results	6	Deduct 1 point if one key energy saving project fails according to the evaluation results
Other evaluation	10	These points may be allocated by provincial government agencies that manage electricity industry operations

**These are threshold criteria; grid companies that do not meet their targets for electricity consumption reduction or electricity load reduction are considered to have failed.*

196 National Development and Reform Commission, 2011a.

197 Grid companies that do not meet their targets for electricity consumption reduction or electricity load reduction are also considered to have failed.

198 National Development and Reform Commission, 2011a.

199 National Development and Reform Commission, 2011a.

200 A grid company may purchase energy savings from customers (or other ESCOs) if the grid company does not itself implement energy efficiency projects.

201 This constraint is currently under review and may be changed.

202 National Development and Reform Commission, 2011a.

- directly carry out grid system upgrades and operational management improvements that save energy and reduce losses in transmission and distribution networks.

As a further constraint, grid companies can only claim 100 percent of the value of those energy savings that are audited by a third party or recorded by online monitoring equipment; otherwise only 80 percent of the value can be claimed.

Three types of energy savings are identified as not eligible to contribute to meeting DSM Rule targets:

- energy savings from commercially operated renewable energy projects;
- electricity savings that cannot be measured and verified; and
- electricity saved through implementing government policy on the orderly use of electricity.

The grid companies also use their claimed eligible energy savings to calculate load reductions that contribute to meeting their DSM Rule maximum load reduction targets. Eligible load reductions are calculated as the annual eligible electricity savings[203] divided by the average dispatched operation hours of electricity generation units. In addition, the grid companies may achieve eligible load reductions by getting customers to better arrange their production schedules, and by using load shifting technologies and installing new equipment (such as heat pump or reverse cycle air conditioners) to improve load factors at end-use customers' premises.

3.6.10 Eligible Energy Efficiency Measures

Under the DSM Rule, there are no provisions for approving eligible energy efficiency measures or for deeming values for specific measure. The DSM Rule does require each province to develop its own implementation rule that will identify provincial eligible energy efficiency measures based on best practices adapted to local situations.

In the draft Compliance Evaluation Scheme, the National Development and Reform Commission recommends, but does not require, implementation of the following energy efficiency measures:[204]

- energy saving in transmission and distribution system;
- energy efficient electric motors, energy efficient upgrade of boilers, using waste heat and pressure, installation of heat pumps;
- energy saving in buildings, green lighting; and
- electricity thermal (ice) storage and other energy management projects.

The National Development and Reform Commission also encourages grid companies to reduce transmission line losses at different voltage levels, to use efficient power transformers, to improve power supply coverage, and to enforce power factor correction at customers' premises.

3.6.11 Measurement, Verification, and Reporting

Currently, continuing measurement and verification is done to track the grid companies' progress in meeting their DSM Rule targets. In the State Grid Corporation service territory, its affiliate institute, China Electric Power Research Institute, is responsible for measurement and verification. In the China Southern Grid territory, provincial government energy conservation centers carry out measurement and verification work.[205] In both service territories, various independent energy conservation institutes and energy service companies are qualified to deliver energy audits. In some pilot cities, measurement and verification is improved by installing online monitoring systems.

The draft DSM Regulation Compliance Evaluation Scheme states that the grid companies should complete online reporting forms for all types of DSM projects, and send hard copies to a national DSM data platform. Detailed evaluation procedures are specified as follows:[206]

- Provincial grid companies submit proposals for annual electricity saving and DSM implementation by the end of March to the provincial electricity industry regulatory agency for approval. After soliciting opinions from other related agencies, the approved schedule should be agreed by April.
- Provincial grid companies report electricity savings and capacity reductions in the previous year to the provincial electricity industry regulatory agency by the end of February. The provincial regulators will conduct evaluation and verification, and then submit the result to the National Development and Reform

203 Not including energy savings converted from other fuel types.

204 National Development and Reform Commission, 2011a.

205 Natural Resources Defense Council DSM Technical Center, 2011.

206 National Development and Reform Commission, 2011a.

Commission by the end of March.
- State Grid Corporation and China Southern Grid report their DSM achievement to the National Development and Reform Commission by the end of March. The Commission will jointly work with other agencies to conduct evaluation and verification and the complete evaluation report will be disclosed to the public by the end of June.

3.6.12 Trading of Energy Savings

The draft Compliance Evaluation Scheme identifies energy savings purchased by means of business transactions/trading as being eligible to be counted toward the DSM Rule targets.[207] This implies that grid companies can purchase eligible savings from customers or other ESCOs through over-the-counter bilateral contracts, rather than through a spot market.

Spot markets for energy saving credits are currently being developed in China, but none are yet fully operational. Beijing and Shenzhen have showed interest in starting energy saving credit trading in the Twelfth Five Year Plan period from 2011 to 2015. The commodities traded will be energy saving credits exchanged between energy intensive enterprises (or government) to meet concrete energy saving targets.[208] After implementing energy saving projects, energy saving credit holders can sell their verified savings in a trading market. This model is now being trialled by the Beijing Environment Exchange Center.[209] Shanghai's energy saving trading scheme is still under preliminary research. National guidance and detailed regulations for energy credit trading are expected to be issued during the Twelfth Five Year Plan period.

3.6.13 Funding

The DSM Rule states that DSM programme implementation, management, and evaluation costs can be funded in three ways:[210]

- through a city utility surcharge (城市公共事业附加费), collected through electricity tariffs;[211]
- through revenues from differential electricity prices (差别电价), mainly through implementing differential prices for energy-intensive industries;[212, 213] and
- through other fiscal means, for example, an energy saving and emission reduction special fund (节能减排专项资金) established through the budgets of central and provincial governments.[214]

In addition, DSM special funds created and managed by each provincial government will be used to facilitate implementation of the DSM rule. These provincial special funds will support DSM city pilots and provide subsidies for key energy efficiency projects, as well as communication, education, and evaluation programmes. Also, reasonable DSM expenses incurred by grid companies can be recovered as part of power supply costs.[215]

207 National Development and Reform Commission, 2011a.

208 National Development and Reform Commission, 2011b.

209 Beijing Environment Exchange Center website: http://www.cbeex.com.cn/article/gpxm/jnljy/

210 National Development and Reform Commission, 2010. Chapter 3 item 22, page 4.

211 This surcharge took effect in 1964 to support public utilities. Provincial governments set the surcharge amounts for each item (e.g., the industrial power use surcharge is five to ten percent of the electricity price). In Ningxia Autonomous region and Jilin province, the rate for DSM special use is fixed at CNY 0.001/kWh.

212 State Council of China, 2006

213 Differential electricity pricing is applied to energy-intensive enterprises in eight industries (electrolytic aluminium, ferroalloy, calcium carbide, caustic soda, cement, steel, yellow phosphorus, and zinc smelting). Enterprises are divided into three categories according to resource consumption and technology level. The three categories and their applicable prices are: "permit and promote" paying the standard provincial industrial power price; "restrict" paying a surcharge of CNY 0.05 to 0.1/kWh; and "eliminate" paying a surcharge of CNY 0.2 to 0.3/kWh in addition to the first class power price. New pricing mechanisms such as time-of-use prices, inclining block tariffs, seasonal prices, and price discounts for interruptible loads, are only applied in some large cities in China.

214 The main objective of this fund is to encourage green production and environmental protection projects by giving subsidies, interest discounts, or other incentives. Local governments select projects based on requests; the financial requirements and support amount vary among provinces. According to energy saving and emission reduction audits in 20 provinces, from 2007 to 2009, up to CNY 124 billion was allocated to support energy saving projects. The audit is available at: http://www.gov.cn/gzdt/2011-05/13/content_1863388.htm

215 National Development and Reform Commission, 2010

3.6.14 Scheme Administration

In early 2012, the National Development Reform Commission and the Ministry of Finance jointly launched the DSM Cities Programme as demonstration projects for the implementation of the DSM Rule, with three cities being selected initially and plans to expand to more cities. Provincial grid companies are working on developing DSM regulation and planning to make sure the necessary resources and human capital are in place to implement the DSM Cities Programme.

State Grid Corporation of China[216]

In response to the DSM Rule, State Grid has created energy service companies in all 26 provinces within its service territory as subsidiaries of the State Grid-owned provincial grid companies. Ten of the ESCOs are certified by the National Development Reform Commission and the Ministry of Finance. Their main roles are implementing energy efficiency projects, delivering specialised energy and consultancy services, and helping to organise workshops and seminars to better engage end-users in energy efficiency programmes. Between late 2010 and early 2012, State Grid ESCOs signed 116 energy management contracts, which are estimated to deliver 667 GWh of electricity savings. State Grid ESCOs have also constructed an energy efficiency service platform where experts and energy users will get together to study energy efficiency policies and technologies and conduct energy audits.

In June 2011, State Grid launched a campaign to promote end-use energy efficiency. The campaign broadly disseminates information about energy efficiency and educates people to change to a high-efficiency and low-carbon lifestyle.

State Grid has also been very active in building high-voltage DC transmission lines and reducing line losses. In 2011, grid losses decreased by 0.07 percent, which contributed 2.3 TWh of electricity savings. In addition, State Grid also strengthened its commitment to green procurement, promoting energy efficient products, high-efficiency electric motors, and other energy efficient equipment.

China Southern Grid Company[217]

In 2007, Southern Grid commenced its "Green Action" programme, which it will now use to meet its DSM Rule targets. Southern Grid has:

- moved to a clean energy generation portfolio by supporting renewables integration and shutting down low-efficiency coal-fired power plants;
- increased the efficiency of transmission and distribution networks by optimising grid structure, selecting energy efficient transformers, and introducing innovative transmission system designs. Southern Grid's average transmission loss rate has reduced from 7.38 percent in 2005 to 6.28 percent in 2010;
- implemented energy saving (environmental) dispatch by giving priority to renewables and more efficient coal-fired power plants;
- planned to save 27.2 TWh of electricity from 2010 to 2015 by building efficiency power plants fully exploiting energy efficiency potential in green lighting, high- efficiency electrical devices, and residential appliances;
- established a green enterprise culture by promoting energy efficiency in its offices, and using energy efficient appliances and office equipment; and
- emphasised energy services by changing from pure peak load management to end-use energy efficiency, and from concentrating on electricity consumption management to providing comprehensive energy services.

During the Eleventh Five Year Plan period from 2006 to 2010, Southern Grid provided 28,000 energy audits to large end-users, and conducted 170 energy efficiency demonstration projects in steelmaking, chemical, and non-ferrous metal industries, which produced accumulated electricity savings of 4.6 TWh.

3.6.15 Scheme Results

The results for the first year of implementation of the DSM Rule have not yet been reviewed and published by the National Development Reform Commission, but there have been estimates published of the possible results. In 2011, total electricity use in China was 4,692.8 TWh, an 11.7 percent increase from 2010.[218] If the grid companies

216 State Grid Corporation of China, 2011

217 China Southern Grid Company, 2010

218 2011 Electricity Consumption in China. News item on 15 January 2012, retrieved from: http://www.yblmz.com/html/3848.html

succeed in meeting their DSM Rule targets, there will be around 14 TWh of electricity saving in 2012, which is equivalent to the electricity use by over 10 million Chinese families.

3.6.16 Areas for Improvement

Because the DSM Rule has placed an EEO on the grid companies for the first time in China, the whole implementation design is still to be tested. At the national level, the roles and responsibilities of each central government agency need to be clarified, while at the provincial level, certain provinces have to catch up others in setting up procedures and working out regulatory rules and evaluation schemes to guide their daily operations. Incentives for good performance and sanctions for poor performance in meeting DSM Rules targets still have to be determined. More flexible market-based mechanisms (trading of energy saving credits) have to be established to provide more flexibility to the grid companies in how they meet their DSM Rule targets.

The DSM Rule is seen as a milestone that will enable the integration of demand-side resources into electricity resource planning. There are already some signs that, in the future, China will place more stringent EEOs on the grid companies. This will have to be supported with a robust measurement, verification, and reporting system to ensure that all cost-effective energy efficiency opportunities are realised.

3.7 Denmark

In Denmark, energy efficiency has been a focus since the mid 1970s. A total of approximately EUR 86 million is spent every year on measures to promote energy efficiency: EUR 40 million for activities of energy companies, EUR 32 million for energy labeling of buildings, and EUR 14 million for the Danish Electricity Saving Trust. Denmark uses ten groups of policy instruments to promote energy efficiency:[219]

- the European Union emissions trading scheme;
- energy taxes;
- EEOs for energy companies;
- energy labeling of buildings;
- the Danish Electricity Saving Trust;
- building codes;
- energy labeling and standards for appliances;
- directives on energy savings in the public sector;
- energy efficiency agreements with industry; and
- energy saving subsidies to non-governmental organisations.

Denmark's energy providers have been working with energy efficiency since 1990.[220] The first EEO for electricity utilities was introduced in 1995; natural gas and district heating were included in the obligation starting in 2000. The focus of this programme was on free advice and campaigns for energy efficiency, with industries and private enterprises as the main target groups.[221] Since 2006, electricity, natural gas, district heating, and heating oil distributors have been obligated to undertake energy efficiency activities under a scheme called Energiselskabernes spareindsats (energy companies' efficiency efforts).[222]

3.7.1 Policy Objectives

The Danish Energy Agency lists climate change, energy security, and competitiveness as reasons to pursue energy efficiency.[223] The Energy Policy Agreement of 2008 (revisited in 2010), which established the energy savings obligation, contained an objective to decrease total energy consumption (in Denmark) by two percent in 2012 and by four percent in 2020 from 2006 levels. This is a further strengthening of the objective that has existed since 1980, and which has achieved large energy savings and efficiencies through power-heat extension and other measures.[224]

3.7.2 Legal Authority

The Danish scheme consists of an EEO with an annual binding energy saving target for all energy distributors. The binding target was introduced in 2006, and is a further development of the Danish DSM scheme that commenced in 1995.[225] The EEO initiative was re-articulated in a

219 Togeby, et al., 2009

220 Togeby, et al., 2009

221 Bach, 2009

222 Togeby, et al., 2009

223 Bach, 2009

224 Styrelse, 2010

225 Mikkelsen, 2012

political agreement of 21 February 2008, which set Danish energy policy for the years 2008 to 2011.

The details of the EEO on the energy distributors are detailed in amendments to the *Electricity, Natural Gas and District Heating Act* (Law No 520 of 2006). In November 2009, the actual conditions for the initiative were implemented in an agreement between the Minister of Climate and Energy and the electricity, natural gas, heating oil, and district heating distributors. Executive Order No 667 of 23 June 2010 detailed energy savings measures for the distribution companies.[226] Although set within a legal framework, the obligations are currently implemented by a voluntary agreement. Commercial heating oil companies are also covered on a voluntary basis.[227]

3.7.3 Fuel Coverage

Fuel sources covered by the Danish EEO scheme include electricity, natural gas, heating oil products, and district heating. Since January 2011, reductions in losses in electricity, gas, and district heating networks have been eligible to meet the scheme energy saving target.[228]

3.7.4 Sector and Facility Coverage

The residential, public, private business, and energy-intensive industry end-user sectors are covered by the EEO, as are all facilities in these sectors, including facilities covered by the European Union Emissions Trading Scheme.[229] Obligated companies are not restricted to their own type of customers, and savings in all types of energy are eligible to contribute to the EEO targets, except transport fuels. This freedom stimulates specialisation and results in a higher cost-effectiveness of enterprising measures, especially by the smaller district heating companies.

3.7.5 Energy Saving Target

The 2006 to 2009 Danish energy savings target was 2.95 PJ of first-year savings to be achieved per year, which corresponded to 0.7 percent of consumption in the covered sectors. From 2010 to 2012, the target increased to 6.1 PJ, including assumptions about the incentive weighting factors. This is expected to produce energy savings corresponding to 1.2 percent of final consumption in the covered sectors and grid losses. In 2012, the target will be increased 50 percent. The target for distribution companies corresponds to 50 percent of the total expected savings from all energy efficiency measures implemented in the country.[230]

Until January 2011, the energy saving target was set in terms of the energy savings in the first year after an energy efficiency measure was implemented (the lifetime of the measure was not considered).[231] Since 2011, weighting factors are to recognise the value of energy efficiency measures with longer lifetimes, which are disadvantaged if only the first-year savings are considered, and also to incentivise energy efficiency projects outside of the European Union emissions trading scheme. The weighting factors reflect lifetime, primary energy, and whether the energy savings are from the non-Emissions Trading Scheme sector.

3.7.6 Obligated Parties

The obligated parties are distributors for electricity, natural gas, and district heating. Heating oil distributors participate on a voluntary basis.[232] For electricity, natural gas, and heating oil, the obligation is negotiated with the sector trade association, whereas for district heating the obligation is put on individual companies.

Denmark has approximately 240 obligated parties: 75 in electricity and gas and 160 in district heating. Although the obligation is on distribution companies, most activities are carried out in practice by commercial subsidiaries of the obligated parties. Most of the realised savings are achieved in the sector in which the obligated party operates, but this is not always the case.

An individual obligated party's share of the energy saving target is calculated in proportion to its market share of the relevant fuel sector. Almost 50% of the target has to be achieved by electricity distributors, 30% by district heating companies, 20% by natural gas distributors, and a very small share by heating oil companies.[233]

226 Danish Energy Agency, 2011

227 Togeby, et al., 2009

228 Bach, 2011

229 Togeby, M. et al., 2009

230 Mikkelsen, 2012

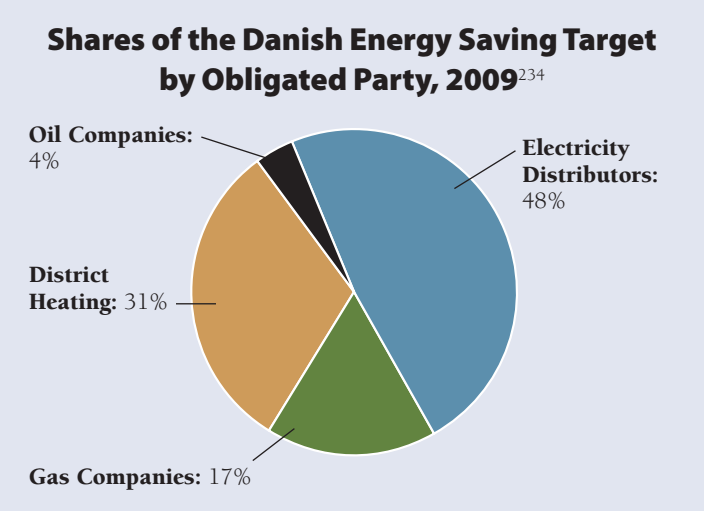
231 Togeby, et al., 2009

232 Togeby, et al., 2009

233 Boot, 2009 at 22

In 2009, the energy saving target was shared among obligated parties as shown in Figure 5.

Figure 5



3.7.7 Compliance Regime

The Danish Energy Agency is responsible for basic administration of the EEO scheme. The energy savings achieved must be well documented and they must be verifiable by an independent source. Each energy efficiency programme must have a quality assurance system, which is audited internally every year, and by an independent auditor every second year. The obligated energy companies must develop a transparent accounting of funds they use to achieve energy savings, categorised into direct savings and deemed savings.

Obligated energy companies that fail to meet their individual energy saving targets must pay a penalty of EUR 0.1 per kWh of shortfall. In addition, obligated distribution companies may lose their license to distribute energy if they fail to meet their target.[235]

3.7.8 Performance Incentives

The weighting factors used to recognise the value of energy efficiency measures with longer lifetimes are the only performance incentives available.

3.7.9 Eligible Energy Savings

The Danish Government does not allow obligated energy distributors to implement energy efficiency projects themselves and requires that they pass the implementation task to third-party companies. The third parties include energy retailers within the same company group, energy service companies, and private companies such as installers, craftsmen, engineering companies, lighting companies, and so on.[236]

Eligible energy savings are denominated in final end-use consumption (rather than primary energy) and may be achieved in all end-uses. Obligated energy distributors must take concrete steps to contribute to the achievement of energy savings for end-use consumers, and may only take credit for those savings that would not have taken place without the distributor's input. Input from the distributor may take the form of advice, technical assistance, or financial assistance, including grants for the implementation of energy savings.[237]

Obligated energy distributors have freedom in how they will achieve energy savings. Commencing in 2006, distributors are allowed to carry out energy efficiency projects outside of their supply areas and with all types of energy, except transport fuels.[238] An obligated distributor must be actively involved in an energy efficiency project in order to take credit for the energy savings.[239]

3.7.10 Eligible Energy Efficiency Measures

Energy savings in the Danish EEO scheme are based on deemed standard energy saving values for smaller, standardised activities (typically in homes and other buildings), applied from a catalog of deemed values for around 200 energy efficiency projects, including new windows, new appliances, insulation, boilers, and the like. If a standard value is available for a given energy efficiency measure, then this must be used. Specific calculations are used in areas where there is no standard value, typically larger and integrated projects in business enterprises or public institutions.[240]

234 Source data for Figure 5 were compiled by Eoin Lees Energy based upon data supplied by Peter Bach of the Danish Energy Agency.

235 Mikkelsen, 2012

236 Mikkelsen, 2012

237 Styrelse, 2010

238 Mikkelsen, 2012

239 Togeby, et al., 2009

240 Staniaszek and Lees, 2012

Eligible energy efficiency measures can take many forms, including energy audits, targeted information, subsidies for efficient appliances and equipment, or a combination of these.[241] Energy savings from small-scale household solar photovoltaic installations and wind turbines may be claimed as eligible savings as long as the plants are located on the end-use customer's own property.[242]

3.7.11 Measurement, Verification, and Reporting

Obligated energy distributors are responsible for verification, documentation, and reporting. External and internal audits and quality control are required. The Danish Energy Authority carries out special inspection of the documentation on an annual basis.[243] Energy savings can be calculated or based on deemed standard energy saving values. Specific calculations, using engineering methods, are used for all big projects, especially in industry and the public sector. If a specific calculation is used, then the entire project must be calculated specifically, including the energy savings achieved from energy efficiency measures where standard values exist.[244]

3.7.12 Trading of Energy Savings

Energy savings may only be traded among obligated energy distributors, but all private enterprises can make a contract with a distributor for the delivery of a specified amount of savings.[245] The extensive freedom allowed in the implementation of energy efficiency projects bears features similar to an energy efficiency certificate trading scheme.[246]

3.7.13 Funding

The costs for obligated energy distributors to meet their individual energy saving targets are funded through tariffs.[247]

3.7.14 Scheme Administration

Although the energy saving targets are applied to obligated energy distributors, most energy efficiency projects are carried out by commercial subsidiaries of the obligated distributors, often combined with other activities like selling electricity to industrial companies.[248]

3.7.15 Scheme Results

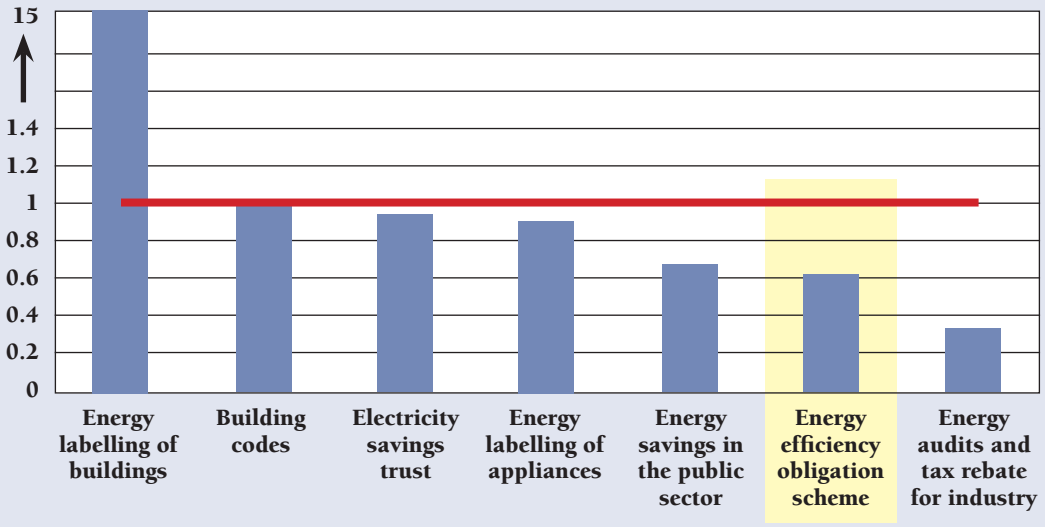
In 2006 to 2009, the average cost of energy savings achieved in the Danish EEO scheme was EUR 0.045/kWh, including consumer and administrative costs. In 2011, the average cost was EUR 0.056/kWh.[249]

Figure 6 shows the cost of energy savings in the Danish EEO scheme compared with the cost of savings from other policy instruments in Denmark, indicating that the EEO scheme is one of the most cost-effective policy instruments.

Table 12 (page 48) shows the recorded energy savings per sector from 2006 to 2008 for the Danish EEO scheme.

Figure 6

Cost of Energy Savings from Various Policy Instruments in Denmark[250]



241 Togeby, et al., 2009
242 Mikkelsen, 2012
243 Bang, 2012
244 Bang, 2012
245 Mikkelsen, 2012
246 Togeby, et al., 2009
247 Styrelse, 2012
248 Togeby, et al., 2009
249 Mikkelsen, 2012
250 Bang, 2012

Table 12

Recorded Energy Savings per Sector in Denmark, 2006 to 2008[251]

Fuel Type	Savings by Sector			
	Residential Sector (TJ)	Public Sector (TJ)	Trade and Industries (TJ)	Total (TJ)
Electricity	694	283	2,444	3,421
Natural Gas	1,011	73	530	1,614
District Heating	952	192	541	1,685
Heating oil	347	0	50	397
Total	3,004	548	3,565	7,117
	42%	**8%**	**50%**	**100%**

3.7.16 Areas for Improvement

The Danish EEO scheme requires annual alternating internal and external audits, as well as evaluations every three years. The initial EEO was put in place in 2006. The evaluation in 2009 analysed the programme from 2006 through the first half of 2008. Changes as a result of the evaluation took place in 2010. The evaluation found that, while the overall distribution of energy savings among sectors was similar to the energy consumption, the obligated electricity distributors focussed on industrial companies, because costs can be minimised in relation to large energy users. District heating companies are generally smaller than the other obligated distributors, and as a consequence have often worked with their own customers and their own energy carriers.[252]

Publishing a more explicit methodology for minimising or accounting for free riders (those parties that would have carried out the energy efficiency investment anyway, in the absence of the EEO scheme) would strengthen confidence in the claimed energy savings.

It remains to be seen whether the weighting factors for the different lifetimes of energy efficiency measures give sufficient incentives for the obligated energy distributors to value the longer-lived measures rather than just focussing on annual energy savings. For example, insulation has a 30- to 40-year lifetime, depending on the actual measure, compared to, say, a 10- to 12-year lifetime for an appliance. If the energy saving target is set in terms of first-year energy savings only, then the three to four times longer lifetime energy savings from insulation are not valued. Thus, if the cost of the measures to the energy distributors are similar or indeed slightly cheaper for the appliances to produce similar first-year energy savings, then there will be a perverse incentive for the distributors to invest in the shorter-lived measures rather than the longer, more cost effective energy efficiency measures.

3.8 France

France has in place mandatory quantitative energy saving targets for energy suppliers and a scheme of tradable energy efficiency certificates (certificats d'économies d'énergie) to track energy savings and determine compliance with the targets. The certificate scheme is operating in three-year periods: the first from 1 July 2006 to 30 June 2009 and the second commencing after an 18-month gap on 1 January 2011 and running to 31 December 2013.

The certificate scheme comprises part of France's broader policy goal, established by Programme Law No 2005-781 of 13 July 2005 (2005 Law), to reduce the nation's final energy intensity by two percent per year until 2015, rising to 2.5 percent per year from 2016 to 2030.[253] This target is expected to bring France in line with the energy efficiency target set forth in the European Union Directive on Energy End-use Efficiency and Energy Services.

3.8.1 Policy Objectives

The certificate programme aims to realise the diffuse but immediately available potential for energy efficiency in

251 Togeby, et al, 2009 at 303

252 Togeby, et al., 2009

253 Programme Law No 2005-781, of 13 July 2005 establishing energy policy guidelines, Articles 14-17. The 2005 law further addresses security of supply, competitiveness, environmental protection, and public service obligations throughout France. Text of the law is available at: http://www.legifrance.gouv.fr/affichTexte.do;jsessionid=5F9767897E08CF4465B718FFB7D8BF0E.tpdjo10v_2?idSectionTA=LEGISCTA000006122857&cidTexte=JORFTEXT000000813253&dateTexte=20100607#LEGISCTA000006122857 (French only).

France, particularly in the residential and tertiary sectors. These sectors are responsible for 40 percent of final energy consumption and one quarter of GHG emissions in France.[254]

3.8.2 Legal Authority

The 2005 Law establishes both France's national energy intensity targets and the certificate programme. Energy saving obligations, and rules regarding energy efficiency certificates and registry management have been set forth in subsequent decrees.[255] Specific targets for the certificate programme are established by the government in consultation with ADEME, the French environment and energy management agency.[256]

3.8.3 Fuel Coverage

Originally placed on retailers of electricity, natural gas, and heating oil, the obligation was extended from 2011 to include importers of road transport fuel. Any fuel can be saved by the obligated parties.

3.8.4 Sector and Facility Coverage

Standardised energy efficiency measures with deemed energy saving values have been established for six sectors:

- residential buildings;
- commercial sector buildings;
- manufacturing industries (excluding those covered by the European Union emissions trading scheme);
- networked industries (district heating and cooling, lighting, and electricity);
- transport; and
- agriculture.

In addition to these sectors, energy efficiency certificates can be created for non-standardised measures, programmes targeting fuel poverty, and informational programmes, training, and innovation targeting reductions in energy demand.

3.8.5 Energy Saving Target

Under the certificate scheme, the French government in consultation with ADEME has established two, three-year energy saving targets. The target for the first compliance period was set at 54 TWh cumac[257] to be achieved in the period 1 July 2006 to 30 June 2009. The target for the second compliance period was set at 345 TWh cumac to be achieved in the period from 1 January 2011 to 31 December 2013.

The obligation is divided among retailers of electricity, natural gas, heating oil, LPG, and district heating and cooling (255 TWh cumac) and wholesale suppliers of transport fuels (90 TWh cumac). As the main original obligated companies continued to undertake energy efficiency actions in the 18-month period between the formal end of the first phase of the certificate scheme and the start of the second phase, the actual increase on an annual energy saving basis is less than the apparent six-fold increase.

3.8.6 Obligated Parties

The 2005 Law allocated the target for the first phase of the certificate scheme among energy retailers, defined as legal entities who sell electricity, natural gas, and district heating and cooling to end consumers and the annual sales of which exceed a threshold, as well as natural persons or legal entities who sell heating oil to end consumers.[258] The threshold was set at an annual supply of 400 GWh/year or more for retailers of electricity, natural gas, and district heating and cooling; 100 GWh per year or more for LPG suppliers; and at any level of sales by heating oil suppliers.[259]

In the second phase, wholesale suppliers of automobile fuels have been added as obligated parties. All relevant entities whose sales exceed the following thresholds (expressed in terms of final delivered energy) are obligated:

254 http://www.ile-de-france.drire.gouv.fr/energie/Economies/Dossier percent20de percent20presse/Plaquette_12p.pdf, p. 2.

255 Relevant decrees are available through ADEME at: http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=15024#theme6

256 Legislation and rulemaking relating to the French white certificate scheme are available at: http://www.developpement-durable.gouv.fr/Le-cadre-reglementaire,13469.html (French only).

257 Cumulative and discounted (in French, cumulés actualisés). This term is used to refer to the annual delivered energy savings from an energy efficiency measure, summed over the lifetime of the measure and discounted at a standard rate, in this case four percent per annum.

258 NEEAP at 15, citing Articles 14 and 17 of the 2005 Law.

259 Capozza, 2006

- electricity, natural gas, district heating and cooling – 400 GWh/year;
- liquefied petroleum gas (non-transport uses) – 100 GWh/year;
- heating oil – 500 m^3/year;
- liquefied petroleum gas (transport) – 7,000 t/year or 7,000 m^3/year; and
- motor fuel – 7,000 t/year or 7,000 m^3/year.[260]

Although around 2,500 companies are obligated under the programme (mainly heating oil suppliers), 80 percent of the obligation falls to the largest two obligated companies, Electricité de France and Gaz de France.

3.8.7 Compliance Regime

Compliance under the certificate scheme is achieved by surrendering the amount of energy saving certificates that corresponds to each obligated party's target at the end of each three-year period. In the first compliance period there were no intermediate deadlines.[261]

Energy efficiency certificates are defined as "certificates issued by independent certifying bodies confirming the energy savings claims of market actors as a consequence of energy efficiency improvement measures." Certificates are tracked through a national registry. Lifetime energy savings are confirmed through random sampling.

The scheme penalty is EUR 0.02/kWh cumac shortfall. This is far higher than the cost of delivering energy savings, which equated to EUR 0.004/kWh cumac during the first compliance period.[262]

3.8.8 Performance Incentives

No performance incentives are available.

3.8.9 Eligible Energy Savings

Obligated parties have a variety of options for meeting their commitments. They may:[263]

- implement energy saving programmes (within their customer base);
- buy energy efficiency certificates;
- pay a penalty; or
- some combination of the above.

Obligated parties and some non-obligated parties can produce eligible energy savings, which are then used to create certificates. During the second compliance period, eligible non-obligated parties have been restricted to local authorities, the National Housing Agency, and social housing landlords. This is a change from the first compliance period, which allowed all economic actors whose main business is not energy efficiency and for whom the energy savings action produces no direct income to produce eligible energy savings.

3.8.10 Eligible Energy Efficiency Measures

There are three categories of eligible energy efficiency measures:

- standardised measures for which deemed energy savings values have been calculated;
- non-standardised measures; and
- contributions to programmes targeting fuel poverty, and informational programmes, training, and innovation targeting reductions in energy demand.[264]

Standardised measures are specified in individual sheets (known as "fiches").[265] Measures are categorised into six end-use sectors (see section 3.8.4, page 49), each of which is subdivided into up to five different categories: building envelope, heating/cooling, lights and appliances, other equipment, and services.

Each (usually one-page) sheet specifies the following parameters for that measure:[266]

- eligible end-use application;
- brief description of the measure, its applicability, and any relevant technical standards;
- requirements concerning installation of measure;
- measure lifetime; and
- deemed energy saving (e.g., per unit, per square meter), including any variations between the three French climatic zones.

260 Greaume and Borde, 2011.

261 Capozza, 2006. The target is fuel-neutral because of the low-carbon content of electricity generated by nuclear power stations in France.

262 Staniaszek and Lees, 2012

263 Staniaszek and Lees, 2012

264 Ministère de l'Écologie, de l'Énergie, du Dévelopment Durable et de la Mer, 2010

265 The full list of standardised measure sheets is available at: http://www.developpement-durable.gouv.fr/Secteur-du-batiment-residentiel html

266 Staniaszek and Lees, 2012

In France, tax credits of up to 50 percent of the capital costs have been introduced for householders who have certain energy efficiency measures installed professionally (e.g., insulation, efficient heating). These are allowed to be claimed in conjunction with energy efficiency certificates by an obligated energy retailer. This has resulted in (by international standards) very low subsidy levels required to be offered to householders by electricity and gas suppliers. The view of the French Environment and Energy Management Agency is that the tax credit drives the demand for energy efficient heating measures and is the real economic trigger. The agency felt that the energy efficiency certificate activity helped the offer to develop and makes the promotion of the tax credit more widespread.

3.8.11 Measurement, Verification, and Reporting

Certificates are issued after energy efficiency measures have been carried out but before energy savings have actually been achieved.

As of 31 December 2010, 95 percent of energy saving certificates issued were for standardised energy efficiency measures.[267] A number of criteria are considered in establishing deemed saving values, including the type of equipment or goods employed, the process used to save energy, the state of the market of the process, and the level of grid congestion that might be relieved in the geographic area where the measure is being undertaken.[268]

Energy savings achieved through implementing non-standard energy efficiency measures require approval of both the methodology and the level of savings achieved.[269]

3.8.12 Trading of Energy Savings

Trading of energy efficiency certificates occurs over the counter, as no formal market has been established by the French government.[270] Ownership of certificates is established contractually, with the contract submitted at the time certificates are claimed to ensure issuance to the proper party.[271] Banking of certificates is allowed for up to nine years (three compliance periods).

Trading of energy efficiency certificates in France has been limited, largely because the bulk of the EEO falls on Electricité de France and Gaz de France.[272] Registered trading accounted for less than three percent of all certificates in the first compliance period.[273] Trading has further been limited by the fact that most obligated suppliers prefer to implement projects themselves or through agreements with equipment suppliers and installers.

During the first compliance period the average market price was approximately EUR 0.0032/kWh cumac, which is well below the penalty price of EUR 0.02/kWh. The sellers were mainly eligible non-obligated parties, such as local authorities and some companies.

3.8.13 Funding

Under the 2005 Law, the regulator is authorised to take into account retailers' costs of complying with EEO in setting tariffs. In the first three-year period no cost recovery was allowed.[274] Retailers have buffered the cost of implementation by targeting energy efficiency measures that qualify for tax rebates. The cost of achieving energy saving targets has been subsidised for gas retailers in part through funds raised by France's natural gas consumption tax.[275]

3.8.14 Scheme Administration

The key players in the French energy efficiency certificate scheme are:[276]

- the Directorate for Energy and Climate within the Ministry of Ecology, Sustainable Development, Transport and Housing sets the scheme rules and the level of the obligation;
- the Energy Environment Technical Association is a forum in which actors in the energy savings market (e.g., energy suppliers, manufacturers, retailers) work together to propose new standardised energy

267 Second Energy efficiency action plan for France.

268 Capozza, 2006

269 Bertoldi, et al., 2010

270 Monjon, 2006

271 Bertoldi, et al., 2010

272 Bertoldi, et al., 2010

273 Greaume and Borde, 2011

274 Although the French gas and electricity sectors have been fully open to competition since 2007, gas and electricity prices for most customer classes remain regulated.

275 Hamilton, et al., 2010

276 Staniaszek and Lees, 2012

efficiency measures to the Ministry based on the consensus of all actors. The Association develops feedback on the certificate scheme and contributes to the adaptation and evolution of the scheme over time;
- ADEME provides "back office" functions on behalf of the Directorate for Energy and Climate, including technical analysis, expert advice, and evaluation. ADEME also runs information campaigns as well as numerous other government-funded energy saving activities;
- the National Energy Savings Certificates Centre under the control of the Directorate awards and records the certificates and controls eligible energy efficiency projects;
- the obligated parties; and
- the "eligible parties"—these are organisations that are not obligated parties but who can earn energy efficiency certificates in their own right.

For the first phase of the certificate scheme to 30 June 2009, 77 percent of the 65 TWh cumac savings were awarded to obligated parties, and the remaining 23 percent to non-obligated parties (mainly local authorities and social housing providers).[277] Only a small minority of certificate holders (37 out of 147) were non-obligated parties. Most energy efficiency measures were implemented through contracts between obligated parties—particularly Electricité de France and Gaz de France—and third parties.

3.8.15 Scheme Results

By the end of the first compliance period, French suppliers had exceeded their aggregate target by more than 11 TWh, delivering 65.2 TWh cumac of energy savings.[278] On 31 December 2010, at the start of the second compliance period, the volume of energy savings certificates issued was 163.4 TWh cumac.

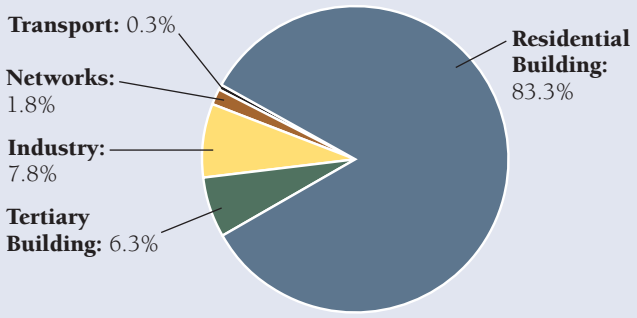
Figure 7 shows that the majority of energy savings occurred in the residential sector, followed by industry, tertiary buildings, networks, and transport.

Popular energy efficiency measures included installation of efficient boilers, heat pumps, insulation, and windows; these measures have been favoured in part because of the added support provided by tax benefits.[280]

The total cost of the first compliance period for consumers has been estimated at EUR 3.9 billion (including EUR 1.3 million in complementary tax credits on most energy efficient equipment), and the energy bill reduction has been estimated at EUR 4.3 billion. The estimated total cost to obligated parties was EUR 210 million or about EUR 0.039/kWh cumac.[281]

Figure 7

Energy Savings During the First Compliance Period in the French Energy Efficiency Certificate Scheme[279]



3.8.16 Areas for Improvement

One of the main criticisms of the first phase of the energy efficiency certificate scheme was that a significant portion of the energy savings was not additional. A total of 72.3 percent of all certificates were issued for measures in the heating sector, which were pursued due to the availability of generous tax incentives. Furthermore, energy savings for boiler replacements were awarded relative to an assumed stock average for the boiler efficiency rather than the customary approach of awarding savings relative to the average efficiency of a boiler in the market place. As the latter approach was used by the French for awarding appliance energy savings, there is clearly an inconsistency in the approach.

It would appear that the normal retail suppliers to households for energy efficiency measures such as lighting and appliances were not utilised to the maximum effect.

277 Lees, 2010

278 Ministère de l'Écologie, de l'Énergie, du Dévelopment Durable et de la Mer, 2009

279 Greaume and Borde, 2011

280 Bertoldi and Rezessy, 2009

281 Greaume and Borde, 2011

The first phase of the energy efficiency certificate scheme explicitly forbade non-obligated parties from increasing their sales through promotion of energy efficiency measures.

3.9 Italy

Italy has the most active energy efficiency certificate market in Europe, characterised by significant market participation by energy efficiency providers, including some ESCOs, and high levels of certificate trading through the spot and over-the-counter markets. An EEO for electricity and gas distribution system operators was introduced as part of the legislation liberalising Italy's electricity and gas sectors in 1999 and 2000. The energy efficiency certificate scheme, coupled with annual energy saving targets, commenced operation in January 2005.

As a participant in the European Union emissions trading scheme and the Kyoto Protocol, Italy has committed to reducing its GHG emissions to 6.5 percent below 1990 levels between 2008 and 2012. End-use energy efficiency improvements play an important role in helping meet this target. Italy's energy efficiency certificate scheme also plays an important role in helping achieve the European Union's "20-20-20 Climate Package," which calls for GHG emissions reductions and improved energy efficiency.[282]

3.9.1 Policy Objectives

The energy efficiency certificate scheme is designed to serve as the primary driver for end-use energy efficiency in Italy. End-use energy efficiency improvement is seen as essential for fulfilling Italy's commitments under the Kyoto Protocol, increasing competitiveness and employment, and ensuring security of energy supply.[283] The certificate scheme serves to reduce the cost of complying with the energy saving targets.[284]

3.9.2 Legal Authority

The energy efficiency certificate scheme was created by the Legislative Decrees of 16 March 1999, No. 79, and 23 May 2000, No. 164. These laws require electricity and natural gas distributors to pursue end-use energy efficiency, according to quantitative targets and procedures to be determined in subsequent ministerial decrees. The Minister for Productive Activities (now the Minister of Economic Development), jointly with the Minister of Environment, issued two decrees on 24 April 2001 that established the energy efficiency certificate scheme and charged Autorità per l'Energia Elettrice e il Gas (AEEG), the Italian electricity and gas regulator, with implementation. The Ministerial Decrees of 20 July 2004 put in place energy saving targets for electricity and gas, and launched the energy efficiency certificate scheme in January 2005. The certificate scheme was amended on 21 December 2007 by a Ministerial Decree and extended to 2012.

3.9.3 Fuel Coverage

Electricity and natural gas.

3.9.4 Sector and Facility Coverage

All end-use sectors are covered under the scheme, including transport, as well as small-scale co-generation and photovoltaics.

3.9.5 Energy Saving Target

The 2007 Decree sets the following targets for annual cumulative energy savings by obligated parties: 2.2 million tonnes of oil equivalent (Mtoe) in 2008, 3.2 Mtoe in 2009, 4.3 Mtoe in 2010, 5.3 Mtoe in 2011, and 6.0 Mtoe in 2012.

The energy savings that have to be achieved for the first time each year are lower, (e.g., for 2012 the Decree requires 1.1 Mtoe first-time annual savings).

The targets are fuel-neutral and savings of any end-use fuel may contribute toward meeting the energy saving targets. Prior to the 2007 Decree, no more than 50 percent of savings could come from either electricity or natural gas, but this constraint has now been lifted.

Energy savings are generally counted for energy efficiency measure lifetimes of five years, although savings from measures involving energy efficient improvements to building fabric are counted for eight years, and savings from combined heat and power/co-generation are counted for ten years.

282 AEEG, 2009b

283 AEEG, 2006

284 Italian Ministry of Economic Development, 2007

3.9.6 Obligated Parties

Obligated parties are distributors of electricity and natural gas who, as of 31 December of the preceding year, "have connected to more than 50,000 consumers through their distribution grid."[285] At the end of 2009, 14 electricity and 62 natural gas distributors were obligated to meet energy saving targets.[286]

Individual targets for obligated parties are determined annually by the AEEG based on each distributor's proportion of energy distributed to final customers as compared to the total amount of energy distributed in Italy the preceding year.[287] The electricity sector is responsible for over half of the total obligation (3.6 Mtoe in 2012 out of a total of 6 Mtoe).[288] One electricity distributor, ENEL, is responsible for meeting the vast majority of the electricity sector target (86.8 percent in 2008). There are more obligated parties in the gas sector, with three companies accounting for just under 45 percent of the gas sector target, and all other gas distributors individually responsible for under five percent of the target.[289]

3.9.7 Compliance Regime

Each obligated electricity and gas distributor achieves compliance by surrendering the number of energy efficiency certificates that corresponds to their individual annual energy saving target.

Penalties for shortfalls in meeting the annual target are assessed on a case-by-case basis. The minimum overall penalty is EUR 25,000; the maximum is EUR 155 million. The penalty does not cancel the obligation to meet the target. There is a one-year grace period if at least 60 percent of the annual target is met.[290]

3.9.8 Performance Incentives

Energy efficiency activities, when accompanied by information campaigns, are eligible for a five percent premium over actual energy savings achieved.[291] It is proposed to remove this incentive from 2013.[292]

Crediting energy savings from certain energy efficiency measures over longer lifetimes than the standard five years is an approach used to incentivise the implementation of certain types of measures, including energy efficient improvements to building fabric and combined heat and power/co-generation.

Further changes to performance incentives are proposed. The major proposed change is to adjust the energy saving values for energy efficiency measures to better reflect the value of those measures that have much longer lifetimes (e.g., insulation, 30-40 years). It is also proposed to offer incentives for measures carried out by genuine ESCOs.[293]

3.9.9 Eligible Energy Savings

Obligated electricity and natural gas distributors may meet their individual annual energy saving targets in one of three ways:[294]

- by directly implementing energy efficiency measures to create energy efficiency certificates;
- by contracting energy service companies to implement energy efficiency measures; and
- by purchasing energy efficiency certificates through over-the-counter or spot market transactions.

The creation of energy efficiency certificates is not restricted to the obligated parties. Any organisation that is accredited by the AEEG as an energy service provider can create certificates in its own right, which can then be sold over the counter or traded on the market.[295] A large majority of the accredited energy service providers do not meet the European Union definition of an ESCO, as they are primarily installers of energy efficiency measures. Organisations that consume large amounts of energy and also have an energy manager may also create their own energy efficiency certificates, but these organisations accounted for only around one percent of certificate creation activity in the period up to 2009.

Obligated parties and other organisations accredited

285 AEEG, 2009b

286 AEEG, 2009b

287 Italian Ministry of Economic Development, 2007

288 AEEG, 2009b

289 AEEG, 2009b. The three companies are: Società Italiana per il Gas per Azioni (23.8%), Enel Rete Gas S.p.a. (12.7%), and HERA S.p.a. (8.1%).

290 Pavan, 2009

291 Pavan, 2009

292 Pavan, 2011

293 Pavan, 2011

294 Italian Ministry of Economic Development, 2007

295 Pavan, 2011

to create certificates submit to the AEEG proposals for energy efficiency projects and requests for energy savings verification and certification together with the supporting documentation. The AEEG verifies (with technical support from the national energy agency) and certifies the energy savings delivered, on the basis of the detailed documentation received.

In the first phase of the Italian energy efficiency certificate scheme to the end of 2009, only 15.5 percent of certificates were created by the obligated parties. The parties acquired certificates mainly by contracting energy service companies to implement energy efficiency measures and through purchasing certificates in over-the-counter trading.[296]

Most energy efficiency projects are implemented by accredited energy service providers (over 80 percent between 2005 and 2009). This is largely because the obligated parties are distribution system operators that do not have the direct contact with customers. By the end of 2009, over 1,375 energy service providers had been accredited, but only 231 of these entities had been issued energy efficiency certificates.[297] There is a strong concentration in the market, with 70% of certificates issued to 15 energy service providers.

3.9.10 Eligible Energy Efficiency Measures

The AEEG publishes and regularly updates a list of energy efficiency measures with standard procedures for calculating deemed energy saving values over the lifetime of the measure. Although obligated electricity and natural gas distributors have primarily implemented measures on this list, they are free to propose other measures to be assessed on a case-by-case basis.

As is common in most European EEO schemes, the overwhelming majority of energy efficiency certificates are issued for measures with deemed or ex ante energy saving values. By the end of 2010, more than 80 percent of certificates were issued for energy savings in the residential sector.[298]

3.9.11 Measurement, Verification, and Reporting

There are three methods for measurement and verification of energy savings:

- **deemed energy savings.** This method is based on standard calculation procedures that have been established for specific energy efficiency measures, such as installing compact fluorescent light bulbs, wall and roofing insulation, and certain high-efficiency appliances. A list of calculation procedures is available through the AEEG;[299]
- **partial on-field measurement** This method is similar to the deemed energy savings method in that standard calculation procedures have been established for specific energy efficiency measures; however, on-site measurement of certain parameters must be carried out for each energy efficiency project; and
- **metered baseline method.** This method applies to energy efficiency projects that cannot be assessed under either of the first two methods. These projects must include a monitoring plan and require the AEEG's approval and on-site measurement and verification to receive credit for the energy savings achieved.[300]

The AEEG conducts random on-site audits for all types of energy efficiency projects to confirm claimed energy savings.

3.9.12 Trading of Energy Savings

Distributors may meet their annual efficiency obligations through the purchase of energy efficiency certificates through over-the-counter or spot market transactions.[301]

Each energy efficiency certificate represents primary energy savings of one tonne of oil equivalent. Certificates are divided into three classes, each representing primary energy savings: Class I certificates represent reductions in electricity consumption; Class II certificates represent reductions in natural gas consumption; and Class III certificates represent all primary energy savings that fall outside the first two categories.[302]

Banking of certificates is allowed; borrowing is not.[303] Market transactions occur on a dedicated market, organised and managed by Gestore Mercati Energetici, the company that organises and manages the Italian Power Exchange

296 Pavan, 2011

297 Pavan, 2011

298 Pavan, 2011

299 http://www.autorita.energia.it/it/operatori/operatori_ee.htm (Italian).

300 Capozza, 2006

301 Italian Ministry of Economic Development, 2007

302 AEEG, 2009b

303 Capozza, 2006

(IPEX). Prices and total trades for all types of market and bilateral transactions are publicly available through the company.[304] All market participants must register with Gestore Mercati Energetici, which publishes a public list of participants.[305] Certificates are issued annually by the company on request from the AEEG, after verification of results is achieved.[306]

3.9.13 Funding

Obligated electricity and natural gas distributors recover their cost of complying with energy saving targets (including purchase of energy efficiency certificates) through a "unitary tariff contribution," established annually and applicable to all distributors for Type I, II, and (since 2008) III energy savings.[307] The unitary tariff contribution is set annually pursuant to a formula that takes into account trends in energy prices. The tariff contribution for 2010 was set at EUR 92.22/toe.[308]

The idea behind a fixed contribution for cost recovery, rather than a case-by-case determination based on actual costs, is to incentivise obligated parties to seek out highly cost-effective energy efficiency measures.[309]

Obligated electricity and natural gas distributors may recover costs up to their actual expenditure to achieve their annual target. Transport measures are not eligible for cost recovery. In addition, "tariff funds are used to finance information campaigns from electricity and natural gas distributors as well as audit schemes at the local level."[310]

3.9.14 Scheme Administration

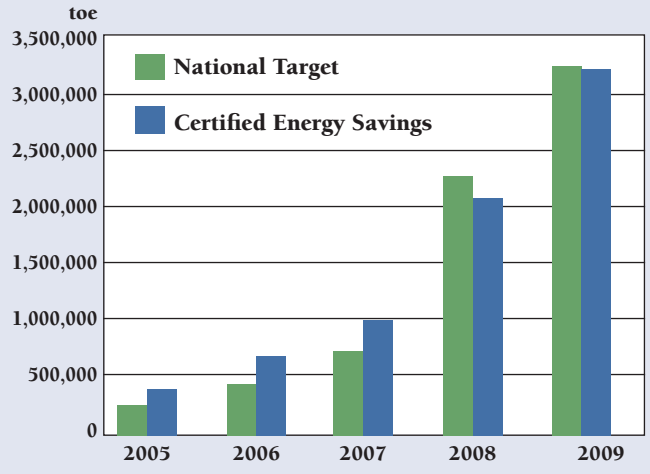
As the principal administrator of the scheme, the AEEG is in charge of developing the rules for issuing and trading energy efficiency certificates, establishing the cost-recovery mechanism, defining sanctions for non-compliance, certifying savings, monitoring and publicly publishing results through an annual report and two interim reports, and proposing improvements to the programme. The AEEG establishes the market rules for energy efficiency certificate trading jointly with Gestore Mercati Energetici, which organises and manages the Italian Power Exchange. Since 2009, AEEG has delegated to the Italian National Agency for New Technologies, Energy and Sustainable Economic Development responsibility for overseeing assessment and certification of energy savings as well as updating technical sheets and guidelines for quantification of energy savings.[311]

3.9.15 Scheme Results

Figure 8 shows the cumulative certified energy savings achieved in the Italian energy efficiency certificate scheme to the end of 2009.

Figure 8

Cumulative Certified Energy Savings Achieved in the Italian Energy Efficiency Certificate Scheme to the End of 2009 [312]



304 See more information at: http://www.mercatoelettrico.org/En/Esiti/TEE/BilateraliTEE.aspx

305 A list of participants is available at: http://www.mercatoelettrico.org/En/Mercati/TEE/MercatoTEE.aspx?filename=elencooperatori

306 AEEG, 2009b

307 Legislative decree no. 115 of 30 May 2008 expanded the tariff contribution to Type III energy savings.

308 AEEG Resolution, 24 November 2009 available at: http://www.autorita.energia.it/it/inglese/enlex/09.htm. The formula was established to AEEG Resolution of 29 December 2008 available at: http://www.autorita.energia.it/it/inglese/enlex/08.htm

309 Eyre et. al., 2009

310 Eyre et. al., 2009

311 English summary of Resolution 26 available at: http://www.autorita.energia.it/it/inglese/enlex/09.htm. The Italian National Agency for New Technologies, Energy and Sustainable Economic Development was established pursuant to Art. 37 of Law no. 99 of July 23, 2009. See more information at: http://www.enea.it/com/ingl/default.htm

312 Pavan, 2011

Overall, obligated electricity and natural gas distributors have been on target to meet their annual targets. Between January 2005 and the end of 2009, the scheme yielded 6.6 Mtoe in total cumulative energy savings against a target of 6.5 Mtoe.[313]

In 2008, over 77 percent of total savings involved electricity savings, 19 percent natural gas savings, and three percent other fuels.[314] Most energy savings have occurred in the residential sector, with only between five and ten percent occurring in the industrial sector.[315] The most common measures for which energy efficiency certificates have been issued are: introduction of compact fluorescent light bulbs (66.3 percent), followed by residential low-flow showerheads (16.7 percent), and residential low-flow faucets (5.4 percent).[316] Most measures implemented are those for which deemed savings have been established.[317]

3.9.16 Areas for Improvement

Italy's energy efficiency certificate scheme suffered from low trading activity in its early stages. The AEEG has taken a number of steps to stimulate a more robust market, including expanding the number of obligated distribution companies and making energy saving targets entirely fuel-neutral.[318]

A number of areas for improvement remain and are under active discussion.

With a couple of exceptions, the scheme incentivises low-cost, shorter lifetime measures over more costly measures that save more energy over a longer time period and that may be more cost effective in the long run. Focussing on low-cost measures may also encourage projects that install only one measure in a facility rather than carrying out comprehensive energy efficiency retrofits that capture all available cost-effective energy savings.

The "unitary tariff contribution" cost recovery mechanism has been seen by some as generating windfall gains for obligated distributors, especially for electricity in the period until the end of 2007, when the distributors retained funds in excess of their expenditure on energy efficiency at the expense of ratepayers.

Finally, there is a continued need to further facilitate consumer access to information and capital and to tailor incentives to areas where they are most needed.[319]

3.10 Korea

The Republic of Korea has gradually shifted the emphasis of its economy to energy-intensive heavy industries, such as petrochemicals, cement, iron, steel, machinery, and automobiles. Korea also has no significant energy sources and imports the majority of energy needed to meet its domestic needs. This, combined with the oil crises of the 1970s, caused energy efficiency and a stable supply of energy to become priorities in Korea's energy policies.[320]

In 1978, directly following the second world oil shock, Korea established the Ministry of Energy and Resources to administer the planning and enforcement of national energy policies. The Ministry was later incorporated into the existing Ministry of Trade, Industry and Energy. In December 1979, Korea promulgated the *Rational Energy Utilization Act* to ensure energy security and to promote energy efficiency.[321] Korea's energy efficiency programmes are planned and implemented based on the Act. The Korea Energy Management Corporation was established in 1980 and functions as the national energy efficiency center responsible for the implementation of national energy efficiency programmes.

Under the *Rational Energy Utilization Act*, the Ministry of Trade, Industry and Energy must draft a Basic National Energy Plan every five years. In addition, all local governments, assisted by the Korea Energy Management Corporation, must make and implement a regional energy plan every five years that is in tune with the Basic National Energy Plan.[322]

313 Pavan, 2011

314 AEEG, 2009b

315 AEEG, 2009b

316 AEEG, 2009a

317 AEEG, 2009b

318 2007 Decree

319 Pavan, 2009

320 Ahn, 1998

321 Ahn, 1998

322 Republic of Korea Ministry of Commerce, Industry and Energy, 1998

The *Rational Energy Utilization Act* established several other initiatives aimed at promoting energy efficiency:[323]

More recently DSM has been progressively pursued in Korea because of the growing difficulty in securing suitable sites and investment capital for constructing new power supply facilities. Additionally, an increase in the use of air conditioners in the 1990s caused a severe drain on electricity reserves and resulted in a shortage on several occasions. In 1995, the Government revised the Rational Energy Utilization Act to require that all energy utilities establish and implement a DSM investment plan on an annual basis. The plan and its implementation results must be reported to the Government.[324]

3.10.1 Policy Objectives

The *Rational Energy Utilization Act* states that energy utilities must establish and execute an annual DSM investment plan "to improve the efficiency in the production, conversion, transport, storage and utilization of the energy, and the reduction of the demand, etc."[325] The 1997 Basic Plan for Rational Use of Energy includes in its goals: reducing energy imports, reducing production costs through reduced energy use, minimising carbon dioxide emissions, developing an energy efficiency socioeconomic structure, and strengthening DSM in the power sector.[326]

3.10.2 Legal Authority

The energy utility DSM investment scheme was instituted under an amendment to the Rational Energy Utilization Act. If it is deemed necessary, the Ministry of Trade, Industry and Energy may request any revision or supplement of a utility DSM investment plan. The Rational Energy Utilization Act was also amended in 1997 to allow the Ministry of Trade, Industry and Energy to require an energy utility to establish and carry out energy efficiency measures in order to reduce a part of the energy demand expected in the long-term demand plan. Finally, the Ministry of Trade, Industry and Energy may establish and carry out a least-cost plan to promote the investment of DSM by energy utilities.[327]

3.10.3 Fuel Coverage

Electricity, natural gas, and district heating. It is possible that in the future oil will also be included under the energy utility DSM investment scheme.[328]

3.10.4 Sector and Facility Coverage

Energy utilities invest in DSM programmes, including load management and energy efficiency for commercial, industrial, educational, and residential customers.

3.10.5 Energy Saving Target

Under the energy utility DSM investment scheme there are no quantitative targets for reduction in energy usage, energy efficiency improvements, or annual investments, except that the total investment budget for DSM programmes implemented by energy utilities must exceed the total investment budget of the previous year.[329]

3.10.6 Obligated Parties

The energy utility DSM investment scheme places obligations on the Korea Electric Power Corporation, the Korea Gas Corporation, and the Korea District Heating Corporation.[330] The Minister of Knowledge Economy may designate other companies that supply a large amount of energy as obligated parties, however it has not yet done so.[331] In the future, the scope may be expanded to include private utilities, such as gas and heat retailers, in order to maximise energy savings. Additionally, oil companies may be included as obligated parties.[332]

323 Ahn, 1998

324 Ahn, 1998

325 Republic of Korea Ministry of Commerce, Industry and Energy, 1998

326 Ahn, 1998

327 Ahn, 1998

328 Korea Energy Management Corporation, 2010

329 Because of the lack of quantitative energy saving targets, the Korean energy utility DSM investment scheme is strictly not an energy efficiency obligation scheme. However, it is included in this report as an example of how energy utilities may be obligated to carry out load management and energy efficiency programmes without establishing quantitative energy saving targets.

330 Republic of Korea Ministry of Commerce, Industry and Energy, 1998

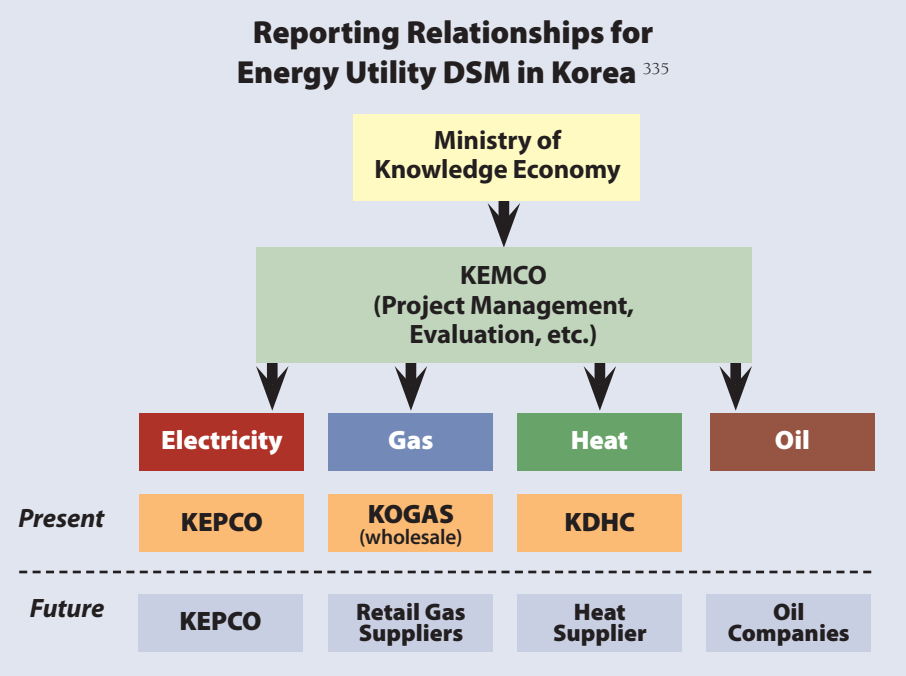
331 Ahn, 1998

332 Korea Energy Management Corporation, 2010

3.10.7 Compliance Regime

Figure 9 shows the reporting relationships for energy utility DSM in Korea. Energy utilities must submit their DSM investment plans and report the results to the Ministry of Knowledge Economy, which has authorised the Korea Energy Management Corporation to serve as the project management company with regard to the DSM plans. The Korea Energy Management Corporation evaluates the plans and the results of energy supplier DSM.[333] The total investment budget for DSM programmes implemented by energy utilities must exceed the total investment budget of the previous year. Energy utilities must report investments to the Korea Energy Management Corporation the following year.[334]

Figure 9



3.10.8 Performance Incentives

No performance incentives are available.

3.10.9 Eligible Energy Savings

The *Rational Energy Utilization Act* states that the energy utilities must invest directly in DSM programme implementation. Many DSM programmes are actually implemented by ESCOs or vendors of energy efficient equipment.[336]

3.10.10 Eligible Energy Efficiency Measures

The DSM measures implemented under the energy utility DSM investment scheme vary among energy utilities and can fall into one of three categories:[337]

- energy efficiency improvements;
- load management; and
- industry basis funding, which includes investments in research and development and programme promotions.

An energy utility may also contribute a part of its annual investment to a specialised agency for DSM.[338]

3.10.11 Measurement, Verification, and Reporting

Before 2012, the energy utilities calculated energy savings from DSM investments based on the dissemination status of each programme. Starting in 2012, however, the government requires verification of actual energy savings by an independent third party.[339]

3.10.12 Trading of Energy Savings

No trading of energy savings is allowed under the programme.

3.10.13 Funding

The Korea Electric Power Corporation collects a customer charge equal to 3.7 percent of the electricity charge, which funds the Electric Power Infrastructure Fund and investments in DSM. The Korea Gas Corporation and the Korea District Heating Corporation do not include a

333 Korea Energy Management Corporation, 2010

334 Kil Hwan, private communication, March 2012

335 Korea Energy Management Corporation, 2010

336 Kil Hwan, private communication, March 2012

337 Kil Hwan, private communication, March 2012

338 Republic of Korea Ministry of Commerce, Industry and Energy, 1998

339 Kil Hwan, private communication, March 2012

charge for DSM investments in customers' energy bills. These companies simply invest some part of their total revenues.[340]

3.10.14 Scheme Administration

Between 2002 and 2008, the Korea Electric Power Corporation was excluded from the entities required to establish DSM investment plans because it was undergoing partial privatisation from being a fully government-owned company.[341] During this period, the Government of Korea used the Electricity Industry Support Fund to implement DSM programmes.

The Korea Electric Power Corporation now typically invests more than 60 percent of its total DSM budget in energy efficiency improvement. The Korea Gas and District Heating Corporations concentrate their investments in short-term load management.[342] Table 13 shows the planned DSM programmes for each of the energy utilities in 2012.

3.10.15 Scheme Results

Table 14 (page 61) shows that from 1996 to 2008 KRW 2,158,800 million (approximately USD 1,918 million) has been invested through the energy utility DSM investment scheme.

3.10.16 Areas for Improvement

To maximise savings, the energy utility DSM investment scheme is planned to be expanded to cover oil companies and private energy retailers.[344]

Korea planned to implement an EEO with quantitative energy saving targets in 2012.[345] This has been delayed due to the implementation of various other regulations, including a Renewable Portfolio Standard.[346]

340 Kil Hwan, private communication, March 2012

341 Heyeong-Jung Kim, private communication, March, 2012

342 Kil Hwan, private communication, March 2012

343 Kil Hwan, private communication, March 2012

344 Korea Energy Management Corporation, 2010

345 Korea Energy Management Corporation, 2010

346 Heyeong-Jung Kim, private communication, March, 2012

Table 13

DSM Programmes Planned by Energy Utilities in Korea, 2012[343]

Programme	Korea Electric Power Corporation	Korea Gas Corporation	Korea District Heating Corporation
Energy Efficiency Improvement	Supporting energy efficient equipment installation (lighting, inverters, refrigerators); installation of smart meters	Supporting small-scale combined heat and power installation	Improving household heating efficiency; providing incentives for heat usage savings
Load Management	Providing financial incentives for participating in load management programme; subsidy for cool storage facility installation; offering monetary payments for direct load interruption	Installation subsidy for gas cooling equipment (absorption chillers and gas heat pumps); rate discount for gas cooling; rate discount in industrial sector for newly installed equipment; rate discount for compressed natural gas buses	Discounted district cooling charge
Industry Basis Funding	Promotion, campaigns, events	Supporting DSM specialised institution's research, promotion, R&D	Supporting DSM specialised institution's research, promotion, R&D
2012 Business Budget	USD 150 million	USD 100.6 million	USD 9 million

Table 14

DSM Investment by Energy Utilities in Korea[347] *(Unit: KRW 100 million)*

	1996 to 2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
***Electricity**	3,763	1,400	1,181	1,045	931	1,398	1,673	1,708	1,880	**14,979**
Gas	533	503	518	572	731	774	825	885	847	**6,188**
Heat	38	25	31	47	51	56	59	65	49	**421**
Total	**4,334**	**1,928**	**1,730**	**1,644**	**1,713**	**2,228**	**2,557**	**2,658**	**2,776**	**21,558**

3.11 Poland

In April 2011, Poland transposed European Directive 2006/32/EC on energy end-use efficiency and energy services into national law with the adoption of an *Act on Energy Efficiency.* The Act sets a national, economy-wide target of achieving a nine-percent reduction in final[348] annual energy use by 2016 as compared to Poland's average energy use from 2001 to 2005.

The Act introduces an obligation on suppliers of electricity, natural gas, and district heating, as well as brokerage firms and end-users transacting on the Polish Power Exchange, to meet annual energy efficiency targets between 2013 and 2016 in order to help meet the nine-percent economy-wide target.[349] The obligation is planned to be in place for three years, commencing in 2013 and ending in 2016. The Act further introduces a system of tradable energy efficiency certificates to facilitate compliance with the obligation.

3.11.1 Policy Objectives

The purpose of the Polish energy efficiency certificate scheme is to drive energy efficiency in the public sector.

3.11.2 Legal Authority

The *Act on Energy Efficiency* establishes:

- the EEO;
- a national energy saving target;
- a system for obtaining and retiring energy efficiency certificates; and
- the rules for conducting energy efficiency audits and for certification of energy efficiency auditors.[350]

The Act sets forth the framework for the EEO and the energy efficiency certificate scheme. The Minister of Economy and President of the Energy Regulatory Office are charged with issuing implementing regulations and overseeing various aspects of the obligation and of the certificate scheme.[351]

3.11.3 Fuel Coverage

Electricity, natural gas, and district heating.

3.11.4 Sector and Facility Coverage

The EEO covers the residential, commercial, and industrial sectors in respect of:[352]

- end-use energy efficiency;
- energy savings in energy companies' own activities; and
- reduction in transmission and distribution losses for electricity, natural gas, and district heating.

347 Korea Energy Management Corporation, 2010

348 Final energy savings are calculated from primary energy savings using conversion factors established by the Minister of Economy. Act on Energy Efficiency, 15 April, 2-11, Dz. U. z 2-11 r. Nr. 94, poz. 551 Art. 15, paragraph 1.4. See more information at: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20110940551 (Polish).

349 Polish Government, 2011. Companies supplying 5MW or less of heat are exempted from the obligation. See more information at: http://orka.sejm.gov.pl/proc6.nsf/opisy/3514.htm

350 Polish Government, 2011

351 The Ministers of Transport and of Construction, Spatial Order and Housing also play a role in implementation of the Act on Energy Efficiency.

352 Polish Government, 2011

3.11.5 Energy Saving Target

The *Act on Energy Efficiency* sets a target of achieving a nine-percent reduction in economy-wide final energy use by 2016 as compared to average final energy use from 2001 to 2005. Poland, in its National Energy Efficiency Action Plan, calculated this level of savings to amount to 53,452 GWh.[353]

3.11.6 Obligated Parties

The EEO covers electricity, natural gas, and district heating companies supplying customers connected to the grid within the borders of Poland. District heating companies supplying no more than 5MW of heat are exempted from the obligation. The obligation also covers brokerage firms and end-users connected to the Polish grid who conduct transactions on the Power Exchange.

Targets for individual obligated parties will be set annually at a level needed to help meet the 2016 national energy saving target.

3.11.7 Compliance Regime

The energy efficiency certificate scheme is the compliance mechanism for the EEO. Obligated parties comply with their individual annual energy saving target by surrendering certificates demonstrating primary energy savings that correspond to their target, or by paying an alternative compliance payment. At the request of the President of the Energy Regulatory Office, obligated parties must submit any documents or information that is necessary to verify compliance with the obligation, so long as such information is not classified or otherwise legally protected.[354] Failure to meet an individual target through surrendering certificates or alternative compliance payments will result in a penalty, which is set by the Energy Regulatory Office and is not to exceed 10% of the non-compliant party's annual earnings.

Oversight of the energy efficiency certificate scheme is shared between the Energy Regulatory Office and the Minister of Economy. The Minister of Economy establishes the annual energy saving target and establishes conversion coefficients used to convert primary energy to final energy. The President of the Energy Regulatory Office is responsible for issuing and retiring certificates, verifying compliance, and issuing penalties.

Certificates can be issued for any energy efficiency project generating average annual savings of 10 toe or more, and for any bundle of energy efficiency projects of the same type that, in aggregate, generate average annual savings of 10 toe or more. Projects are selected through an annual auction conducted by the Energy Regulatory Office.

The Energy Regulatory Office will assess penalties of up to EUR 2 million for entering false or misleading information in the auction declaration; failing to follow through with an energy efficiency project that cleared the auction; failing to notify the Energy Regulatory Office of the completion of a project; and failing to cover any shortfall in projected project energy savings with certificates.

3.11.8 Performance Incentives

No performance incentives are available.

3.11.9 Eligible Energy Savings

An annual auction conducted by the Energy Regulatory Office is used to select energy efficiency projects that will produce energy savings eligible to contribute to the energy saving target. There is no authorisation or accreditation procedure for parties to qualify for participation in the auctions, and participation in the auction is free of charge.[355]

In order to participate in the auction, a party must submit an "auction declaration" form that includes details relating to the energy efficiency project being bid into the auction, including the amount of primary energy savings being bid (in toe), and an energy audit for the project.

3.11.10 Eligible Energy Efficiency Measures

Eighty percent of energy efficiency certificates are to be issued for end-use energy savings measures. The remaining 20 percent of energy savings measures may come from:

- improvements in energy companies' own activities; and
- reductions in transmission and distribution losses for electricity, natural gas, and district heating.

A separate auction is held for each category. If the auction for end-use energy savings does not generate enough certificates to cover 80 percent of total projected certificates required for the year, the share of certificates from the remaining categories may be increased.

353 Polish Government, 2007

354 Polish Government, 2011

355 Polish Government, 2011

The *Act on Energy Efficiency* provides the following examples of eligible energy efficiency measures:[356]

- insulation of industrial installations;
- reconstruction and refurbishment of buildings;
- modernisation of:
  - appliances for domestic use;
  - lighting;
  - energy companies' own activities;
  - devices and installations used in industrial processes; and
  - local heat networks and heat sources;
- recapture of energy used in industrial processes;
- reducing:
  - reactive power flows (i.e., correcting power factor);
  - line losses;
  - transformer losses; and
- heating or cooling with renewable resources, co-generation, and waste heat recovery in industrial processes.

This list is not exclusive. The Minister of Economy is responsible for publishing a detailed listing of eligible energy efficiency measures. The Energy Regulatory Office is then responsible for choosing, through an annual auction, the energy efficiency projects for which energy efficiency certificates will be issued.

3.11.11 Measurement, Verification, and Reporting

Energy efficiency certificates can be issued for completed or planned energy efficiency measures implemented in projects that clear the auction. In the case of completed energy savings measures, the measures must have been completed no earlier than 1 January 2011.

An energy efficiency certificate serves as official verification of energy savings achieved through energy efficiency projects that cleared the auction. Parties must notify the Energy Regulatory Office within 30 days of a project's completion through a declaration of energy savings. The Energy Regulatory Office issues a certificate within 60 days of receiving the declaration.

Energy savings for energy efficiency projects with average annual energy savings that exceed 100 toe must be verified via energy audit. The audit may not be conducted by the same auditor who conducted the initial audit for the project auction declaration. Projects that fall below the 100-toe threshold are subject to random sampling by the Energy Regulatory Office to verify energy savings.

To avoid double-counting, energy savings measures credited under the energy efficiency certificate scheme cannot have received support from the Thermomodernization Fund, from the national or European Union budgets, or from any other public sources (e.g., the Norwegian Financial Mechanism or the European Economic Area Financial Mechanism[357]).

3.11.12 Trading of Energy Savings

Energy efficiency certificates are commodities that are fully tradable on the Polish Power Exchange.

3.11.13 Funding

Costs of the energy efficiency scheme are passed through to consumers via tariffs for electricity, heat, and natural gas. Costs of administration are estimated at PLN 3 million per year.[358]

3.11.14 Scheme Administration

The scheme has not yet commenced operation.

3.11.15 Scheme Results

The energy efficiency scheme is expected to save a total of 25,586 GWh by 2016.[359]

3.11.16 Areas for Improvement

Although the Polish energy efficiency scheme has not yet commenced, it has been criticised for its short timeframe. The scheme is only planned to last three years, commencing in 2013 and ending in 2016. Any energy efficiency certificates that have not been retired by the Energy Regulatory Office by March 31, 2016 will lose their legal effect on April 1, 2016. This creates limited motivation to invest in energy efficiency under the Act on Energy Efficiency, because there is no certainty that there will be an obligation to help drive energy efficiency measures beyond 2016.

356 Polish Government, 2011

357 Poland Ministry of Regional Development, 2012

358 Poland Ministry of Economy, 2011

359 Poland Ministry of Economy, 2011

3.12 United Kingdom

The United Kingdom[360] has in place two programmes that set mandatory carbon reduction targets for retail suppliers of electricity and natural gas and for electricity generators:

- the Carbon Emissions Reduction Target; and
- the Community Energy Savings Programme.

Both programmes support the United Kingdom's national and international climate obligations, primarily by promoting energy efficiency retrofits in the residential sector.

The Carbon Emissions Reduction Target entered into force in 2008 and is authorised through 2012. It represents a continuation of the United Kingdom's Energy Efficiency Commitment programmes.[361] The Carbon Emissions Reduction Target is expected to cost around 10 times more per year than the Community Energy Savings Programme.

The Community Energy Savings Programme was initiated in 2009 as a pilot programme focussing the activities of obligated parties into partnerships with local authorities and other local bodies, to provide whole-house retrofits in low-income communities. It has a target that is split equally between electricity retailers and generators, but in practice nearly 80 percent of the target has to be met by the main six retailers of electricity and natural gas.

3.12.1 Policy Objectives

The purpose of the Carbon Emissions Reduction Target is "to help electricity and gas consumers in the household sector to reduce the carbon impact of their home by using energy more efficiently, reducing consumption and using energy from renewable and micro-generation sources."[362]

The Community Energy Savings Programme has two goals:

- to significantly reduce the fuel bills of those living in low-income areas; and
- to help improve the energy efficiency of existing housing stock in order to reduce the United Kingdom's GHG emissions.[363]

The residential sector contributes 27 percent of total GHG emissions in the United Kingdom, with 86 percent of the existing housing stock expected to still be in use in 2050.[364] Consequently the Carbon Emissions Reduction Target and the Community Energy Savings Programme comprise an important part of the United Kingdom's broader climate policy, including meeting the country's "carbon budgets" and supporting the United Kingdom's national climate and energy strategy, set forth in the Low Carbon Transition Plan.[365] The Low Carbon Transition Plan calls for a 29-percent reduction in emissions from homes by 2020 as compared to 2008 levels and places particular focus on energy efficiency retrofits of existing homes, insulation, and fuel poverty.[366]

The Carbon Emissions Reduction Target and the Community Energy Savings Programme interact with a number of programmes that target these broader climate goals. For example, the Carbon Emissions Reduction Target played a central role as part of a broader plan to insulate six million United Kingdom households by the end of 2011, and the Community Energy Savings Programme is part of a suite of area-based programmes that target energy efficiency on a community-wide level.[367] The United Kingdom Government has recognised the need to ramp up its energy efficiency retrofit programmes in order to meet its 29-percent reduction target, and plans to replace the Carbon Emissions Reduction Target with a more ambitious programme to operate from 2012 to 2020.[368]

360 The two programmes described in this section cover obligated parties in Great Britain (i.e., England, Scotland, and Wales). Northern Ireland, which is also part of the United Kingdom, has a similar, but separate, program.

361 These programmes ran from 2002 to 2005 and from 2005 to 2008.

362 Carbon Emissions Reduction Target Explanatory Memo, 2008

363 Community Energy Savings Programme Explanatory Memo, 2009

364 Sustainable Development Commission, 2006

365 The Carbon Emissions Reduction Target has been extended to 2012 to align it with the first carbon budget period and provide certainty for continued investment in household energy efficiency. See more information at: http://www.decc.gov.uk/en/content/cms/consultations/cert_ext/cert_ext.aspx

366 This is an interim goal toward the United Kingdom's long-term target of reducing carbon emissions by 80% by 2050, which will require a near-zero carbon housing sector by 2050.

367 United Kingdom Department of Energy and Climate Change, 2009

368 United Kingdom Department of Energy and Climate Change, 2010

3.12.2 Legal Authority

Programmes that place EEO on energy suppliers in the United Kingdom can trace their roots back to 1994 when the first Energy Efficiency Standards of Performance were placed on 12 electricity retailers in England and Wales by the then-electricity regulator who had a duty "to promote the efficient use of electricity among customers."[369]

The current Carbon Emissions Reduction Target and Community Energy Savings Programme were made possible by legislative amendments introduced by the Climate Change and Sustainable Energy Act 2006. This Act empowers the Secretary of State for Energy and Climate Change to set an overall carbon emissions reduction target to—among other things—improve energy efficiency or reduce energy consumption.[370] Statutory instruments are used to define the targets and eligible energy efficiency measures for the individual phases of subsequent activity.

3.12.3 Fuel Coverage

Electricity and natural gas.

3.12.4 Sector and Facility Coverage

Residential dwellings, including those of low-income households and disadvantaged groups.

3.12.5 Energy Saving Target

The Carbon Emissions Reduction Target sets an overall target of reducing 293 million lifetime tonnes of CO_2-e for the period 1 April 2008 to 31 December 2012.[371] The original target for the end of March 2011 was for 185 million lifetime tonnes of CO_2-e, and 78 percent of the increased target must be met with professionally installed insulation. Up to two percent of the target may be met through installing micro generation.

The Community Energy Savings Programme sets an overall target of reducing 19.25 million lifetime tonnes of CO_2-e for the period 1 October 2009 to 31 December 2012.

Although these targets are dominated in CO_2-e, they are to be met through energy efficiency measures (residential retrofits). The targets are fuel-neutral and savings of any end-use fuel that is used by residential customers in their homes may contribute toward meeting the targets. Energy savings are multiplied by an appropriate carbon coefficient to calculate equivalent CO_2-e savings. There are procedures to address the potential for double counting of measures under the two programmes (see section 3.12.11, page 67).

The Carbon Emissions Reduction Target also includes a sub-target for social equity reasons. Forty percent of the target must be met with savings in low-income households and/or households that include a person aged more than 70 years. In the extended target, a new "super priority group" covering the most disadvantaged in society has been introduced, and 15 percent of savings in the extension period must come from this group.[372]

3.12.6 Obligated Parties

The schemes require retail suppliers of electricity and natural gas who have 50,000 or more domestic customers to meet a proportion of the overall targets based on their shares of residential customers. As of May 2010, there were six obligated electricity and gas retail suppliers.

The Community Energy Savings Programme further requires electricity generators that are not part of a group that also owns an electricity retailer and that generate 10 TWh/year or more of electricity to meet half of the overall target. Each obligated generator's individual target is based on the amount of electricity they generated relative to other obligated generators. As of March 2012 there are 11 obligated generators.[373]

3.12.7 Compliance Regime

The legislation establishing the Carbon Emissions Reduction Target and the Community Energy Savings Programme charges the Office of Gas and Electricity Markets[374] with programme oversight.

Obligated parties must fulfill certain reporting requirements. They must notify the Office of Gas and Electricity

369 Staniaszek and Lees, 2012

370 Carbon Emissions Reduction Target Explanatory Memo, 2008

371 http://www.decc.gov.uk/en/content/cms/funding/funding_ops/cert/cert.aspx

372 The 15-percent super priority group target is included within the 40-percent target for low-income households.

373 United Kingdom Office of Gas and Electricity Markets, 2012

374 The Office of Gas and Electricity Markets is the electricity and gas regulator for Great Britain (i.e., England, Scotland, and Wales). There is a separate regulator for Northern Ireland who administers a similar energy efficiency obligation program.

Markets of any energy efficiency projects[375] that they intend to promote at least one month prior to commencement of a project, and submit a proposal for approval. Progress reports are required every three months for the Carbon Emissions Reduction Target and every six months for the Community Energy Savings Programme, and a completion report is due at the end of the programme period.[376]

Compliance is determined at the end of the programme period, based on final measurement of the carbon reductions achieved by each obligated party. Non-compliance is enforced by the Office of Gas and Electricity Markets through an order securing compliance and/or imposition of a penalty.

Up to 100 percent of a retailer's or generator's obligation may be met through a transfer of carbon emissions reductions (Carbon Emissions Reduction Target) or trade of carbon obligations (Community Energy Savings Programme) between obligated parties. The transfer or trade must occur prior to the end of the compliance period, must be approved by the Office of Gas and Electricity Markets, and cannot compromise the transferring or trading party's ability to meet its target.[377]

3.12.8 Performance Incentives

Both the Carbon Emissions Reduction Target and the Community Energy Savings Programme offer incentives for certain types of activities, which take the form of "uplifts" that increase the carbon reductions claimable for certain energy efficiency measures. For example, certain market transformation actions under the Carbon Emissions Reduction Target receive a 50-percent uplift in the applicable carbon coefficient value for a given measure.[378] The Community Energy Savings Programme has a complex scoring system that offers uplifts in the carbon reductions credited for certain types of energy efficiency measures (e.g., for measures that are implemented as part of a whole-house approach) and for measures that cover more than 25 percent of properties within a low-income area.[379]

3.12.9 Eligible Energy Savings

The obligated parties, electricity and gas retail suppliers and electricity generators, produce eligible energy savings either by directly implementing energy efficiency projects themselves or by engaging specialist third parties, such as installers of insulation or energy efficient heating, to implement projects on their behalf.

3.12.10 Eligible Energy Efficiency Measures

The Carbon Emissions Reduction Target and the Community Energy Savings Programme are limited to energy efficiency measures implemented in residential dwellings in Great Britain (i.e., England, Scotland, and Wales).

There is no additional limit on the types of measures that are eligible under the Carbon Emissions Reduction Target. The vast majority of measures implemented have deemed energy saving values that have been adjusted and validated over years of monitoring and evaluation.

Eligible energy efficiency measures must be implemented for one of four purposes:[380]

- achieving improvements in energy efficiency;
- increasing the amount of electricity generated or heat produced by micro-generation;
- increasing the amount of heat produced by any plant that relies wholly or mainly on wood; or
- reducing energy consumption.

Under the Carbon Emissions Reduction Target, at least 40 percent of measures must focus on priority groups, primarily low-income and elderly customers.[381]

The Community Energy Savings Programme is limited to 17 types of measures, which must be achieved in areas of low income.[382]

375 Energy efficiency projects implemented under the Carbon Emissions Reduction Target and the Community Energy Savings Programme are called "schemes" and may involve the implementation of energy efficiency measures in hundreds or thousands of residential dwellings.

376 20 April 2011 for Carbon Emissions Reduction Target; 31 January 2013 for Community Energy Savings Programme.

377 Carbon Emissions Reduction Target Order, Article 18. Community Energy Savings Programme Order, Article 21.

378 Carbon Emissions Reduction Target Order, Articles 19 and 20.

379 Community Energy Savings Programme Explanatory Memo, 2009

380 Carbon Emissions Reduction Target Order, Article 9(1).

381 Carbon Emissions Reduction Target Order, Article 13.

382 Defined as "those within the lowest income decile under the Index of Multiple Deprivation in England and Wales and the lowest 15 percent in Scotland." See more information at: http://www.ofgem.gov.uk/Sustainability/Environment/EnergyEff/cesp/Documents1/cespfeb10.pdf

3.12.11 Measurement, Verification, and Reporting

Carbon savings are estimated during the compliance period and finalised at the end of the programme period. Final carbon savings achieved under the Carbon Emissions Reduction Target are calculated in one of two ways, depending on whether a measure is a "qualifying action" or a "demonstration action." The formula for qualifying actions under the Carbon Emissions Reduction Target and the Community Energy Savings Programme is as follows:

(Annual energy before – Annual energy after) x Carbon coefficient x Measure lifetime = tCO_2 lifetime

Carbon coefficient values, expressed in kilograms of CO_2-e per kWh, has been established for six sources of energy: electricity, gas, coal, liquid petroleum gas, oil, and wood.[383]

In practice, most qualifying actions are credited based on a deemed savings approach, whereby lifetime CO_2-e reductions have been predetermined for specific energy efficiency measures and are averaged over the fuel used for that specific purpose as appropriate, for example, energy saving calculations for insulation use an average CO_2-e reduction value, which weights the carbon content of all the existing fuels used for heating in proportion to their national use.[384]

Demonstration actions allow innovative energy efficiency measures that do not have independently proven energy saving values to be installed and monitored without risk to the obligated party. Energy savings for demonstration actions are determined by dividing the estimated cost of promoting and monitoring the action by GBP 18/CO_2-e. The product represents lifetime tonnes of CO_2-e to be credited to the project.[385] The Office of Gas and Electricity Markets must first make a determination that the costs are reasonable. A cap of six percent of the target may be met through a mix of demonstration actions and market transformation actions.

Obligated parties must monitor the implementation of energy efficiency measures to ensure that they are properly installed and conform to relevant quality standards.[386] The Office of Gas and Electricity Markets audits a sample of each supplier's energy efficiency projects to verify proper delivery, evidence that reported actions are being performed, that there is no double counting, that measures are properly categorised, and that procedures are in place for any technical or other required monitoring.[387]

Energy savings must be additional, for example, for retail appliances and products, the savings accredited represent the difference between the purchased product and the energy consumption of the market average.

The close interaction between the Carbon Emissions Reduction Target, Community Energy Savings Programme, and related programmes and legal obligations, presents the risk that measures will be double counted. The Office of Gas and Electricity Markets has introduced procedural safeguards to mitigate this risk, including a database that records by individual household all energy efficiency measures installed under the various programmes.

Under article 14(5) of the Community Energy Savings Programme Order, an action that is approved under the Carbon Emissions Reduction Target is not a qualifying action under the Community Energy Savings Programme.

Actions undertaken in conjunction with other government programmes must fulfill a number of requirements, including demonstration that the joint action will result in improvements that would not have happened absent supplier involvement; an agreement with other programmes ensuring that there is no double counting; and a letter from the government's or devolved administrator's lead contractor confirming additionality and that there is no double counting.[388]

Actions that are related to other regulatory mechanisms, such as energy efficiency measures that relate to the United Kingdom's building codes, must lead to improvements

383 Carbon Emissions Reduction Target and Community Energy Savings Programme Orders, Schedule 3.

384 See more information at: http://www.ofgem.gov.uk/Sustainability/Environment/EnergyEff/InfProjMngrs/Pages/InfProMngrs.aspx

385 Carbon Emissions Reduction Target Order, Article 21. Carbon Emissions Reduction Target Supplier Guidance V.2, Section 8 and Appendix 6.

386 United Kingdom Office of Gas and Electricity Markets, 2009

387 Carbon Emissions Reduction Target Supplier Guidance – Version 2, pp. 67-68.

388 Carbon Emissions Reduction Target Supplier Guidance, p. 20; Community Energy Savings Programme Supplier Guidance, p. 17.

above what would be achieved to meet the requirements of the regulations.

3.12.12 Trading of Energy Savings

Neither programme employs tradable certificates. Transfers of carbon emissions reductions (Carbon Emissions Reduction Target) and trading of carbon obligations (Community Energy Savings Programme) are allowed among obligated parties. Such transfers and trading must be approved by the Office of Gas and Electricity Markets.

3.12.13 Funding

Costs of implementing energy efficiency projects under the Carbon Emissions Reduction Target and the Community Energy Savings Programme are shared among the obligated parties and other entities involved in the implementation of projects.[389] For electricity and gas retailers, the costs are considered "a cost of doing business" and so are reflected in the prices charged to end-use customers; for electricity generators, the costs are indirectly passed on to consumers through increased wholesale prices.

3.12.14 Scheme Administration

Obligated parties may (and often do) work with project partners to jointly carry out energy efficiency measures under the Carbon Emissions Reduction Target and the Community Energy Savings Programme. Customer outreach plays an important role to ensure the necessary uptake of energy efficiency projects to meet programme targets. The Community Energy Savings Programme calls on obligated parties to collaborate with local community groups in implementing energy saving measures in low-income areas. The Office of Gas and Electricity Markets requires customer utilisation and evaluation monitoring for home energy advice to ensure that measures are being used as expected. Customer satisfaction monitoring is required for certain types of measures, such as installation of heating or insulation in homes.

3.12.15 Scheme Results

Since the introduction of retail supplier EEOs in 2002, the programmes have achieved significant energy efficiency improvements in the residential sector. Between 2002 and 2009 some six million households benefited from partially subsidised or free insulation, five million under the Energy Efficiency Commitment (the predecessor to the Carbon Emissions Reduction Target) and one million in the first year of the Carbon Emissions Reduction Target.[390]

In an evaluation for the United Kingdom Government of the second phase of the Energy Efficiency Commitment, which ran from 2005 to 2008, the cost of saving a delivered unit of electricity and gas through the Energy Efficiency Commitment was GBP 0.022/kWh and GBP 0.06/kWh, respectively—less than a quarter of the average price to consumers of those fuels. Obligated energy retailers delivered energy savings 23 percent more cost effectively than the Government predicted. More than two out of three households (including low-income households) have directly benefited from the second phase of the Energy Efficiency Commitment, mainly from energy efficient appliances and lighting measures. Additionally, over 1.1 million low-income households were helped by more substantive energy efficiency measures such as insulation and fuel switching. Excluding free riders, the lifetime carbon savings were nearly 59 million tonnes of CO_2-e from the measures required to meet the target; this was achieved at a net benefit of GBP 53/tCO_2-e saved.[391]

In the Carbon Emissions Reduction Target, 229.0 MtCO_2-e lifetime emissions reductions have been achieved by the end of 2011, including carryover from the second phase of the Energy Efficiency Commitment.[392] Obligated parties under the Carbon Emissions Reduction Target are expected to spend over GBP 5 billion by the end of 2012 to meet their target; approaching GBP 3 billion of which will support priority group measures that target elderly and low-income populations.

The Community Energy Savings Programme aims to benefit approximately 90,000 homes and is expected to

389 Carbon Emissions Reduction Target estimates the cost to energy suppliers over three years to amount to GBP 2.3 billion with other contributions totaling GBP 1.5 billion. Community Energy Savings Programme envisions the cost to power suppliers and generators at GBP 3.11 million with remaining costs of GBP 65 million. Carbon Emissions Reduction Target Explanatory Memo, p. 6; Community Energy Savings Programme Explanatory Memo, p. 7.

390 United Kingdom Office of Gas and Electricity Markets, 2009

391 Eoin Lees Energy, 2008

392 United Kingdom Office of Gas and Electricity Markets, 2012

deliver annual average fuel bill savings of up to GBP 300 for participating households. Progress has been slow, with only one percent of the target met by the end of 2011. However, 304 energy efficiency projects have been proposed by obligated energy retailers and electricity generators up to the end of December 2011. The estimated savings associated with these schemes represent 67.9 percent of the overall Community Energy Savings Programme target. The total number of dwellings treated by the end of 2011 was 30,588.[393]

Of the Carbon Emissions Reduction Target programme activities thus far, loft and wall insulation accounted for 63 percent of all savings, and lighting accounted for 22.4 percent of savings, although this percentage figure will fall with time, as compact fluorescent light bulbs have not been an eligible measure since April 2011. Heating was responsible for 8.5 percent of total carbon reductions, followed by appliances (4.3 percent), behavioural measures (1.1 percent), and micro-generation and combined heat and power (0.7 percent). Information on demonstration actions is not yet available.[394]

3.12.16 Areas for Improvement

Although the Carbon Emissions Reduction Target programme has achieved significant results, a number of areas for improvement remain. According to National Energy Action, a non-profit organisation addressing fuel poverty, the model of implementation, which involves different funders and/or scheme managers, leads to higher costs and a lack of coherent delivery. The group sees the Carbon Emissions Reduction Target as underutilising local authorities, who could apply in-depth knowledge of their constituencies to ensure more comprehensive implementation of retrofit programmes, including greater penetration of low-income neighbourhoods.[395] Distribution of compact fluorescent light bulbs by mail has led to the criticism that suppliers are targeting low-hanging fruit and receiving credit for measures that may not be achieving the levels of efficiency attributed to them, as there is little guarantee that the bulbs are being used. To meet the United Kingdom's targets, deeper whole-house retrofits are needed. This includes retrofitting low-income homes, which have significant untapped efficiency potential.

The United Kingdom Government has recognised the need to improve its residential retrofit programmes. In 2009, the Carbon Emissions Reduction Target was amended to restrict compact fluorescent light bulb promotions to retail outlets from 1 January 2010. The Office of Gas and Electricity Markets phased-out compact fluorescent light bulbs from the programme altogether from April 2011. The Community Energy Savings Programme and the 15-percent super priority group requirement under the extension of the Carbon Emissions Reduction Target were introduced in response to the concern over under-investment in low-income retrofits, particularly in the most disadvantaged households.[396] Finally, the extension of the Carbon Emissions Reduction Target to the end of 2012 required seven percent of CO_2-e reductions to come from professionally installed insulation measures and introduced a super priority group target requirement covering the most disadvantaged in society.

From 2013, the United Kingdom Government plans to significantly ramp up its residential housing retrofit programme, which will involve even more drastic changes. There is a recognition that the insulation challenge needs to focus increasingly on the over six million properties with solid walls that lack insulation. Insulating such properties is considerably more expensive than the more common cavity wall insulation or roof insulation measures that have been the mainstay of such programmes to date. At the same time, the Government-funded fuel programme will cease and it is expected that the energy company obligation will take over this role in the future. The Government is also planning to introduce a Pay as You Save type programme to be called "Green Deal," which will provide long-term loans tied to the electricity meter.[397] The details remain to be finalised, but the package of programmes is intended to focus on the most energy inefficient homes and the most vulnerable in society and to reduce over time the subsidy required to engender action in those homes not classed as low income.

393 United Kingdom Office of Gas and Electricity Markets, 2012

394 United Kingdom Office of Gas and Electricity Markets, 2012

395 National Energy Action, 2009

396 Community Energy Savings Programme Update, 2010

397 For more information see: http://www.decc.gov.uk/en/content/cms/tackling/green_deal/green_deal.aspx

3.13 United States – California

The most populous of US states, California has consistently led the United States in aggressive utility-sector energy efficiency policy and practice.[398] State policies include a "loading order" with energy efficiency as the first priority heat and electricity resource, aggressive energy saving targets, decoupling of gas and electricity sales from revenues, performance-based incentives and comprehensive energy efficiency programme funding through approved energy procurement rates and, a system-benefit charge. This has contributed significantly to the stable level of electricity use per capita in California over the past three decades.

In 2005, California's then-Governor Arnold Schwarzenegger issued an executive order that established GHG emission reduction targets of 2000 levels by 2010; 1990 levels by 2020; and 80 percent below 1990 levels by 2050.[399] The Order further directs the Secretary of the California Environmental Protection Agency to coordinate efforts made to meet the targets with the Chair of the California Energy Commission and the President of the Public Utilities Commission, among others. The California Global Warming Solutions Act of 2006 (Assembly Bill 32) outlines the state's timetable for reducing its GHG emissions to 1990 levels by 2020.[400]

3.13.1 Policy Objectives

California is committed to obtaining 100 percent of cost-effective energy efficiency and reducing total electrical consumption by ten percent within ten years from 2006. California's goals are to "produce cost-effective energy savings, reduce customer demand, reduce overall system costs, increase reliability, and increase public health and environmental benefits" and help meet the state's GHG reduction targets.[401]

3.13.2 Legal Authority

Legal authority for the EEO has evolved over time—the following summarises the main elements. The California Public Utilities Code requires utilities to meet their "unmet resource needs through all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible."[402] Since the mid-1970s, California investor-owned utilities have been authorised by the California Public Utilities Commission to fund energy efficiency programmes through regulated rates, initially as vertically integrated companies. With the restructuring of the electricity industry in the mid-1990s, Assembly Bill (AB) 1890 established a public goods surcharge on electricity ratepayers through their "wires" charge to create funds for renewables, energy efficiency, and research and development. After the electricity crisis that peaked in 2000/2001, the investor-owned utilities were reinstated as the portfolio managers for overall energy procurement for their customers, as well as portfolio administrators for energy efficiency programmes. Funding of energy efficiency through the public goods surcharge established by AB 1890 is now augmented through electricity and natural gas procurement rates authorised by the California Public Utilities Commission.

Promoting cost-effective energy efficiency through ratepayer-funded programmes is also a foundational policy for California's implementation of its GHG emissions cap-and-trade programme. The Draft Scoping Plan for the Global Warming Solutions Act, which outlines how it is likely to be implemented, establishes a statewide energy saving target of at least 32,000 GWh and 800 million therms by 2020.[403] In October 2009, the California Public Utilities Commission issued D. 09-09-047, building upon its regulatory framework (including D. 04-09-060), which first outlined quantitative goals for energy savings for the four largest investor-owned utilities. AB 2021 (signed into law September 29, 2006) requires the California Energy Commission to develop a triennial estimate of all potential cost-effective energy efficiency savings beginning in 2007, and to use the estimate to establish statewide annual targets (including publicly owned utilities) for energy efficiency savings and demand reductions over ten years.[404]

398 American Council for an Energy-Efficient Economy, 2009

399 California Office of the Governor, 2005

400 California Air Resources Board, 2008

401 California Legislature, 2006

402 Public Utility Code Section 454.5(b)(9)(C) for investor-owned utilities and Section 9615 for publicly owned utilities.

403 California Air Resources Board, 2008

404 California Public Utilities Commission, 2006a

3.13.3 Fuel Coverage

Electricity and natural gas.

3.13.4 Sector and Facility Coverage

California's investor-owned utility energy efficiency programmes are guided by the Long Term Energy Efficiency Strategic Plan published by the California Public Utilities Commission, which outlines a strategic vision of goals focussed in large part on market transformation[405] and four "Big Bold Energy Efficiency" strategies.[406] The four strategies are:

- all new residential construction in California will be zero net energy by 2020;
- all new commercial construction in California will be zero net energy by 2030;
- heating, ventilation, and air conditioning will be transformed to ensure that its energy performance is optimal for California's climate; and
- all eligible low-income customers will be given the opportunity to participate in the low-income energy efficiency programme by 2020.

3.13.5 Energy Saving Target

Investor-owned utilities provide about 67 percent of the retail electricity consumed in California.[407] In October 2009, the California Public Utilities Commission issued Decision (D.) 09-09-047 establishing the energy efficiency targets, budget, and programmes for the state's four major gas and electricity investor-owned utilities for 2010 to 2012.[408] The energy efficiency targets for the three-year period are: 6,965 GWh (0.9 percent of sales), 1,537 MW, and 150 million therms.[409]

California's publicly owned utilities are required by statute to propose savings targets and report their progress to the California Energy Commission.[410] The proposed annual energy efficiency target for publicly owned electricity utilities for 2010 and beyond is approximately 700,000 MWh.[411]

3.13.6 Obligated Parties

The obligated parties for the California EEO are the investor- and publicly owned electricity and natural gas utilities. Individual energy efficiency targets, budgets, and programmes for investor-owned utilities are set by the California Public Utilities Commission. Individual energy efficiency targets, budgets, and programmes for the publicly owned utilities are proposed by the utilities themselves and reported to the California Energy Commission.

3.13.7 Compliance Regime

California utilities comply with their individual energy efficiency targets by implementing approved energy efficiency programmes and reporting the results to the relevant agency, the California Public Utilities Commission for investor-owned utilities and the California Energy Commission for publicly owned utilities.

3.13.8 Performance Incentives

After the energy crisis of 2000/2001, the California Public Utilities Commission reinstated both revenue decoupling and a "shared savings" incentive mechanism for investor-owned utilities, both of which had been suspended during electricity industry restructuring. The current version of shared savings adopted in 2007 (called the "risk return incentive mechanism") is designed to align ratepayer and shareholder interests by creating a significant reward/penalty for investor-owned utilities' success or failure in meeting the California Public Utilities Commission's targets for reducing customer demand for electricity and natural gas.[412] Penalties may be triggered if savings are below 65 percent of the California Public Utilities Commission

405 A market transformation approach seeks to change the entire market for particular products or services so that efficient products or services are the norm and do not need to be promoted with incentives over the long term, instead of saving energy building by building.

406 California Public Utilities Commission, 2008a

407 Lewis et al., 2009

408 Pacific Gas and Electric Company, Southern California Edison Company (electricity only), Southern California Gas Company, and San Diego Gas and Electric Company.

409 California Public Utilities Commission, 2008a

410 Lewis et al., 2009. Publicly owned utilities are locally controlled companies. They range from very small entities serving less than a thousand customers to the Los Angeles Department of Water and Power, the state's third-largest utility. The 13 largest publicly owned utilities are responsible for 95% of the proposed energy savings.

411 Kline et al., 2007

412 California Public Utilities Commission, 2007

energy saving targets.

The risk return incentive mechanism is calculated for each investor-owned utility based on how well it meets the energy saving targets and the economic benefits generated from its energy efficiency portfolio. Investor-owned utilities are eligible for the risk return incentive mechanism if they achieve 80 to 85 percent of the California Public Utilities Commission energy saving targets and can earn greater incentives if they exceed the targets. Total potential incentives were capped at USD 450 million (less than one percent of total sales) for the 2006 to 2008 cycle for the four utilities combined. Two interim payments are provided, first after verifying actual measures installed and programme costs, then after evaluation, measurement, and verification reports document projected per-measure savings. Thirty percent of the total incentive is held back pending a final post-installation evaluation, measurement, and verification "true-up" in 2010.[413]

3.13.9 Eligible Energy Savings

The investor-owned gas and electricity utilities are responsible for implementing energy efficiency programmes. The programmes may be implemented by the utilities themselves or by contractors engaged by the utilities.

3.13.10 Eligible Energy Efficiency Measures

California Public Utilities Commission Decision 09-09-047 approved 2010 to 2012 portfolio plans designed to support the Long Term Energy Efficiency Strategic Plan. In particular, the Commission required the investor-owned utilities to administer 12 statewide programmes that will be consistent throughout the utilities' service area as well as some local and pilot programmes.[414] The statewide programmes include an array of energy efficiency measures in the following categories: residential; commercial; industrial; agricultural; new construction; lighting; heating, ventilation, and air conditioning; codes and standards; DSM integration and coordination; workforce education and training; marketing, education, and outreach; and emerging technologies. The residential Statewide Program for Energy Efficiency offers a tiered suite of savings options designed to leverage municipal funding programmes, federal stimulus dollars, and related programmes of the California Energy Commission with a goal of 20 percent savings in up to 120,000 homes.[415]

3.13.11 Measurement, Verification, and Reporting

California's most recent energy efficiency evaluation, measurement, and verification protocols were developed by the California Public Utilities Commission and stakeholders in 2006 and will be further updated as needed.[416] The Commission's Energy Division manages and engages contractors to carry out energy savings and demand measurement and verification studies, and rigorous financial and management audits for individual programmes, groups of programmes, and portfolios. The Energy Division oversees the issuance of three types of reports: verification of programme activities and their costs, updating the parameters used to estimate programme savings and benefits, and reports of the earning incentives the investor-owned utilities can claim. The utilities retain a limited budget to undertake studies related to market assessment and portfolio implementation.[417] Evaluation of the 2006 to 2008 portfolios has been the first application of the 2006 evaluation, measurement, and verification protocols with consistent data sets compiled across investor-owned utilities at the technology or measure level.[418]

3.13.12 Trading of Energy Savings

There is no trading of energy savings allowed in California.

413 California Public Utilities Commission, 2008b. The Commission is continuing to review the risk return incentive mechanism rules. See Docket # R. 09-01-019.

414 California Public Utilities Commission, 2008a

415 American Council for an Energy-Efficient Economy, 2009

416 California Public Utilities Commission, 2006b.

417 California Public Utilities Commission, 2006c. The evaluation, measurement, and verification process was outlined in D. 05-01-055, available at: http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/43628.pdf, and further detailed in an Administrative Law Judge ruling available at: http://docs.cpuc.ca.gov/PUBLISHED/RULINGS/52676.htm and updated in D. 10-04-029, available at: http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/116710.pdf

418 California Public Utilities Commission, 2010

3.13.13 Funding

The public goods charge represents an electricity system benefit charge of about USD 0.003/kWh, capped at three percent of a customer's bill; a natural gas DSM charge is also applied to the customer's bill, and additional funding is provided through utility resource procurement budgets, recovered through rate cases brought before the California Public Utilities Commission. In September 2009, the Commission approved a USD 3.1 billion investor-owned utility energy efficiency programme budget for 2010 to 2012—a 42-percent increase over the previous 3-year period. The publicly owned utilities budgeted USD 150 million for the fiscal 2008 to 2009 year.[419] Four percent of the energy efficiency budget is allocated to evaluation, measurement, and verification.

For 2010 to 2012, USD 260 million in funding is being directed to government entities for local efforts targeting public sector building retrofits and innovative energy efficiency opportunities, and USD 175 million has been earmarked to launch the state's push for zero net energy homes and buildings.

3.13.14 Scheme Administration

Implementation and delivery of most of California's efficiency programmes is administered by the state's electricity and gas utilities. Energy efficiency services are delivered by both the utilities and third-party providers. From 2010 to 2012, the utilities have identified programme leads to oversee the implementation of each of the 12 statewide programmes.

Prior to 2010, energy efficiency marketing had been coordinated under the "Flex Your Power" brand. Each utility also marketed efficiency services. The California Public Utilities Commission's 08-07-047 decision directed the electricity investor-owned utilities to conduct a "brand assessment of Flex Your Power and potential revision of this brand or creation of a new brand, the development of a web portal, and the development of a Statewide integrated communication plan."[420]

3.13.15 Scheme Results

The 2006 to 2008 investor-owned utility investments of USD 2.1 billion have resulted in verified annual savings of over 6,000 GWh, 80 million therms, and over 1,100 MW based on evaluation, measurement, and verification study results adopted by the California Public Utilities Commission to early 2012. These energy savings levels represent approximately 1.3 percent of electricity and 0.2 percent of the natural gas sales over the same 2006 to 2008 time period. The majority of electrical savings (58 percent) were due to lighting, while gas savings were due to improvements in heating, ventilation, and air conditioning (43 percent) and industrial processes (38 percent). The commercial sector was responsible for 46 percent of electricity savings and 75 percent of gas savings. It is estimated that the state received USD 1.17 in benefits for each dollar invested in investor-owned utility energy efficiency.[421] Energy efficiency spending by the publicly owned utilities increased by 65 percent to USD 104 million from 2007 to 2008, with commensurate energy savings increases of 58 percent and 46 percent for peak savings. Nonetheless, publicly owned utilities fell significantly short of their 2008 adopted targets.[422]

3.13.16 Areas for Improvement

Changes implemented in the 2010 to 2012 investor-owned utility programme include: a Joint Evaluation, Measurement, and Verification Plan, developed by California Public Utilities Commission's Energy Division and the utilities with the goals of transparency, consensus, cost-efficiency, time for collaboration and ethical standards and best practices; the required development of performance metrics to measure the progress of each programme toward market transformation and achievement of the goals and in the Strategic Plan, benchmarking for all commercial buildings, and reduced reliance on lighting for savings.[423]

419 California Municipal Utilities Association, 2009

420 California Public Utilities Commission, 2008a

421 California Public Utilities Commission, 2010

422 Lewis et al., 2009

423 See more information at: http://www.californiaenergyefficiency.com/docs/EEFactSheet092409.pdf and D. 10-04-029.

3.14 United States – Connecticut

Connecticut deregulated its wholesale electricity market in 1998, and retail-level consumers of electricity have had the right to switch providers since July 2000. Concurrent with and following deregulation, the state has adopted a range of policies to encourage clean energy and energy efficiency, many of them utility-supported. The three primary policies are: an "all cost-effective energy efficiency" requirement, an obligation for utilities to prepare annual energy efficiency plans that use funds collected through an on-bill system benefits charge to support efficiency programmes, and inclusion of energy efficiency within the state's renewable portfolio standard.

Electricity distribution companies must meet their resource needs first through "all available energy efficiency and demand reduction resources that are cost-effective, reliable and feasible."[424] They are obligated to provide demand projections and consult with the Connecticut Energy Advisory Board, the state's energy planning body, to develop an annual "comprehensive plan for the procurement of energy resources" (also referred to as an "integrated resource plan") for the state that includes energy efficiency, load management, and demand response among other resources.[425] The Public Utilities Regulatory Authority must approve the integrated resource plans.

The state's renewable portfolio standard, which has been in place since 1999, requires electricity retail suppliers to contract with their wholesale suppliers to obtain specified amounts of retail load from three separate "classes" of energy resources, one of which includes energy efficiency.[426]

Connecticut climate change goals are to reduce the level of emissions of GHG at least ten percent below the level emitted in 1990 by 2020 and 80 percent below the level emitted in 2001 by 2050.[427] Connecticut's draft greenhouse reduction strategies include numerous actions related to Connecticut Energy Efficiency Fund operations, weatherisation programmes, improved efficiency standards, and increasing financial resources for implementing energy efficiency.[428] Connecticut is a member of the Regional Greenhouse Gas Initiative emissions trading scheme, and proceeds from the auction of all of the state's emissions allowances are directed primarily to cost-effective energy efficiency, demand response, and Class I renewable energy programmes.[429] In a September 2008 decision, the Public Utilities Regulatory Authority required that proceeds from the 2008 and 2009 auctions be applied to offset the USD 10 million in under-collections of the Connecticut Energy Efficiency Fund for the 2008 programme year.[430]

3.14.1 Policy Objectives

Electricity distribution companies are required to acquire "all cost-effective" energy efficiency and demand reduction resources to "meet the projected requirements of their customers in a manner that minimizes the cost of such resources to customers over time and maximizes consumer benefits consistent with the state's environmental goals and standards."[431] The Connecticut Energy Advisory Board,[432] in its 2010 Procurement Plan, identified four policy objectives: manage costs, maintain reliability, improve environmental performance, and enhance independence

424 State of Connecticut General Assembly, 2007

425 Connecticut Energy Advisory Board's responsibilities also include "representing the state in regional energy planning" and "participating in the state's annual load forecast." See more information at: http://www.ctenergy.org/index.html

426 Retail suppliers include companies providing "transitional standard offer service, standard service, supplier of last resort service or back-up electric generation service." See more information at: http://www.ucsusa.org/assets/documents/clean_energy/connecticut.pdf. Currently electricity providers are obligated to secure at least 20 percent Class I and three percent Class I or II resources by January 1, 2020, and four percent of Class III resources by 2010 according to an incremental implementation schedule. Class I includes solar, wind, fuel cells, landfill methane, ocean thermal, wave, or tidal power and newer run-of-the river hydro. See more information at: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CT04R&state

427 State of Connecticut General Assembly, 2008

428 Connecticut Department of Energy and Environmental Protection, 2010

429 State of Connecticut General Assembly, 2007

430 Connecticut Department of Public Utility Control, 2008

431 State of Connecticut General Assembly, 2007

432 The Connecticut Energy Advisory Board reports to the General Assembly on the status of programmes administered by the Department of Energy and Environmental Protection, consults with the Commissioner of Energy and Environmental Protection regarding the integrated resource plan, and reviews requests from the General Assembly.

and security.[433] The Energy Efficiency Board, responsible for administering Connecticut's Energy Efficiency Fund, states its policy objective as follows: "to advance the efficient use of energy, to reduce air pollution and negative environmental impacts, and to promote economic development and energy security."[434]

3.14.2 Legal Authority

Public Act 98-28, the state's restructuring legislation, required electricity distributors to offer energy efficiency programmes, mandated the USD 0.003/kWh system benefits charge, effective in 2000, and established the Energy Efficiency Board and Connecticut Energy Efficiency Fund.[435] Legislation in 2005 added the Class III Renewable Portfolio Standard requirements, mandated that investor-owned natural gas companies submit Conservation and Load Management Plans and budgets for Public Utilities Regulatory Authority approval, and obligated municipal electricity utilities to collect a system benefits charge and work with the Energy Efficiency Board to develop Conservation and Load Management Plans.[436] Public Act 07-242 (2007) added cost-effective energy efficiency as the first priority resource, established heating oil energy efficiency programmes, funded gas energy efficiency programmes, added new energy efficiency requirements, and established decoupling to help meet these goals.[437]

3.14.3 Fuel Coverage

Electricity, natural gas, propane, and heating oil are all covered fuels.

3.14.4 Sector and Facility Coverage

Connecticut requires a system benefits charge to be applied to all end-use customers to support energy efficiency and load management programmes.[438] All customer classes are served by electricity distributors, municipal utilities, and natural gas companies with targeted energy efficiency programmes for limited-income, municipal, non-profit, residential, school, small business, state government, university, and large commercial and industrial customers.

3.14.5 Energy Saving Target

Electricity distributors, municipal utilities, natural gas companies, and the Fuel Oil Conservation Board must prepare annual comprehensive Conservation and Load Management Plans detailing energy saving targets and energy efficiency programmes.

In addition, Connecticut maintains a renewable portfolio standard requiring electricity distributors to secure four percent of their load from "Class III" resources from 2010 to 2020. Class III resources include electricity savings from energy efficiency and load management programmes."[439] There is no minimum requirement for energy efficiency within the Class III requirement.

3.14.6 Obligated Parties

Electricity distributors, municipal utilities, and natural gas companies are obligated parties.

3.14.7 Compliance Regime

The Public Utilities Regulatory Authority approves plans, budgets, and incentives for regulated utilities and appoints the Energy Efficiency Board.[440] Electricity distributor and natural gas company Conservation and Load Management Plans and budgets must be reviewed by the Energy Efficiency Board and approved by the Public Utilities Regulatory Authority. The Energy Efficiency Board, with approval of the Public Utilities Regulatory Authority, also guides distribution of funds from the Connecticut Energy

433 Connecticut Energy Advisory Board, 2010

434 Connecticut Energy Efficiency Fund, 2012

435 State of Connecticut General Assembly, 1998

436 State of Connecticut General Assembly, 2005

437 State of Connecticut General Assembly, 2007

438 Conn. Gen. Stat. § 16-245m available at: http://www.cga.ct.gov/current/pub/chap283.htm#Sec16-245m.htm

439 State of Connecticut General Assembly, 2005. Class III resources were added to the renewable portfolio standard in the June Special Session Public Act No. 05-1, at that time the eligible resources were limited to combined heat and power and energy savings. Waste recovery was added to Class III in 2007. Conn. Gen. Stat. §16-1(a)(44).

440 Conn. Gen. Stat. § 16 245m available at: http://www.cga.ct.gov/current/pub/chap283.htm#Sec16-245m.htm

Efficiency Fund, which collects revenue from a number of sources, including the system benefits charge.[441]

3.14.8 Performance Incentives

During the annual review of Conservation and Load Management Plans, the Energy Efficiency Board reviews the past year's results relative to the targets specified in the Plans and determines a performance incentive for obligated utilities achieving or exceeding their targets. The incentive, referred to as a "performance management fee," is available for a range of outcomes from 70 to 130 percent of the Plan targets, including lifetime energy savings and demand. The threshold for earning the minimum incentive (one percent of obligated party's energy efficiency and load management expenditures) is 70 percent of the target. At 100 percent of the target, the incentive is five percent of expenditures, and at 130 percent of the target, it is eight percent of expenditures. Anticipated incentives are built into the annual budgets.

3.14.9 Eligible Energy Savings

Electricity distributors, municipal utilities, natural gas companies, and the Fuel Oil Conservation Board produce energy savings by implementing approved Conservation and Load Management Plans. Energy efficiency programmes included in the Plans are implemented by the obligated parties and by contractors.

In addition, parties obligated to meet Connecticut's renewable portfolio standard may purchase energy efficiency certificates from third-party providers to meet their Class III renewable portfolio standard requirements. Although the certificate scheme includes energy efficiency, most energy efficiency programmes occur outside of the certificate scheme through the Connecticut Energy Efficiency Fund and Conservation and Load Management Plans.

3.14.10 Eligible Energy Efficiency Measures

Eligible energy efficiency measures include "direct funding, manufacturers' rebates, sale price and loan subsidies, leases and promotional and educational activities" that support energy efficiency and load management programmes; research, development, commercialisation, and market development for more energy efficient products and processes including appliances, lighting and heating, ventilation, and air conditioning devices; energy use assessment for new buildings and major renovation; joint fuel conservation strategies; and indoor air quality programmes related to energy efficiency.[442] These measures may be included in Conservation and Load Management Plans for approval by the Public Utilities Regulatory Authority.

3.14.11 Measurement, Verification, and Reporting

Connecticut statute requires all programmes to be screened for cost effectiveness annually, if practical.[443]

A 2004 Public Utilities Regulatory Authority order required the electricity distributors to develop a technical reference manual detailing costs and energy savings calculations corresponding to individual energy efficiency measures.[444] A joint Program Savings Documentation manual was first developed in 2006; an updated version is submitted with the annual Conservation and Load Management Plan filing.[445] Program Savings Documentation calculations can be used as deemed savings for typical measures. When required, more detailed energy savings calculations are obtained from third-party engineering consultants.

441 The Conservation and Load Management plan for 2010 was jointly filed by both the electricity distributors and the natural gas companies. See more information at: http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/0722a35818b7ebc685257642006d07a4/$FILE/FINAL%20CLM%20Electric%20&%20Gas%20Plan%2010-01-2009%20FILED.doc

442 Conn. Gen. Stat. § 16 245m (d)(4) available at: http://www.cga.ct.gov/2007/pub/Chap283.htm#Sec16-245m.htm

443 Conn. Gen. Stat. § 16 245m (d)(3). The electricity distribution companies use the Electric Systems test and Total Resource test for screening programs.

444 State of Connecticut General Assembly, 2004

445 The Program Savings Documentation is also used as the basis for calculating both Conservation and Load Management Plan and non-Plan measures that qualify as Class III resources. The only difference is that non-Plan-funded projects do not incorporate free-ridership and spillover factors. (Program Savings Documentation p. 8.) The 2010 version can be viewed at: http://www.dpuc.state.ct.us/dockhist.nsf/6eaf6cab79ae2d4885256b040067883b/1a135ec687648c4c852575fa00544735/$FILE/PSD%2010-1-08.pdf

Energy savings are reported annually as part of the Conservation and Load Management Plan approval process. A 2009 Public Utilities Regulatory Authority decision clarified the responsibilities of the Energy Efficiency Board Evaluation Committee (composed of three non-utility Energy Efficiency Board members) and an Energy Efficiency Board evaluation consultant as providing leadership and "evaluation planning, study development, contractor selection, project initiation, project management and completion, and finalising the evaluation report."[446]

3.14.12 Trading of Energy Savings

Connecticut is the only US state that has an operating certificate trading programme. The Public Utilities Regulatory Authority approves projects for Class III credit (which includes energy efficiency) under the renewable portfolio standard on a quarterly basis. Certificates are issued quarterly for each project over the life of the project, with a maximum of ten years.

The minimum price per certificate is USD 10/MWh[447] Parties are also allowed to make an alternative compliance payment, which is currently USD 31/MWh but statutorily permitted to be as high as USD 55/MWh.[448] The trading price for Connecticut certificates ranged between USD 20/MWh and USD 26.75/MWh in the period from their inception through October 2008.[449]

As noted in section 3.14.9 (page 76), most energy efficiency programmes occur outside of the certificate scheme through the Connecticut Energy Efficiency Fund and Conservation and Load Management Plans.

3.14.13 Funding

Sources of funding for regulated electricity utility energy efficiency programmes in 2010 include: the system benefits charge (68 percent), Regional Greenhouse Gas Initiative funds (17 percent), ISO-New England Forward Capacity Market revenues (six percent), US stimulus funds (five percent), Class III renewable energy credits (three percent), and revenues from federally mandated congestion charges (two percent).[450] Municipal electricity utility programmes are funded with a system benefits charge that was USD 0.001/kWh in 2006, increasing by USD 0.003 annually to USD 0.025/kWh for 2011 and thereafter.[451] Gas company funding in 2010 came from base rates (17 percent) and a conservation adjustment mechanism charge on customer bills.[452]

3.14.14 Scheme Administration

The obligated utilities design and administer energy efficiency programmes for their customers. Implementation is by the utilities and third-party contractors.

The Energy Efficiency Board's mandate includes outreach to residents and businesses about energy efficiency programmes, services, and technologies. The Board maintains a website[453] with energy efficiency information. The Public Utilities Regulatory Authority, the Energy Efficiency Board, and an educational entity funded by the Connecticut Energy Efficiency Fund also jointly manage another website[454] that provides consumers with energy-related resources and links to utility-specific programmes for residential and business customers. Outreach is also achieved through "museum exhibits, public forums, school-based programs (kindergarten through college), trade shows and training seminars."[455]

3.14.15 Scheme Results

The Energy Efficiency Board released a report on 1 March 2011 outlining Connecticut's energy efficiency accomplishments.[456] Table 15 (page 78) shows the energy savings that were accrued according to the report.

Residential customers saved USD 53.9 million in 2010 and had lifetime savings of USD 417.3 million. Commercial and industrial customers saved USD 25.4 million in 2010

446 Connecticut Department of Public Utility Control, 2010a. The current Energy Efficiency Board Program Evaluation Plan can be seen at: http://www.ctsavesenergy.org/files/The%202010%20ECMB%20Program%20Evaluation%20Plan3.doc

447 Conn. Gen. Stat. § 16 243t

448 Conn. Gen. Stat. § 16 243q (b)

449 World Resources Institute, 2008

450 Connecticut Department of Public Utility Control, 2010b

451 State of Connecticut General Assembly, 2005

452 Connecticut Department of Public Utility Control, 2010b

453 http://www.ctsavesenergy.org

454 http://www.ct-energyinfo.com

455 Connecticut Energy Efficiency Board, 2010

456 Connecticut Energy Efficiency Board, 2011

Table 15

Energy Savings in Connecticut, 2010[457]

Customer Sector	Annual Energy Savings			Lifetime Energy Savings		
	Electricity (GWh)	Natural Gas ('000 ccf)	Oil ('000 gallons)	Electricity (GWh)	Natural Gas ('000 ccf)	Oil ('000 gallons)
Limited income	17	559	727	145	8,230	10,456
Residential (non-limited income)	244	947	981	1,496	18,793	19,428
Commercial and industrial	162	1,070	0	2,076	14,068	0
Totals	423	2,576	1,708	3,717	41,091	29,884

and had USD 326.2 million lifetime savings.

3.14.16 Areas for Improvement

Funds collected through the system benefit charge were redirected by the Legislature to the state's general fund from July 2003 to July 2005, and from August 2006 to July 2007, at the rate of USD 1 million per month or approximately one third of the amount collected. During this period, the electricity distributors overspent the available funds by borrowing from future year's budgets. The Public Utilities Regulatory Authority's Docket No. 07-10-03RE01, approving the Conservation and Load Management Plans for these utilities, directs them to stop this borrowing and outlined provisions to prevent borrowing and overspending. The allocation of Regional Greenhouse Gas Initiative auction funds was applied to offset under-collections in 2008.[458] Most recently in 2010 the Connecticut Legislature introduced a bill to divert a significant portion (about 37 percent) of system benefits charge funds into the state's general fund.[459]

Significant room for improvement remains under the statutory mandate requiring all electricity distributors to meet their energy and capacity resource needs through "all available energy efficiency and demand reduction resources that are cost-effective, reliable and feasible." This is done through annual integrated resource plans. In their 2008 integrated resource plan, the electricity distributors proposed aggressive DSM measures, and the Energy Efficiency Board supported the electricity distributors' 3- to 5-year energy efficiency and demand response programme levels. The Public Utilities Regulatory Authority denied authorisation of these proposed measures, holding that the record did not "support a finding that Connecticut needs additional energy or capacity resources to meet reliability requirements now or in the near term."[460] This decision has been criticised by some for failing to properly interpret the statutory mandate.[461] The Public Utilities Regulatory Authority is currently undergoing review of the 2010 Integrated Resource Plan.[462]

Legislation in 2008 directed the Connecticut Clean Energy Fund to contract with the Connecticut Academy of Science and Engineering to "determine the best way for the state to plan, oversee, develop, implement and

457 Connecticut Energy Efficiency Board, 2011

458 Connecticut Department of Public Utility Control, 2008

459 Senate Bill No. 484 available at: http://www.plol.org/Pages/ExternalSite.aspx?rs=Connecticut&rt=Statutes. See also Northeast Energy Efficiency Partnerships, letter to Senator Daly and Representative Staples urging opposition to SB 484, 2 April 2010 (estimating that SB 484 would divert about 37 percent of the energy efficiency fund's budget to the general fund in Fiscal Year 2011 and continuing thereafter). Available at: http://neep.org/uploads/policy/Ltr%20to%20CT%20legis%20from%20NEEP%20-%20Preserving%20EE%20Funds%204.2.10.pdf

460 Connecticut Department of Public Utility Control, 2009

461 Environment Northeast's Exception to the Draft Decision Docket 08-07-01 available at: http://www.dpuc.state.ct.us/dockhist.nsf/8e6fc37a54110e3e852576190052b64d/2a09a60f7017c517852575de004b833e?OpenDocument. It is also interesting to contrast the Department of Public Utility Control's interpretation of an "all cost-effective" energy efficiency mandate with the approval of ambitious energy efficiency targets by the Massachusetts Department of Public Utilities under a similar statutory mandate.

462 Connecticut Department of Public Utility Control, 2010b

manage energy issues and programs in the form of a state agency and/or other alternative organizational structure(s) that would best achieve the energy policy goals of Connecticut, while fostering the state's economic competitiveness."[463] The study found that the plethora of entities implementing programmes and addressing energy and environmental policy resulted in "a lack of clarity, long-term vision and strategic planning, interagency communication and coordination, and a designated focal point for overall accountability regarding the effective achievement of defined goals and benchmarks."[464] Some of these recommendations, including a new energy leadership structure, were included in 2010 Senate Bill 493, which was vetoed by the Connecticut Governor.

3.15 United States – Massachusetts

In 2008, the Massachusetts State Legislature passed and Governor Patrick signed the *Green Communities Act*. Among many other energy-related provisions, the Act requires that the Department of Public Utilities ensure that "electric and natural gas resource needs…first be met through all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply." In this regard, the Act builds on an existing system benefits charge and utility-administered energy efficiency programmes.[465] Since 1997, Massachusetts electricity utilities have used system benefits charge funds to offer end-use energy efficiency to their customers. Although not codified in Massachusetts law, the gas utilities have also funded programmes through a system benefits-like charge to ratepayers. Historically, electricity utilities offered annual programmes, while gas utilities offered five-year programmes. Under the Act, both electricity and gas utilities are required to implement three-year energy efficiency investment plans.

3.15.1 Policy Objectives

The *Green Communities Act* requires obligated utilities to acquire "all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply."

3.15.2 Legal Authority

Because no further guidance on the quantity of energy efficiency and demand reduction that is "available" was given in the *Green Communities Act,* an EEO policy was negotiated between the relevant parties, including the utilities, the Department of Energy Resources, industry, environment and low-income representatives, and the Energy Efficiency Advisory Council.[466] The agreed statewide energy saving targets were subsequently approved by the Massachusetts Department of Public Utilities.

The *Green Communities Act* also established a mandatory kWh charge to consumers to fund energy efficiency programmes, including DSM programmes. The Act required that electricity efficiency programmes be administered by the electricity distribution companies and by municipal aggregators and gas energy efficiency programmes by gas distribution companies.

3.15.3 Fuel Coverage

Electricity and natural gas.

3.15.4 Sector and Facility Coverage

The *Green Communities Act* requires that electricity and gas efficiency programme funds be allocated to all customer classes, including low-income, in proportion to their contributions to those funds. At least ten percent for electricity and 20 percent for gas must be spent on low-income residential sector DSM and education programmes.

3.15.5 Energy Saving Target

Negotiations on energy saving targets were preceded by an assessment of available, cost-effective energy efficiency in Massachusetts. The assessment, which is also a requirement of the *Green Communities Act*, found that a minimum of 2.5 percent of electricity load and two percent

463 Connecticut Academy of Science and Engineering, 2008

464 Connecticut Academy of Science and Engineering, 2008

465 Massachusetts Legislature, 1997

466 The Energy Efficiency Advisory Council was formed by the Green Communities Act and has the general responsibility of working with program administrators to develop three-year energy efficiency plans that meet the Act's requirements. It approves plans and budgets, works collaboratively to assess energy efficiency potential, determines the societal benefits of energy efficiency programmes, and reviews progress toward meeting plan goals, among other tasks. The Council consists of 11 non-utility representatives that are appointed by the Department of Public Utilities.

of gas demand annually was achievable over three years.

On 28 January 2010, the Department of Public Utilities approved the electricity and gas saving targets shown in Table 16. The electricity saving targets are designed to gradually increase over time so as to allow opportunity to ramp up from existing electricity saving levels.

Table 16

Energy Saving Targets in Massachusetts, 2010 to 2012 [467, 468]

Year	Electricity (percent of retail sales)	Gas (therms)	Gas (percent of retail sales)
2010	1.4	13,598,098	0.6
2011	2.0	19,097,305	0.9
2012	2.4	24,706,795	1.15

All energy saving targets are incremental. An updated assessment of achievable electricity and gas efficiency will be performed in 2011 in preparation for the three-year plans for 2013 through 2015.[469]

The *Green Communities Act* requires that ten percent of electricity efficiency budgets and 20 percent of gas efficiency budgets be spent on measures in low-income households.[470]

3.15.6 Obligated Parties

Electricity and gas distribution utilities and municipal aggregators[471] (collectively known as programme administrators) are subject to the EEO.

The targets do not necessarily apply equally to all obligated parties. The level of energy savings that each proposes to achieve may be different depending on factors such as service territory size and customer makeup. Four of the smaller utilities in Massachusetts, Western Massachusetts Electric, Berkshire Gas, New England Gas Company-Fall River Service Area, and Unitil, have individual targets lower than the statewide target.[472, 473]

3.15.7 Compliance Regime

The *Green Communities Act* requires obligated utilities to jointly file a three-year statewide plan describing how they will meet the EEO. The plans provide information on the energy efficiency programmes the utilities intend to implement, costs, funding sources to cover the costs, and savings and benefits expected to result from their programmes.

The Department of Public Utilities is the final authority (and the traditional utility regulator) ensuring that the Act's requirement to acquire all cost-effective energy efficiency is met. The Energy Efficiency Advisory Council both collaborates on the development of the three-year energy efficiency plans and approves or rejects the plans before they can be submitted for Department of Public Utilities consideration. The final plan is subject to a two-thirds majority vote of the Council. Once it receives an affirmative vote, the final plan is submitted to the Department of Public Utilities for approval.[474]

The obligated utilities must submit annual and quarterly reports to both the Department of Public Utilities and the Energy Efficiency Advisory Council on the status of their programmes.[475] The Department of Public Utilities must determine the effectiveness of each utility's plan on an annual basis. If the utility has not reasonably complied with the joint plan, an investigation may be opened. The utility has the burden of proof to show good cause in failing to comply with the plan. If it cannot, a fine of USD 0.05 per kWh or USD 1 per therm of shortfall may be levied against the utility.

3.15.8 Performance Incentives

The Green Communities Act required the obligated utilities to propose incentive mechanisms in the jointly drafted statewide energy efficiency plan. In its 28 January 2010 order, the Department of Public Utilities approved in part the incentive mechanism proposed in the statewide plan.

467 Statewide Savings Targets and Performance Incentives for Electric Program Administrators available at: http://www.ma-eeac.org/docs/091006-KeyIssuesOfferDOER-AG-EEAC-Approved.pdf

468 Massachusetts Energy Efficiency Advisory Council, 2009a

469 Massachusetts Energy Efficiency Advisory Council, 2009b

470 Commonwealth of Massachusetts Senate, 2008

471 Municipal aggregators are cities or towns without their own power plants who acquire electricity on the wholesale market on behalf of consumers in their jurisdiction.

472 Massachusetts Department of Public Utilities, 2010a

473 Massachusetts Department of Public Utilities, 2010b

474 Commonwealth of Massachusetts Senate, 2008

475 Massachusetts Department of Public Utilities, 2010a

The approved total incentives available for electricity efficiency programmes are USD 17,328,480 in 2010, USD 21,612,362 in 2011, and USD 25,273,089 in 2012.[476] To be eligible for an incentive payment, an obligated utility must achieve 75 percent or more of its individual energy saving target. The total incentive payable scales to the energy savings achieved and is capped at 125 percent of the target for the three-year period.

The incentive available to each obligated electricity utility is calculated after the fact and is a function of three separate components: a savings mechanism, a value mechanism, and a performance mechanism. The savings mechanism pays out a portion of the total benefits accrued from administration of electricity efficiency programmes. The payout rate varies from about USD 0.0065 to 0.007 per dollar of total benefits. The value mechanism pays out a portion of the lifetime net benefits achieved through electricity efficiency programmes. The payout rate is approximately USD 0.0067 to 0.0081 per dollar of net benefit. The proposed performance mechanism was remanded by the Department of Public Utilities back to the Energy Efficiency Advisory Council and programme administrators for refinement.[477]

In its 28 January 2010 order, the Department of Public Utilities approved a total statewide incentive pool of USD 14,403,614 for gas efficiency programmes. Of that, USD 4,344,255 is available in 2010, USD 4,518,960 in 2011, and USD 5,540,399 in 2012.[478] The incentive pool will be allocated at the end of each year on the basis of achieved savings. An obligated gas utility must meet 75 percent or more of its individual energy saving target to be eligible for an incentive payment. Incentives are capped at 125 percent of the target. As with the electricity performance incentive, there are three components to the gas performance incentive: a savings mechanism, a value mechanism, and a performance mechanism. The savings mechanism pays a portion of total statewide benefits ranging from USD 0.0061 to 0.0074 per dollar of total benefit. The value mechanism pays a portion of lifetime net benefits ranging from USD 0.0058 to 0.0103 per dollar of lifetime net benefit. The Department of Public Utilities approved the incentive pool and payout mechanisms for 2010, but requested that the performance mechanism be reworked and resubmitted for approval.[479]

3.15.9 Eligible Energy Savings

The *Green Communities Act* specified that energy efficiency programmes must be administered by gas and electricity distribution companies and municipal aggregators.

3.15.10 Eligible Energy Efficiency Measures

There is no apparent restriction on the energy efficiency measures that may be included in the three-year statewide energy efficiency plans, except that they must be for electricity or gas end-uses, although non-electricity or gas resource benefits such as heating oil cost savings are included in cost-effectiveness calculations.[480] An emphasis is placed on coordination of electricity and gas efficiency measures in order to maximise energy savings.[481] The *Green Communities Act* specifically authorises the gas distribution utilities to spend funds on combined heat and power and geothermal cooling and heating projects.

3.15.11 Measurement, Verification, and Reporting

The obligated utilities have responsibility for measurement, verification, and reporting of their own energy efficiency programmes. The Energy Efficiency Advisory Council's evaluation consultant will work collaboratively with the utilities on their measurement and verification activities. Ultimately the Energy Efficiency Advisory Council has oversight over the measurement and verification studies as well as the power to resolve disputes between its consultant and the utilities on measurement and verification issues.[482]

3.15.12 Trading of Energy Savings

There is no trading of energy savings allowed under the Massachusetts scheme.

476 Massachusetts Department of Public Utilities, 2010a

477 Massachusetts Department of Public Utilities, 2010a

478 Massachusetts Department of Public Utilities, 2010b

479 Massachusetts Department of Public Utilities, 2010b

480 Massachusetts Department of Public Utilities, 2010a

481 Massachusetts Energy Efficiency Advisory Council, 2009a

482 Massachusetts Energy Efficiency Advisory Council, 2009c

3.15.13 Funding

Massachusetts' electricity industry restructuring legislation of 1997 created separate system benefits charges for energy efficiency in the electricity sector and for renewable energy. The *Green Communities Act* amended the 1997 language to increase the level of funding for energy efficiency, although it held the electricity efficiency system benefits charge constant at USD 0.0025/kWh.

Funding for electricity efficiency programmes comes from up to five sources in case the first four do not cover the expenditures necessary to meet the objectives of the Act. The five sources with their projected total levels of funding from 2010 to 2012 are:

- the systems benefits charge (USD 365 million);
- revenues from the ISO-New England forward capacity market (USD 35 million);[483]
- auction revenue from the Regional Greenhouse Gas Initiative emissions trading scheme (USD 146 million);
- outside funding from federal grants, bank loans, bond issuances, and so forth (USD 181 million); and
- a surcharge on electricity bills (USD 618 million).

Including funds carried over from previous years (whether positive or negative), total expenditures on electricity efficiency programmes are expected to be approximately USD 1,272 million by 2012. The 2012 expenditures are a 340 percent increase over 2008 expenditures.[484]

The current funding source for gas efficiency programmes is a surcharge on gas bills, although the obligated gas utilities have set a goal to secure outside funding during 2011 and 2012 (USD 60 million total). The three-year budget is approximately USD 322 million.[485]

3.15.14 Scheme Administration

The obligated electricity and gas distribution utilities and municipal aggregators are responsible for energy efficiency programme delivery and implementation. The obligated utilities anticipate a number of new outreach initiatives such as creating a statewide set of efficiency "brands." In 2010, a website portal for all Massachusetts energy efficiency programmes, called Mass Save, was launched. Other activities include marketing and implementing energy efficiency measures by leveraging the networks of community-based organisations, behavioural research, mass media campaigns, and contractor/trade ally training.[486]

There is a special emphasis on providing "seamless" electricity and gas efficiency services regardless of the provider, because in some instances the gas provider is not the same as the electricity provider.

3.15.15 Scheme Results

Table 17 (page 83) shows that in 2010, actual annualised electricity savings totalled 619,639 MWh, representing 99 percent of the planned savings for that year. Gas savings in 2010 totalled 11,245,671 therms, representing only 83% of the planned savings.

3.15.16 Areas for Improvement

Prior to the *Green Communities Act,* Massachusetts was saving 0.86 percent of retail sales through its electricity efficiency programmes.[487] The potential for electricity efficiency savings in the state was recently assessed at 2.5 percent annually. No similar figures for gas efficiency savings are available.

The suite of energy efficiency measures and programmes offered by the obligated utilities following the Act's passage has greatly expanded. For example, prior to 2008, NSTAR's gas efficiency programmes consisted primarily of rebates for efficient heating systems, windows, water heaters and thermostats, and custom commercial, industrial, and residential weatherisation.[488] Among other programmes, the gas utilities now offer single- and multi-family deep retrofits, new construction, and commercial and industrial direct install programmes.[489] The new suite of programmes for both fuels is more comprehensive and intended to provide seamless, "fuel-blind" services to energy users.[490]

483 Because energy efficiency resources provide some peak reduction, they are eligible to bid capacity into the New England wholesale electricity market.

484 Massachusetts Department of Public Utilities, 2010

485 Massachusetts Energy Efficiency Advisory Council, 2009a

486 Massachusetts Energy Efficiency Advisory Council, 2009a

487 American Council for an Energy Efficient Economy, 2009

488 NSTAR, 2005

489 Massachusetts Energy Efficiency Advisory Council, 2009a

490 Massachusetts Energy Efficiency Advisory Council, 2009c

Table 17

Annual Reports for Electricity and Gas Energy Efficiency Programmes in Massachusetts [491]

2010 Annual Reports—Electricity: *Summary of Key Indicators, Statewide Total*

Total	2010 Plan	Actual (Evaluated)		Initial Preliminary Year-End Reported, Feb 2011	
	Value	Value	% of Plan	Value	% of Plan
Savings – Annualized (MWh)	623,320	619,639	99%	609,788	98%
Savings – Lifetime (MWh)	7,389,102	7,336,580	99%	7,191,381	97%
Benefits (USD)	1,167,116,859	1,107,898,437	95%	1,100,804,486	94%
Program Costs (USD)	278,629,729	235,885,166	85%	239,192,149	86%
Performance Incentive (USD)	17,328,480	17,735,277	102%		

2010 Annual Reports—Gas: *Summary of Key Indicators, Statewide Total*

Total	2010 Plan	Actual (Evaluated)		Initial Preliminary Year-End Reported, Feb 2011	
	Value	Value	% of Plan	Value	% of Plan
Savings – Annualized (therms)	13,586,660	11,245,671	83%	13,926,865	103%
Savings – Lifetime (therms)	227,794,298	177,824,004	78%	220,610,827	97%
Benefits (USD)	264,427,698	204,285,854	77%	279,784,789	106%
Program Costs (USD)	77,759,749	62,473,787	80%	61,402,677	79%
Performance Incentive (USD)	4,344,256	4,075,563	94%		

3.16 United States – Minnesota

Minnesota's population of 5.2 million is served by 185 retail energy utilities, including 11 investor-owned gas or electricity companies, 130 municipal gas and electricity companies, and 44 electricity distribution cooperatives. All of the state's utilities are obligated to develop and administer energy efficiency programmes (known as "conservation improvement programs"). In 2007, the Minnesota Legislature passed the *Next Generation Energy Act*, which altered the state's approach to utility energy efficiency programmes from requiring specified levels of expenditure to also require achievement of energy saving targets.

3.16.1 Policy Objectives

Minnesota's policy objective as reflected in statute changes enacted in the *Next Generation Energy Act* is to reduce the per capita use of fossil fuel as an energy input by 15 percent by 2015 through energy efficiency and the use of renewables.[492] The Act's breadth clearly indicates that utility energy efficiency programmes are a critical component of reaching this broader objective. Objectives for the energy efficiency programmes include promoting awareness and adoption of energy efficient technologies, reducing energy costs, deferring infrastructure investments, and reducing GHG emissions.[493]

The energy efficiency programme requirements in the *Next Generation Energy Act* are an integral component of

491 Massachusetts Energy Efficiency Advisory Council, 2011

492 State of Minnesota Legislature, 2007

493 http://www.state.mn.us/portal/mn/jsp/content.do?subchannel=-536895041&programid=536917273&id=-536893853&agency=Energy&sp2=y

Minnesota's Climate Change Action Plan, which has a goal of reducing statewide GHG emissions to a level at least 15 percent below 2005 levels by 2015, at least 30 percent below 2005 levels by 2025, and to a level at least 80 percent below 2005 levels by 2050.[494]

3.16.2 Legal Authority

The *Next Generation Energy Act* requires each energy utility to have an energy saving target equal to 1.5 percent of gross annual retail energy sales unless modified.[495] The statute further directs the Commissioner of the Minnesota Office of Energy Security to "evaluate an energy conservation improvement program on how well it meets the goals set." Statutory rules prescribe the requirements related to utility energy efficiency programmes.[496] The Next Generation Energy Act also allows for energy efficiency programme costs to be recovered through rate cases.[497]

3.16.3 Fuel Coverage

Electricity and natural gas.

3.16.4 Sector and Facility Coverage

The Minnesota EEO scheme covers all end-use sectors and all facilities, except that the owners of large customer facilities may petition the commissioner to exempt both electricity and gas utilities serving the facility from the energy efficiency investment and expenditure requirements.[498]

Each utility must provide energy efficiency programmes for low-income households.

3.16.5 Energy Saving Target

The *Next Generation Energy Act* established a statutory statewide energy saving target for all natural gas and electricity utilities of 1.5 percent of retail sales. Each utility has an individual energy saving target of 1.5 percent of retail sales based on the most recent three-year average weather-normalised sales, effective in 2010.[499] Once a utility has achieved energy savings equal to one percent of sales, they may count savings from indirect programmes, such as energy codes, appliance standards, market transformation efforts, or infrastructure improvements.

3.16.6 Obligated Parties

Electricity and natural gas utilities.

3.16.7 Compliance Regime

Each obligated utility develops its own energy efficiency plan, which must be filed at least triennially with the Minnesota Office of Energy Security. The Office reviews and approves each plan and the proposed energy savings calculations.[500] Actual energy savings and expenditures on energy efficiency programmes are reported annually by investor-owned utilities and triennially by cooperative and municipal utilities. The Minnesota Office of Energy Security then verifies the savings and expenses. Because cooperative and municipal utilities are not rate-regulated, the Office's role is more advisory than regulatory, limiting its power to enforce compliance by these entities.[501]

Obligated utilities are required to file resource plans that include least-cost plans for meeting 50 and 75 percent of all new and refurbished capacity needs through a combination of energy efficiency and renewable energy resources.[502] The implementation of these plans may also satisfy the EEO.

3.16.8 Performance Incentives

Minnesota statute allows the Public Utilities Commission to consider incentive plans for utility energy efficiency programmes, including incentive rates of return, shared benefit, and decoupling.[503] In 2000, the Public Utilities Commission approved a financial incentive plan that allows the utility to earn a percentage of net system benefits (as

494 Minnesota Climate Change Advisory Group, 2008

495 Minn. Stat. §216B.241, Subd. 1c, (b)

496 Minnesota Rules part 7690.1200

497 Minn. Stat. §216B.16, subd. 6b

498 Minnesota Statutes, 2011

499 Minnesota Statutes, 2011. A utility may petition the Office of Energy Security for an adjustment of their energy saving target to no less than one percent of sales based on specified factors. 2009 legislation allowed for a target of 0.75 percent for natural gas utilities for the period from 2010 to 2012 based on the findings of a gas efficiency potential study. (Minnesota Session Laws 2009, Ch. 110, Sec. 32)

500 Minnesota Office of Energy Security, 2010a

501 Minnesota Office of Energy Security, 2009

502 Minnesota Statutes, 2011

503 Minnesota Statutes, 2011

measured by the utility cost-effectiveness test) when it surpasses 90 percent of its energy savings goal.[504] The amount of the incentive increases for each percentage point above 90 but is capped at 30 percent of the utility's actual expenditures for energy efficiency. Because more net benefits are created when actual costs are lowered, the utilities are rewarded for more cost-effective energy efficiency programmes.[505]

3.16.9 Eligible Energy Savings

Energy efficiency programmes are administered by the obligated utilities and delivered by the utilities or by third-party contractors engaged by the utilities. The utilities also partner with trade allies and dealers to offer rebate programmes. Municipal utilities have increasingly relied on the Minnesota Municipal Utilities Association or the regional municipal power wholesalers to develop and implement aggregated energy efficiency programmes.

3.16.10 Eligible Energy Efficiency Measures

The *Next Generation Energy Act* expanded eligible energy efficiency measures beyond traditional demand-side measures to also include rate design, energy codes and appliance standard changes, market transformation programmes, behaviour change programmes, utility infrastructure efficiency improvements, and qualifying solar energy projects. Natural gas utilities may also include purchases of biomethane and may use up to five percent of the total amount to be spent on energy conservation improvements.

The Minnesota Office of Energy Security expects measures to be cost effective and able to reach all residential, commercial, industrial, and agricultural customers.[506] Typical measures include funding for residential energy audits, appliance and lighting rebates, and support for building envelope measures. Commercial and industrial measures include rebates for high-efficiency equipment, lighting and controls, recommissioning studies, and process improvements.

3.16.11 Measurement, Verification, and Reporting

The Minnesota Office of Energy Security has established measurement and verification protocols for all utilities and has also developed a deemed energy savings database for specified energy efficiency measures.[507] The database is updated as needed.

Customised energy efficiency projects with first-year savings of more than one million kWh of electricity or 20,000 Mcf of natural gas must undergo more formal measurement and verification processes, including certification by a third-party engineer, or equipment or facility metering.[508]

There are no requirements for independent programme evaluations, although utilities implement evaluations on their own with independent evaluators. The Minnesota Office of Energy Security protocols allow utilities to limit their measurement and verification expenditures per project to ten percent of the monetary value of the total annual savings.

3.16.12 Trading of Energy Savings

There is no trading of energy savings allowed in the Minnesota scheme.

3.16.13 Funding

Utilities have minimum spending requirements per statute of 1.5 percent of gross operating revenues from in-state services for electricity utilities, 0.5 percent for natural gas utilities, and two percent for any utility that operates a nuclear-powered generator in Minnesota.[509] Programme costs, including incentives and operating costs, are recovered through a cost recovery charge, which is determined as part of rate-setting. If actual costs differ from the amount recovered, the utility can adjust its rates subject to Public Utility Commission review.[510]

505 ACEEE State Energy Policy Database available at: http://www.aceee.org/energy/state/minnesota/mn_utility.htm

506 Minnesota relies heavily on the societal test but also measures utility, participant, and ratepayer costs to determine cost-effectiveness. See more information at: http://www.auditor.leg.state.mn.us/ped/pedrep/0504ch2.pdf

507 Minnesota Office of Energy Security, 2008b

508 Minnesota Office of Energy Security, 2008b

509 Minnesota Statutes, 2011. Xcel Energy is the only operator of an in-state nuclear facility. Municipal gas utilities with annual throughput of less than 1 billion cubic feet are exempt from the spending requirement. Utilities can be required to exceed the spending amount when additional cost-effective programmes are identified.

510 United States Environmental Protection Agency, 2007

3.16.14 Scheme Administration

Programmes are typically marketed and promoted by each utility, although some residential programmes proposed for 2010 have been jointly created and marketed by Xcel Energy and CenterPoint Energy, two of the state's larger investor-owned utilities.

3.16.15 Scheme Results

Energy savings by investor-owned utilities were 548,467 MWh of electricity and 1.6 million Mcf of gas in 2008 and 463,543 MWh and 1.9 million Mcf in 2007.[511] Savings were one percent of electricity utility retail sales and 0.5 percent of gas utility sales. Expenditure on energy efficiency programmes over the two years was approximately USD 230 million and CO_2-e reductions were 1.1 million tonnes. Spending by investor-owned utilities is projected to increase by 65 percent from 2008 to 2010.

Municipal and cooperative utilities report their savings triennially; actual 2008 energy savings and expenditure data are not yet available.

3.16.16 Areas for Improvement

Prior to the *Next Generation Energy Act*, investor-owned utility annual energy savings performance varied from a low of 0.2 percent of sales to a high of 1.9 percent. Energy efficiency plans filed for 2010 indicate significant projected increases for the laggards, but also indicate that the two utilities with energy savings that had exceeded 1.5 percent of sales in the past are now projecting only 1.5 percent.[512]

The Minnesota Office of Energy Security and the Legislature are also considering whether or not to eliminate the minimum spending requirement.[513]

3.17 United States – New York

New York encourages energy efficiency through a variety of programmes and policies, including tax credits, loans and grants, a system benefits charge, and end-use energy efficiency programmes. In 2008, an EEO, known in New York as an energy efficiency portfolio standard (EEPS), was placed on investor-owned electricity and natural gas utilities. New York has a unique system for administration of energy efficiency programmes that simultaneously relies on investor-owned utilities[514] and a government organisation called the New York State Energy Research and Development Authority.[515]

New York has a policy goal to reduce GHG emissions to five percent below 1990 levels by 2010, ten percent below 1990 levels by 2020, and 80 percent below 1990 levels by 2050.[516] A GHG emissions forecast included in its 2009 Energy Plan suggests that New York State will not meet its 2010 goal and instead will end up about two percent above 1990 levels.[517]

New York is also part of the Regional Greenhouse Gas Initiative, a carbon dioxide emissions trading programme specifically targeting electricity power plants. In the New York State Energy Research and Development Authority rules on the carbon dioxide allowance auction,[518] New York committed to applying the proceeds from the auction of allowances to "promote and implement programs

511 Minnesota Office of Energy Security, 2010. Electricity savings totals include actual savings by IOUs and projected savings from municipal and cooperative utilities.

512 Minnesota Office of Energy Security, 2010a

513 Minnesota Office of Energy Security, 2010b

514 Publicly owned and municipal utilities are not subject to this system of administration for energy efficiency programmes, as they fall outside the state regulator New York Public Service Commission's jurisdiction.

515 New York State Energy Research and Development Authority, a state agency, was originally founded in 1975 to reduce the State's petroleum consumption. On May 20, 1996, the New York Public Service Commission authorised a system benefits charge to support energy efficiency improvements (Case 94-E-0952), and on January 30, 1998, the New York Public Service Commission charged New York State Energy Research and Development Authority with administration of system benefits charge-funded programmes. Historically most of these funds go to implementation of electricity and gas efficiency programmes. However, some funds are set aside for research and development, monitoring and evaluation, and administration. More information on New York State Energy Research and Development Authority is available at: http://www.nyserda.org/

516 New York's goal was established in the 2002 State Energy Plan and by Governor's Executive Order No. 24. See more information at: http://www.pewclimate.org/what_s_being_done/in_the_states/emissionstargets_map.cfm

517 New York State Energy and Research Development Authority, 2009a

518 21 NYCRR Part 507

for energy efficiency, renewable or non-carbon emitting technologies, and innovative carbon emissions abatement technologies with significant carbon reduction potential," as well as associated administrative and programme design costs.[519]

3.17.1 Policy Objectives

In April 2007, New York released a comprehensive energy plan that called for, among other policy objectives, a reduction in electricity use in 2015 by 15 percent ("15 by 15"), relative to projected use in 2015. In May 2009, the New York Public Service Commission established a policy to encourage end-uses of gas to be as efficient as they can reasonably be made. The Commission's rationale was that beneficial increases in gas usage could be expected as a result of electricity efficiency programmes.[520]

3.17.2 Legal Authority

In June 2008, the New York Public Service Commission issued an order in Case 07-M-0548 establishing an energy efficiency portfolio standard.[521] The EEPS scheme was established through this order, and under the traditional mandate of the New York Public Service Commission, which has helped fund and offer DSM/energy efficiency programmes in New York State since the early 1990s. Funding for energy efficiency programmes implemented under the EEPS scheme, which is collected through New York's existing system benefits charge, likewise also falls under New York Public Service Commission authority. The New York Public Service Commission first established the system benefits charge in 1996 in Case 94-E-0952.[522] The system benefits charge and the EEPS scheme are renewed at the discretion of the New York Public Service Commission.

The EEPS scheme order adopts specific, interim, 3-year targets for MWh reduction, with a forecast trajectory that will achieve the 15-percent reduction in electricity use by 2015; approves specific "fast track" energy efficiency programmes for immediate implementation; and requires the utilities and New York State Energy Research and Development Authority to file energy efficiency programme proposals. The order also directs New York's investor-owned utilities to commence collection, through the system benefits charge, of additional funds to support the EEPS scheme through 2011. In September 2009, an energy planning law was passed that statutorily establishes the State Energy Planning Board and calls on that Board to complete a State Energy Plan on or before March 15, 2013.[523] In May 2009, the New York Public Service Commission extended the EEPS scheme to include gas efficiency programmes.

3.17.3 Fuel Coverage

Electricity and natural gas.

3.17.4 Sector and Facility Coverage

All sectors and facilities are covered by the EEPS scheme. All customer classes pay a non-bypassable system benefits charge and have access to energy efficiency programmes.[524]

3.17.5 Energy Saving Target

The electricity saving targets were established in 2008 at 0.5 percent of 2007 forecast sales and ramp up by a little over two percent of sales each year through 2015. The electricity saving targets were determined by assessing the then-current electricity efficiency programmes,[525] and then determining an incremental programme portfolio mix to be implemented by the investor-owned utilities and the New York State Energy Research and Development Authority to achieve the overall 15-percent reduction in electricity use by 2015.

The natural gas targets are 4.34 Bcf annually through the

519 The full rule is available at: http://www.nyserda.org/RGGI/NYSERDA.RevisedExpressTermsPart507.pdf

520 New York Public Service Commission, 2009

521 New York Public Service Commission, 2008

522 According to New York Public Service Law art. 1, §5, the New York Public Service Commission has a broad statutory mandate "to encourage all persons and corporations subject to its jurisdiction to formulate and carry out long-range programs, individually or cooperatively, for the performance of their public service responsibilities with economy, efficiency, and care for the public safety, preservation of environmental values and the conservation of natural resources."

523 New York State Energy Plan, 2012

524 New York Public Service Commission, 1996

525 For example, the New York State Energy Research and Development Authority's system benefits charge programmes, existing codes and standards efforts, publicly owned utility efforts, and other state agency programmes.

end of 2011 and 3.45 Bcf annually after 2011. The savings target moves downward in 2011 as federal economic stimulus funding ends.[526] By 2020, a 14.7-percent reduction in gas usage is expected—that figure is independent of changes in usage caused by fuel switching or other factors. The target includes gas savings from utility programmes, non-utility programmes (such as the New York State Energy Research and Development Authority's gas efficiency programmes), and savings from codes and standards.[527]

3.17.6 Obligated Parties

The New York State Energy Research and Development Authority and investor-owned electricity and natural gas investor-owned utilities are obligated parties under the EEPS scheme and also under the New York $mart℠ programme.[528]

3.17.7 Compliance Regime

The regulator for the EEPS scheme is the New York Public Service Commission, which has authority over investor-owned utilities. The Commission also regulates the New York State Energy Research and Development Authority for the purpose of energy efficiency programmes funded by the system benefits charge (which include EEPS scheme programmes). The New York Public Service Commission does not require any party to administer an EEPS scheme programme, however, it offers a combination of incentives and lost revenue recovery to encourage utility participation.

Both the New York State Energy Research and Development Authority and the utilities prepare monthly, quarterly, and annual progress reports on energy efficiency performance, including energy savings to date and programme participation rates.

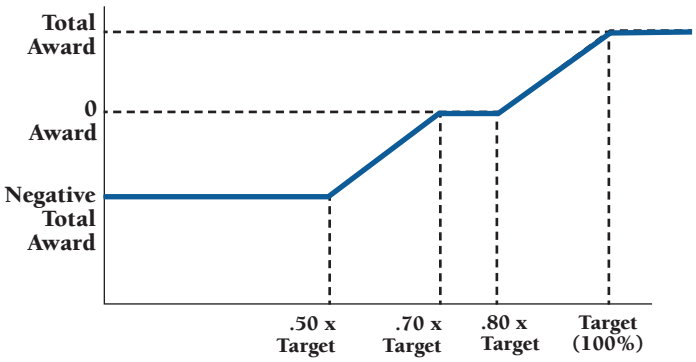
Penalties for non-compliance with EEPS scheme targets are imposed under a risk-reward incentive mechanism (see section 3.17.8 below). Obligated utilities that fail to meet the targets also stand to lose the ability to administer programmes. They also give up the opportunity to recover lost revenue from energy efficiency programmes in their service territory.

3.17.8 Performance Incentives

In August 2008, the New York Public Service Commission authorised performance incentives for EEPS scheme utility-administered energy efficiency programmes.[529] The risk-reward incentive mechanism rewards utilities for achieving 80 percent or more of their energy saving targets (primarily measured in MWh savings) and penalises utilities for achieving 70 percent or less of their targets. The total incentive amount is USD 40 million or roughly 12 percent of programme costs. The incentive is paid through an increase to the utilities' allowed return on equity. The total incentive is roughly equal to a 20 basis point increase on return on equity. Figure 10 shows that the penalties and rewards are symmetric and scale linearly. The maximum penalty/reward is USD 38.85 per incremental MWh.

Figure 10

Relationship between Performance and Incentive Award for Utility Programmes in New York [530]



Under the New York Public Service Commission's order in Case 03-E-0640, the regulated electricity utilities in New York have proposed revenue decoupling mechanisms, which are under consideration in ongoing rate cases. The Commission required the utilities to do so in an effort to remove the disincentive to save energy (and therefore reduce revenues).

526 The federal economic stimulus legislation, the American Recovery and Reinvestment Act, provides USD 5 billion for low-income weatherisation assistance, of which New York State received over USD 394 million.

527 New York Public Service Commission, 2009

528 New York Public Service Commission, 2008

529 New York Public Service Commission, 2008

530 Haeri, et al., 2010

Natural gas utilities may, at their discretion, participate in the incentive mechanism. The maximum incentive available is 19 basis points on return on equity or ten percent of programme costs. Both negative and positive adjustments are paid at a rate of USD 3.00 per incremental Mcf.[531] The same thresholds of 80 percent and 70 percent of target apply to be eligible for an incentive or to incur a penalty.

3.17.9 Eligible Energy Savings

New York allows proposals for energy efficiency programmes to be submitted by any party that can substantiate the resulting energy savings. Eligible energy savings are produced predominantly by New York State Energy Research and Development Authority and its contractors and utilities and their contractors. Independent third parties can also submit proposals for energy efficiency programmes under the EEPS scheme, although none have successfully done so.

3.17.10 Eligible Energy Efficiency Measures

Proposed gas and electricity efficiency measures for residential, multifamily, low-income, and commercial/industrial customers that contribute to the EEPS targets are subject to approval by the New York Public Service Commission. Interruptible gas customers are excluded from the gas efficiency programmes. Through January 2010, the Commission has approved a total of 45 electricity efficiency programmes and 45 gas efficiency programmes.

3.17.11 Measurement, Verification, and Reporting

The New York State Energy Research and Development Authority and the obligated utilities are responsible for developing and implementing a measurement and verification plan for each energy efficiency programme they implement. They typically hire outside consultants to perform much of this work. All measurement and verification plans are subject to review and approval by the New York Public Service Commission staff. Programme-specific measurement and verification plans have been developed and are available on the New York Public Service Commission's evaluation web page.[532]

All measurement and verification must be conducted pursuant to the evaluation guidelines issued by the Evaluation Advisory Group (an advisory group authorised by the New York Public Service Commission) and the New York Public Service Commission staff and use Commission technical manuals. The technical manuals provide a "uniform, measure-specific approach, to estimating energy and demand savings." On October 18, 2010, the New York Public Service Commission adopted an order updating and consolidating a series of five technical manuals approved by the Commission between December 2008 and December 2009.[533]

Approximately five percent of EEPS scheme funds are devoted to programme evaluation. The New York Public Service Commission increased programme evaluation funding relative to pre-EEPS levels in the expectation that utility financial incentives would be based on programme performance.

3.17.12 Trading of Energy Savings

EEPS scheme targets may not be met by purchasing energy efficiency. However, New York participates in the Regional Greenhouse Gas Initiative, which permits the trading of GHG emissions allowances.

3.17.13 Funding

The majority of funding for EEPS scheme energy efficiency programmes comes from the system benefits charge. On December 21, 2005, the New York Public Service Commission extended the system benefits charge through the end of June 2011 and expanded the collection to USD 175 million annually.

In 2008, the New York Public Service Commission directed utilities to collect an additional USD 159 million per year for electricity efficiency programmes and USD 13.2 million for gas efficiency programmes through the system benefits charge.[534] This was the first time funds were collected from gas ratepayers. These funds are specifically earmarked for gas efficiency programmes just as funds collected from electricity ratepayers are for electricity efficiency programmes, although electricity efficiency funding can also be used for fuel switching measures. The

531 New York Public Service Commission, 2009

532 New York Public Service Commission, 2012

533 New York Public Service Commission, 2010

534 New York Public Service Commission, 2008

system benefits charge is renewed at the discretion of the New York Public Service Commission.

As of January 2012, approximately USD 300 million is available for energy efficiency programmes in New York from the auction of allowances in the Regional Greenhouse Gas Initiative.[535] The total funds available were reduced by a variety of expenditures, including a USD 90 million transfer to the State's General Fund as a deficit reduction measure and a settlement payment for a Regional Greenhouse Gas Initiative-related lawsuit.[536] Because The New York State Energy Research and Development Authority has authority over dispersal of the allowance auction funds, the New York Public Service Commission has declined to reduce funding in proportion to the available auction funding.[537]

3.17.14 Scheme Administration

The New York State Energy Research and Development Authority, the utilities, and the New York Public Service Commission offer energy efficiency information and outreach to customers and the public. As part of the EEPS scheme, the Commission has approved outreach and education plans and requisite funding as part of all approved energy efficiency programmes. Programme administrators are required to provide plans, including market and participation assessments, as well as descriptions of the various planned outreach activities. Progress has been made in both expanding and coordinating outreach and marketing. This is an improvement since early 2009, when third-party evaluators had concluded that "The New York State Energy Research and Development Authority…has not embraced a strong organization-wide marketing philosophy and culture," and at that time none of the utilities had sufficiently developed marketing plans for their energy efficiency programmes.

3.17.15 Scheme Results

New York has dedicated considerable time and resources to the pursuit of energy efficiency. It was one of the first states to establish a system benefits charge to support energy efficiency and other public benefits energy programmes.[538] This early start has enabled New York to accrue some impressive successes.

The 13-year budget for New York's Energy $mart^{SM} programme was USD 1.89 billion. USD 1.68 billion of that amount was allocated to four major programme areas—Commercial/Industrial, Residential, Low-Income, and Research and Development—and to an education programme.[539] Spending relative to the 13-year budget is: Commercial/Industrial 74.0%; Residential 93.7%; Low-Income 84.5%; and Research and Development 63.3%.[540] Additionally New York has, for its EEPS scheme programmes, set aside USD 374 million, of which USD 76.7 million has been expended on programme activities.[541]

Table 18 (page 91) shows cumulative annual electricity savings, demand reductions, and other fuel savings from the New York Energy $mart^{SM} and EEPS programmes:[542]

3.17.16 Areas for Improvement

In an assessment report, the New York Public Service Commission staff observes that the complexity of energy efficiency programmes is affecting the rate of achieved energy savings. For example, commercial, industrial, and multifamily programmes have the longest start-up requirements. They typically require energy audits, preapproval, and complex custom measure installations.

Commission staff also reports that relationships among utilities and the New York State Energy Research and Development Authority are influencing implementation of EEPS scheme programmes. Commission staff has learned that business customers are taking time to make careful comparisons between the Authority- and utility-delivered programmes. Where there are areas of overlapping or

535 New York State Energy and Research Development Authority, 2012

536 New York State Energy and Research Development Authority, 2009b

537 Order Denying Petition for a Declaratory Ruling available at: http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={7CA2CA89-F3F2-4826-89E0-616640BDB36B}

538 American Council for an Energy-Efficient Economy, 2011

539 New York State Energy Research and Development Authority, 2011

540 New York State Energy Research and Development Authority, 2011

541 New York State Energy Research and Development Authority, 2011

542 New York State Energy Research and Development Authority, 2011

Table 18

Cumulative Annual Electricity Savings, Demand Reductions, and Other Fuel Savings from the New York Energy $mart℠ and EEPS Programmes [543]

Program	Adjusted Cumulative Annual Savings GWh	MW	MMBtu
COMMERCIAL/INDUSTRIAL			
Existing Facilities: Permanent	1,561.3	459.5	-66,686
Existing Facilities: Callable	N/A	509.0	N/A
New York Energy $mart Business Partners	121.6	31.8	N/A
New York Energy $mart Loan Fund and Financing	87.9	52.	598,666
New Construction Program	431.8	105.2	254,652
Flex Tech Technical Assistance: Permanent	1,213.7	221.5	3,695,897
Flex Tech Technical Assistance: Curtailable	N/A	137.9	N/A
Industry and Process Efficiency	97.2	15.2	254,174
C/I Sector Overlap Removed	**268.4**	**54.9**	**169,198**
Subtotal Commercial/Industrial	**3,245.1**	**1,477.2**	**4,567,507**
RESIDENTIAL AND LOW INCOME			
Single Family Home Performance	65.3	20.9	2,227,490
Multifamily Building Performance	122.1	12.8	969,643
Market and Community Support Program	657.6	136.1	296,607
CFL Expansion	588.2	55.5	N/A
EmPower New York Program	62.9	9.4	191,302
Subtotal Residential and Low Income	**1,496.2**	**234.6**	**3,685,041**
RESEARCH AND DEVELOPMENT			
DG-CHP Demonstration Program	534.1	96.3	-3,593,578
Demand Response and Innovative Rate Research	N/A	99.0	N/A
Renewable Energy Production	107.9	11.7	N/A
Subtotal R&D	**642.0**	**207.0**	**-3,593,578**
Cross Sector Overlap Removed	**345.9**	**48.9**	**-1,295,093**
SBC Portfolio	**5,037**	**1,870**	**5,954,062**

N/A – not applicable, the energy source is not reduced for the particular program.

543 New York State Energy Research and Development Authority, 2011

adjacent market segments or service territories, utilities are trying to reach more customers and/or increase energy efficiency by partnering with neighbouring utilities and/or the Authority. The presence of multiple programmes in a territory is resulting in clients shopping for the most favourable programme, which can result in delays in program sign-up.

Commission staff expects that program ramp-up rates will affect annual achieved energy savings for many programmes, but may not have an impact on longer-term energy saving targets. Program administrators also report that the current economic climate is having an impact on program implementation. Programmes that cater to small businesses, for example, are facing hurdles due to economic pressures on small firms. A number of program administrators have indicated that the ability to provide financing is crucial to gaining small business participation.

3.18 United States – Texas

Texas was the first US state to implement an EEO, known in Texas as an energy efficiency portfolio standard (EEPS). Operating since 2000, the EEPS scheme requires investor-owned utilities to offset a percentage of their load growth through end-use energy efficiency programmes available to all customers in the residential and commercial sectors. Utilities accomplish this by administering energy efficiency programmes, which are delivered by retail electricity utilities and energy efficiency service providers. Utilities must achieve their energy saving targets through either standard offer programmes or targeted market transformation programmes.

In 2001, the Texas Legislature adopted an Emissions Reduction Plan as amendments to its Health and Safety Code designed to help the state comply with federal *Clean Air Act* standards. The amendments included ambitious changes in energy use. Although the timelines were extended in 2007, the amendments require local government areas in the state to: implement all cost-effective energy-efficiency measures, establish a target to reduce electricity consumption by five percent each year for six years beginning on 1 September 2007, and report efforts and progress annually to the State Energy Conservation Office.[544]

Omnibus energy efficiency legislation enacted in 2007 included provisions applicable to school districts and to certain institutions of higher education and executive branch state agencies. These public entities must establish a goal of reducing their annual electricity consumption by five percent for each of six state fiscal years beginning 1 September 2007. The legislation also requires that state-owned or leased buildings purchase Energy Star appliances and equipment, and specified other standards for certain equipment. In addition, statute requires government bodies responsible for new and reconstructed state buildings (and repair or construction of certain systems and equipment) to comply with minimum energy efficiency design requirements and to also conduct an economic analysis of energy efficiency and renewable energy options; if these options are cost effective over the life of the building, they must be undertaken.[545] These requirements do not affect the EEPS scheme targets, as the energy efficiency standards refer to public entities, whereas the EEPS targets focus on energy efficiency measures in residential dwellings and businesses.

3.18.1 Policy Objectives

EEPS scheme programmes are designed to reduce system peak demand, energy consumption, and energy costs.

3.18.2 Legal Authority

The EEO is codified in statute in the *Texas Public Utility Regulatory Act*.[546] The Public Utility Commission of Texas oversees the program pursuant to the procedures outlined and the program templates and associated savings established in the Public Utilities Commission Substantive Rules.[547, 548] Amendments were passed on 30 June 2010, increasing the energy saving target to 30 percent of load growth by 2013.

The Public Utility Commission of Texas regulates nine electricity transmission and distribution territories.

544 Texas State Energy Conservation Office, 2007. 2002 legislation was SB 5; 2007 was SB 12.

545 Texas Legislature, 2007a

546 Texas Legislature, 2007b, §39.905

547 Public Utilities Commission Subst. R., §25.181

548 Texas Public Utilities Commission, 2010 and Public Utilities Commission Subst. R., §25.184 available at: http://texinfo.library.unt.edu/texasregister/html/2003/jul-03/PROPOSED/16.ECONOMIC%20REGULATION.html

3.18.3 Fuel Coverage

Electricity.

3.18.4 Sector and Facility Coverage

All facilities and all customers in the residential and commercial sectors.[549]

3.18.5 Energy Saving Target

In 1999, the Texas Legislature mandated that investor-owned utilities offset at least ten percent of their load growth through energy efficiency programmes and directed the Public Utility Commission of Texas to adopt rules to implement this mandate.[550] Legislation passed in 2007 increased the savings requirement to 15 percent of load growth by 31 December 2008, 20 percent by 31 December 2009, 25 percent by 2012, and 30 percent by 2013.[551] There is also a statutory requirement beginning in 2009 that a utility's demand reduction goal in MW for any year shall not be less than the previous year.[552] The Public Utility Commission of Texas is currently considering new targets for energy efficiency through the rulemaking process.[553]

Commission rules also require each investor-owned electricity utility to meet at least five percent of its annual energy saving target through programmes for "hard-to-reach" customers, defined as households with incomes at or below 200 percent of the US federal poverty guidelines.[554]

3.18.6 Obligated Parties

Under the EEPS scheme in Texas, the obligated parties are all investor-owned electricity utilities plus municipally owned electricity utilities with retail sales of more than 500,000 MWh in 2005.

3.18.7 Compliance Regime

Utilities must file an Energy Efficiency Plan and Report by 1 April each year with the Public Utility Commission of Texas. This document reports on energy and capacity saved over the past five years and includes other information related to program implementation, achievements, and spending. It also includes detailed targets, budgets, and program forecasts for the next two years. The Commission must approve the plans.[555]

3.18.8 Performance Incentives

Legislation passed in 2007 directed the Public Utility Commission of Texas to establish rules and procedures for providing rewards to utilities that exceed the EEPS scheme targets.[556] The revised rules allow performance bonuses for a utility that exceeds its demand reduction target within the prescribed cost limits in the previous year. The bonus entitles the utility to receive a share of the net benefits created by meeting the target. This is calculated as the sum of total avoided costs less the sum of all program costs.

A utility that exceeds 100 percent of its demand reduction target will receive one percent of the net benefits for every two percentage points that the target has been exceeded, with a maximum of 20 percent of the utility's program costs. A utility that meets at least 120 percent of its demand reduction target with at least ten percent of its savings achieved through Hard-to-Reach programmes receives an additional ten percent of the amount described above.[557]

3.18.9 Eligible Energy Savings

Energy savings and demand reductions that contribute toward meeting EEPS scheme energy saving targets are produced in energy efficiency programmes implemented by third party energy efficiency service providers selected by end-use customers. Utilities do not themselves directly implement programmes.

3.18.10 Eligible Energy Efficiency Measures

Public Utility Commission of Texas rules define the standard offer programmes and market transformation

549 Texas Public Utility Commission, 2011

550 Texas Legislature, 1999

551 Texas Legislature, 2007a and Texas Public Utilities Commission, 2010a

552 Texas Public Utilities Commission, 2010b

553 See Section 3.19.16: "Areas for Improvement."

554 Public Utilities Commission Subst. R. §25.181(e)(1)(E)

555 Public Utilities Commission Subst. R. §25.181(m) and §25.183 (M&V Rules) available at: http://www.puc.state.tx.us/rules/subrules/electric/25.183/25.183.pdf

556 Texas Legislature, 2007a

557 Motamedi, 2009

programmes eligible to meet EEPS scheme targets.[558]

Commercial and residential standard offer programmes must produce measurable and verifiable energy savings and demand reductions. There is also a load management standard offer program. The programmes are neutral with respect to specific technologies, equipment, or fuels, and project comprehensiveness is encouraged. Fuel switching from electricity to another energy source is permitted provided that the energy efficiency project results in overall lower energy costs, lower energy consumption, and the installation of high-efficiency equipment. Switching from gas to electricity is only permitted with the installation of high-efficiency combined heating and air conditioning systems.

Market transformation programmes can include advertising, training, incentives, and other mechanisms to overcome the various barriers to the implementation of more efficient technologies.[559] There are more than 15 market transformation programmes, including programmes targeting schools and public facilities, commercial retro-commissioning, new residential construction, and air conditioning installers and distributors.[560]

The Hard-to-Reach standard offer program is primarily building envelope measures designed to achieve cost-effective reduction in peak summer demand. Utilities are encouraged to collaborate with the federally funded weatherisation programmes and cover 100 percent of the costs.[561]

3.18.11 Measurement, Verification, and Reporting

Utilities are responsible for establishing industry-accepted measurement and verification protocols for all standard offer programmes.[562] Protocols may include on-site inspection and measurement and verification, deemed savings, and/or statistically significant samples. Energy efficiency service providers are responsible for ensuring that demand reductions and energy savings have been measured following the protocol. If inspection is part of the protocol, energy efficiency service providers do not receive final compensation until the measurement and verification processes are complete.[563]

3.18.12 Trading of Energy Savings

Texas does not have a trading system for energy saving credits.

3.18.13 Funding

Utilities fund energy efficiency programmes. With standard offer programmes, the utility pays a set incentive amount, determined by the Public Utility Commission of Texas, to the energy efficiency service provider for each kW of peak demand reduction and each kWh of energy savings resulting from an installed measure.[564] The procedure is similar to that of a feed-in-tariff for renewable energy. The Commission sets the level of incentive payments for installing eligible energy efficiency measures based on engineering estimates of the savings ("avoided costs") for many measures.[565] Utilities also pay the costs of approved market transformation programmes.

Utilities are able to recover program costs using an Energy Efficiency Cost Recovery Factor that is determined through base rates or by filing a cost recovery rate schedule in tariffs.[566] The Public Utility Commission of Texas can also approve an energy charge or a monthly customer charge for the Energy Efficiency Cost Recovery Factor. The Factor is calculated to allow the utility to earn revenues equal to the energy efficiency costs, net of energy efficiency costs included in base rates, the energy efficiency performance bonus earned for the prior year, and any adjustment for past

558 See more information about program rules at: http://www.puc.state.tx.us/rules/rulemake/27903/27903.cfm

559 Motamedi, 2009

560 Electric Utility Marketing Managers of Texas, 2009

561 See more information about US Weatherisation programmes at: http://www1.eere.energy.gov/wip/wap.html (DOE site) and http://www.waptac.org/ (technical assistance for providers).

562 Texas A&M's Energy Systems Lab prepared a sample M&V plan in 1999 as guidance for utilities, which is available at: http://repository.tamu.edu/handle/1969.1/1981. An example (Entergy) of utility M&V protocols can be found at: http://www.entergy-texas.com/energy_efficiency/ci_mv.aspx (commercial projects) and at: http://www.entergy-texas.com/energy_efficiency/res_mv.aspx (residential projects).

563 Public Utilities Commission Subst. R. §25.181(o)

564 www.texasefficiency.com/PUC_Staff_SOP_Training.ppt

565 Cowart, 2009

566 Public Utility Commission of Texas §25.181(f) available at: http://www.puc.state.tx.us/agency/rulesnlaws/subrules/electric/25.181/25.181.pdf

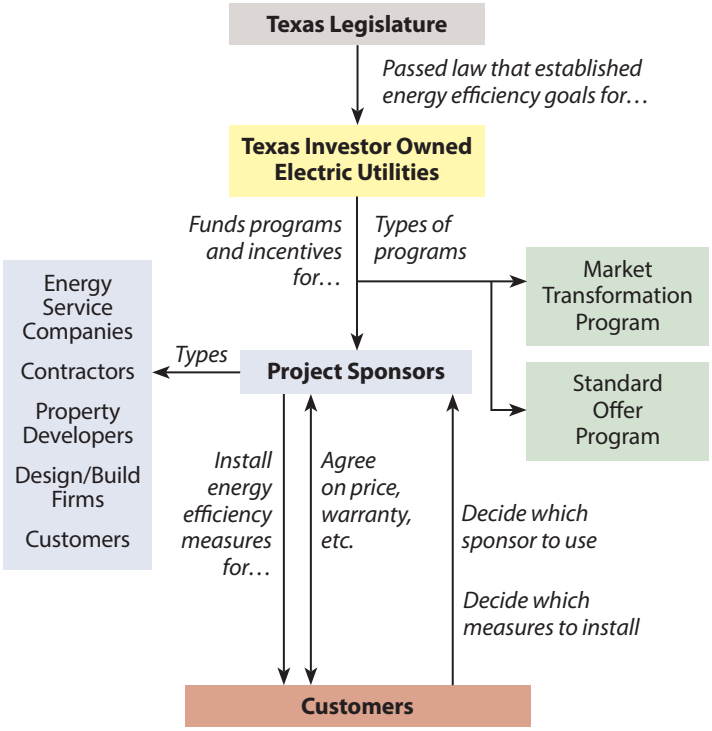
over- or under-recovery of energy efficiency revenues. Costs are recovered from the customer classes that receive energy efficiency services under each program. Each utility is required to file an application at least every three calendar years to reconcile costs recovered through its Energy Efficiency Cost Recovery Factor.[567] Public Utility Commission of Texas rules limit utility administrative costs to ten percent of the total program costs and set total budget ceilings based on previous year spending for utility program expenditures.[568]

3.18.14 Scheme Administration

Texas utilities administer the energy efficiency programmes but have no role in actually delivering the services. As shown in Figure 11, third-party energy efficiency service providers are hired to deliver standard offer programmes and implement market transformation programmes.[569] End-use customers select the energy efficiency service provider, decide what equipment will be installed, and decide what work the contractor will do.

Figure 11

Overview of Texas Energy Efficiency Programmes [570]



programmes. The Electric Utility Marketing Managers of Texas is a voluntary organisation of investor-owned electricity utilities that facilitates coordination among the energy efficiency program managers.[571] Coordinated programmes include "Make Your Mark," a residential lighting program, and SCORE/CitySmart, a program for schools and government entities to receive technical and energy management assistance to help them make decisions about cost-effective energy efficiency investments.

3.18.15 Scheme Results

In 2010, Texas investor-owned electricity utilities achieved 533 GWh of energy savings and 301 MW of peak demand reduction, which was 118% above their 138-MW target. Combined, Texas investor-owned utilities spent approximately USD 105 million on energy efficiency programmes (including administrative expenses) in 2010. Between 1999 and 2010, Texas utilities' efficiency programmes have produced 1,666 MW of peak demand reduction and 4,110 GWh of energy savings.[572]

567 Public Utilities Commission Subst. R. §25.181 (f). The Energy Efficiency Cost Recovery Factor is a new tool as of 2009 designed to standardise the process. Prior to the Energy Efficiency Cost Recovery Factor, utilities were typically granted cost recovery through general rate cases or utility applications.

568 Public Utilities Commission Subst. R. §25.181 (f) 8 – see both current and proposed rules.

569 No formal verification of energy efficiency service providers is required by utilities or the Public Utility Commission of Texas. Public Utilities Commission Subst. R. §25.181(l)(1) requires programmes to provide a complaint process for use by the energy efficiency service provider or the customer and dictates that utilities may require energy efficiency service providers to provide evidence of experience, insurance, permits, appropriate licensing, and references. An example (AEP) of utility info for energy efficiency service providers can be found at: http://www.aepefficiency.com/cisop/downloads/index.htm

570 Electric Utility Marketing Managers of Texas, 2011

571 For more information see: http://www.texasefficiency.com

572 Electric Utility Marketing Managers of Texas, 2011

3.18.16 Areas for Improvement

Consumer advocates have expressed concern that the Texas EEPS scheme targets are too low and that basing the performance bonus on budgets rather than actual savings and costs is skewed. There is also criticism that there is a lack of transparency and rigor about measurement and verification and that there is limited ability to provide feedback on the state's energy efficiency programmes as a whole.[573] The 2007 legislation, House Bill 3693, required the Public Utility Commission of Texas to fund a potential study for the nine investor-owned utilities to see whether the target could be increased to 30 percent of load growth in 2010 and 50 percent of load growth in 2015. The study, which was released in December 2008, found these targets were reasonable and attainable for the majority of utility service areas.[574] The study recommended delaying the adoption of the initial proposed energy savings and demand reduction targets from 2010 to 2012 to allow utilities sufficient time to ramp up programmes. The study also suggested that most utilities would have a better chance of meeting the goals if the saving metrics were changed from a percentage of incremental growth to a percentage of total peak demand.[575]

3.19 United States – Vermont

The State of Vermont is a participant in the Regional Greenhouse Gas Initiative, a mandatory, market-based GHG emissions trading system implemented by 10 states, which is designed to reduce GHG emissions from the power sector by ten percent by 2018. Statute requires 100 percent of Regional Greenhouse Gas Initiative allowances to be auctioned and proceeds from the sale of carbon credits to be deposited in an energy efficiency utility fund, managed by a fiscal agent.[576]

State policy is committed to least-cost integrated planning for electricity and natural gas supply and transmission planning. Statutes mandate that energy efficiency be weighted equally with wires and non-wires solutions.[577] In 2007, the Vermont Legislature adopted the following goals related to building energy efficiency:[578]

- reduce fuel use and bills by 25 percent in 60,000 homes by 2017, and in 80,000 homes by 2020;
- reduce fuel needs and fuel bills by an average of 25 percent in housing units served by energy utilities; and
- reduce fossil fuel use in all buildings by 0.5 percent per year (six percent cumulative annually by 2017; ten percent cumulative annually by 2025).

3.19.1 Policy Objectives

Vermont's policy objectives include: reducing the need for future electricity purchases; reducing GHG emissions; limiting the need to upgrade the transmission and distribution infrastructure; and minimising costs and providing energy efficiency as part of a comprehensive resource supply strategy.[579]

3.19.2 Legal Authority

Vermont statute requires electricity utilities to provide comprehensive energy efficiency services as part of least-cost planning through a least-cost integrated plan. Statute allows the Vermont Public Service Board, which regulates the state's publicly owned electricity utilities, to create an energy efficiency utility and specifies that the energy efficiency utility can satisfy an electricity distribution utility's obligation to provide energy efficiency services.[580] The Public Service Board may also appoint an entity to administer the energy efficiency utility.[581] An energy

573 Motamedi, 2009

574 Texas Legislature, 2007a and Texas Public Utilities Commission, 2008

575 Texas Public Utilities Commission, 2008

576 Vermont Legislature, 2007a

577 Vermont Legislature, 2011

578 Vermont Legislature, 2007b

579 Vermont Legislature, 2008

580 Because the energy efficiency utility can satisfy an electricity distribution utility's obligation to provide energy efficiency services, it is questionable whether the Vermont approach to energy efficiency constitutes an energy efficiency obligation scheme. Despite the language of the statute, the obligation does formally remain with the utilities, and quantitative targets denominated in kW and kWh saved per period are established by the utility regulator. The Vermont case is included in this report as an example of using a separate dedicated organisation to deliver energy savings and demand reductions under an obligation placed on energy providers.

581 Vermont Legislature, 2008 and Vermont Legislature, 2011

efficiency charge was created in 1999 through legislation, which capped the funding level, and by Public Service Board Order. Legislation in 2005 lifted the cap on funding.

3.19.3 Fuel Coverage

Electricity.

3.19.4 Sector and Facility Coverage

The Vermont Public Service Board lists a number of programmes that the energy efficiency utility must deliver in the residential, commercial, and industrial sectors. These include programmes for new construction, low-income households, and dairy farms.[582]

3.19.5 Energy Saving Target

Energy saving targets are established to achieve the maximum amount of cost-effective energy efficiency while limiting rate impacts. Targets are informed by an energy efficiency potential study conducted by the State Energy Office.[583]

The 2009 to 2011 contract with the administrator of the energy efficiency utility was for energy savings of 360,000 MWh per year, approximately two percent of 2008 electricity sales.[584] The summer and winter peak demand reduction targets were 51.2 MW and 54.0 MW, respectively (about five percent of peak load).[585] There were also demand reduction targets for transmission-constrained, geographically targeted areas.

The 2012 to 2014 targets are 320,000 MWh of energy savings per year and 60.8 MW demand reduction for the summer peak.[586]

3.19.6 Obligated Parties

Regulated electricity distribution utilities, with the obligation satisfied for most utilities by energy efficiency programmes delivered by the energy efficiency utility. The City of Burlington Electric Department delivers energy efficiency programmes in its own territory.[587]

3.19.7 Compliance Regime

Since 2000, the Public Service Board has executed contracts with the administrator of the energy efficiency utility (a non-governmental organisation, Vermont Energy Investment Corporation, trading as Efficiency Vermont) for specified amounts of energy savings and demand reductions. Final program oversight rests with the Vermont Public Service Board. The Board employs a contract administrator[588] and a fiscal agent to oversee the energy efficiency utility. The contract administrator tracks compliance with the terms of the contract, approves funding requests, and mediates any disputes related to the energy efficiency utility.[589] The fiscal agent receives funds from the energy efficiency charge collected by the electricity distribution utilities, deposits them into an energy efficiency utility fund, and disburses funds to Efficiency Vermont in accordance with the terms of the contract administrator's contract.

Prior to 2010, the administrator of the energy efficiency utility was selected through a competitive bidding process for a three-year contract with a three-year renewal, pending adequate performance. A 2009 Public Service Board order retains the functions of the energy efficiency utility but alters the relationship from a three-year contract to a 12 year rolling Order of Appointment as authorised in statute.[590] The new model includes increased responsibility for the energy efficiency utility and increased transparency through the use of open proceedings and public reviews to set the energy efficiency utility's performance targets.

3.19.8 Performance Incentives

The contract with Efficiency Vermont includes significant financial incentives to ensure contractor performance.

582 Vermont Public Service Board, 1999

583 Vermont Department of Public Service, 2007

584 ACEEE January 2010 State EERS Summary and online State Energy Policy Database. See Contract Attachment available at: http://psb.vermont.gov/sites/psb/files/projects/EEU/2009-2011contract/Attachment_N_Performance Mechanism_Final.doc

585 According to the Vermont Department of Public Service, electricity usage averages 700 to 750 MW and peaks at around 1,100 MW in the summer.

586 Efficiency Vermont, 2011

587 Vermont Public Service Board, 2012

588 The position of contract administrator will no longer exist once the energy efficiency utility fund has transitioned away from a contract model.

589 Vermont Public Service Board, 2012

590 Vermont Legislature, 2008

Specific targets measuring a variety of performance indicators are established in each contract. Performance indicators currently include energy savings and demand reductions achieved, including demand reductions in geographically targeted areas and energy savings from non-lighting or fuel-switching measures. By meeting these targets, Efficiency Vermont can earn up to 2.7 percent of the energy efficiency utility's total three-year budget.[591] State statute allows for partial decoupling through an alternative regulatory provision.[592]

3.19.9 Eligible Energy Savings

Eligible energy savings are produced by the energy efficiency utility through delivering energy efficiency services to all Vermonters. The Public Service Board states that the energy efficiency utility is expected to be "flexible, intelligent, and responsive to customers and market forces in implementing and re designing the programs it is charged to deliver."[593]

3.19.10 Eligible Energy Efficiency Measures

Energy efficiency programmes are delivered by the energy efficiency utility and approved by the Public Service Board. Measures implemented in these programmes include: energy efficient technologies, appliances, lighting, fuel substitution, and whole building retrofits.

3.19.11 Measurement, Verification, and Reporting

Initial measurement and verification is undertaken by Efficiency Vermont using deemed and actual energy savings. Efficiency Vermont has developed a technical reference manual with documented methodology for calculating energy savings (including allowances for free riders and free drivers).[594] The manual is updated annually by an advisory group that includes the contract administrator, the City of Burlington Electric Department, and the state energy office.

Annual energy savings and demand reductions claimed by Efficiency Vermont are verified by third-party evaluation contractors engaged and overseen by the state energy office and are certified by the Public Service Board, which also approves the annual measurement and verification plan.

Statute requires a triennial independent program audit of the reported energy savings and demand reductions and of the cost-effectiveness of all Energy Efficiency Utility services.[595] The energy efficiency utility's demand reductions were accepted for capacity payments from ISO-New England in the transition phase of the New England forward capacity market.[596] A formal measurement and verification plan for demand reductions has been prepared for continued participation in the market.[597]

3.19.12 Trading of Energy Savings

The energy efficiency utility must obtain energy savings through its own programmes and no trading of energy saving credits is allowed.

3.19.13 Funding

The energy efficiency utility is primarily funded by a volumetric wires charge known as the energy efficiency charge that is shown separately on end-use customers' bills. The Public Service Board determines the energy efficiency charge and the energy efficiency budgets.

In 2009, the energy efficiency charge ranged from USD 0.0029/kWh to 0.0067/kWh, depending on customer class and demand charges.[598]

Table 19 (page 99) shows the annual energy efficiency budgets in Vermont between 2009 and 2011.

Additional funding for energy efficiency in Vermont, directed by statute to heating and process fuel efficiency programmes, is provided by net income from payments for capacity by ISO-New England and the state's participation in the Regional Greenhouse Gas Initiative. This additional funding was about USD 4.1 million in 2010 and 2011.

591 See 2009-2011 Energy efficiency utility contract available at: http://www.state.vt.us/psb/EEU/2009-2011Contract/2009-2011EEUContract.htm

592 Enabling statute is 30 V.S.A. §218d. Vermont Public Service Board, 2006 and Vermont Public Service Board, 2008

593 Vermont Public Service Board, 1999

594 Efficiency Vermont, 2010, and Parker, 2009

595 As required by 30 V.S.A.§209(e)(10) Docket 5980 Order, Public Service Board contract.

596 Parker, 2009

597 PG 2.6.2.

598 See http://psb.vermont.gov/utilityindustries/eeu/generalinfo/currentEECrates for exact amounts.

Table 19

Annual Energy Efficiency Budgets in Vermont, 2009 to 2011[599]

Year	Total Budget (USD million)	Directed to Efficiency Vermont (USD Million)
2009	30.75	26.50
2010	35.40	30.80
2011	40.00	34.70

For the 2009 to 2011 period, 41 percent of total funding was allocated to energy efficiency programmes in the residential sector, and 59 percent to programmes for businesses.[600] The 2009 to 2011 contract with Efficiency Vermont includes certain minimum performance requirements, which include specific targets for certain end-use sectors. This includes minimum required spending of USD 19.7 million on energy efficiency programmes for residential customers and USD 6.3 million on programmes for low-income customers.[601]

For the 2012 to 2014 period, Efficiency Vermont estimates spending of USD 104.6 million for electricity efficiency resource acquisitions as well as USD 12 million for non-resource acquisition including education, training, research, and evaluation.[602]

3.19.14 Scheme Administration

The Public Service Board establishes three-year budgets, policy goals, and performance indicators for Efficiency Vermont. Using this information as a starting point, Efficiency Vermont prepares an annual plan for approval by the Board. The plan details the strategies, initiatives, projected budgets for the different programmes, and an estimate of the societal benefits and costs.

Efficiency Vermont has broad latitude in determining the strategies and measures needed to achieve the targeted energy savings and demand reductions. The current plan's major strategies include: account management for large customers; targeted outreach and initiatives for designers, contractors, and building managers; use of negotiated cooperative promotions and rebates for efficient products; community energy initiatives; and contracting with third-party partners for direct installation in geographically targeted areas.[603]

Efficiency Vermont also partners with community-based weatherisation agencies to deliver services to low-income households. Customers are informed through targeted outreach to specific market sectors (e.g., hospitals, ski areas, and the like), a comprehensive website and customer service department, advertising, and community outreach. Most of Efficiency Vermont's budget applies to electricity services and initiatives, with a fraction going to unregulated fuels and services as of 2009.[604] Efficiency Vermont is committed to bundling unregulated fuel and electricity efficiency so the customer experiences "a single, one-stop, comprehensive service for energy efficiency."[605]

3.19.15 Scheme Results

Figure 12 (page 100) shows that the energy efficiency utility has delivered increased incremental annual energy savings in each year from 2000 until 2008, when annualised savings exceeded 140 GWh. In 2007, increasing energy efficiency efforts in Vermont resulted in energy savings that effectively turned load growth negative.[606]

In 2008, verified energy savings were 46 MWh/USD 10,000 invested at a levelised cost of USD 0.031 per kWh.[607] Energy savings in 2009 and 2010 were 85,000 MWh and 111,000 MWh, with summer peak savings of 12.9 MW and 16.3 MW, respectively.[608]

599 Budget Order 2009-2011 is available at: http://www.state.vt.us/psb/orders/2008/files/2009_2011budgetorder.pdf Funds not allocated to Efficiency Vermont are reserved for measurement and verification activities and the costs of the contract administrator and fiscal agent.

600 Parker, 2009

601 Parker, 2009

602 Efficiency Vermont, 2011

603 Efficiency Vermont, 2008. Although the Plan identifies expected savings from and spending for each strategy, Efficiency Vermont is not obligated to deliver savings as proscribed.

604 Parker, 2009

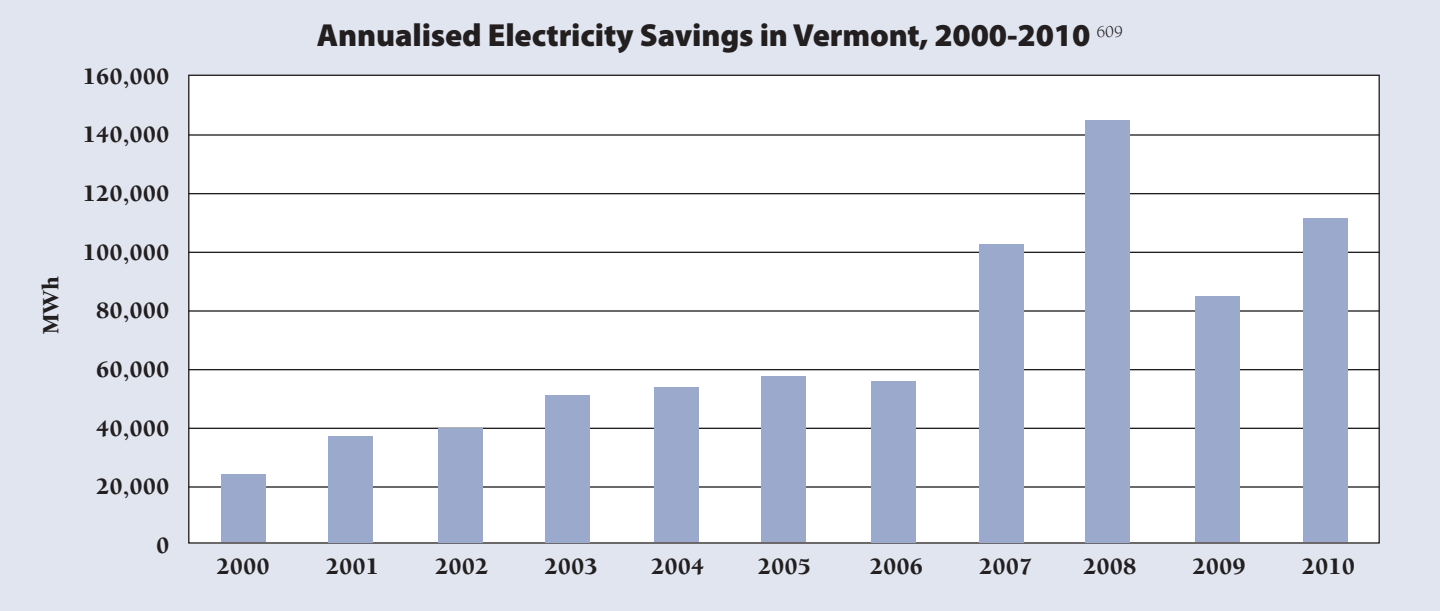
605 Efficiency Vermont, 2008

606 Parker, Hamilton, and Wickenden, 2008

607 Efficiency Vermont, 2009

608 Efficiency Vermont, 2012

Figure 12



3.19.16 Areas for Improvement

Some larger customers have expressed dissatisfaction with the energy efficiency utility. As of 2010, Vermont offered two programmes for self-management of energy efficiency by larger customers.

The Self-Managed Energy Efficiency Program is a three-year pilot that allows customers who paid an annual energy efficiency charge in excess of USD 1.5 million in 2008 to be exempt from the charge, provided that the customer commits to spending an annual average of no less than USD 1 million over a 3-year period on energy efficiency investments.[610]

The Energy Savings Account allows customers who pay an average annual energy efficiency charge of at least USD 5,000 to use 70 percent of their charge contribution to undertake their own energy efficiency investments. The remaining 30 percent of the customer's energy efficiency charge is used to support the energy efficiency utility's system-wide programmes.[611]

609 Efficiency Vermont, 2012

610 Enabled by 30 V.S.A. § 209(h) available at: http://psb.vermont.gov/sites/psb/files/ORDestablishSMEEP.pdf

611 Enabled by 30 V.S.A. § 209(d)(4) available at: http://psb.vermont.gov/sites/psb/files/ESA_Order.pdf

4. Best Practices In Energy Efficiency Obligations

The case studies of 19 EEO schemes in section 3 of this report (commencing on page 8) describe and explain how the EEO schemes actually operate by systematically classifying information about the schemes into categories that apply to all the schemes. Through a comparative analysis of this information, it is possible to identify best practices in designing and implementing an EEO scheme.

4.1 Policy Objectives

There are a variety of policy objectives in the EEO schemes, ranging from achievement of specified energy savings, through stimulating an energy services industry, to assisting disadvantaged households.

Policy objectives about achieving energy savings are clear in what they are trying to achieve and also focus on an area relevant to obligated energy providers, even though the providers may be wary of reducing energy sales through promoting energy efficiency. Objectives aimed at stimulating an energy services industry may also be effective and may encourage energy providers to include energy services in their business models, but should not distract from the main purpose of an EEO scheme to achieve energy savings. Objectives concerned with assisting disadvantaged households may be achieved through implementing energy saving activities in ways that more greatly benefit such households, (e.g., through targeted higher-than-normal rebates, more direct and fully funded investment, and so on).

Best Practice: Keep the policy objectives of the EEO scheme simple and clear, and focussed on achieving energy savings. If the scheme has multiple objectives, ensure that the achievement of any non-energy-related objectives does not hinder pursuit of the primary objective to achieve energy savings.

4.2 Legal Authority

The types of legal authority under which the EEO schemes are established and operate include:

- new single purpose enabling legislation;
- amendments to existing legislation;
- regulations made under existing or new legislation;
- rules made by Ministerial or administrative processes; and
- Ministerial or administrative determinations on individual matters.

Legislation removes any uncertainty about legal authority, and it states clearly that energy efficiency is a high value energy resource. Once legislation is passed, however, it is relatively inflexible and cumbersome to change. Changes may be required as experience is gained in implementing an EEO scheme.

Regulation uses existing legal authority so an EEO scheme may be established quickly. Scheme parameters may also be modified more easily in response to experience and changing conditions than under legislation.

Ministerial and administrative processes also have the advantage that scheme parameters can be easily changed, but they lack the force and standing of legislation.

Best Practice: Use a carefully selected combination of legislation, regulation, and Ministerial and administrative processes to establish and operate the EEO scheme.

4.3 Fuel Coverage

The majority of the EEO schemes cover networked energy, electricity, and natural gas. A few schemes cover other fuels such as LPG, heating oil, transport fuels, and district heating. The more fuels that are covered the greater the energy savings that will be achieved. Increasing

the number of fuels greatly increases the complexity of a scheme, particularly when a large number of small providers of some fuels, such as heating oil and transport fuels, are included. It is better to start by covering one or two fuels, particularly electricity and natural gas, and then expand to other fuels as experience is gained.

The decision on fuel coverage will depend on the overall policy objectives the scheme is designed to achieve. In addition, the choice of fuels to be covered should be made on the basis of estimates of energy efficiency potentials for the different fuels.

Best Practice: Decide the fuel coverage according to the overall policy objectives for the EEO scheme and estimates of energy efficiency potentials for the different fuels. Start by covering one or two fuels and then expand the scheme to other fuels as experience is gained.

4.4 Sector and Facility Coverage

Across all the EEO schemes, all economic sectors and all types of facilities are covered. Individual schemes vary greatly in the range of sectors and facilities they cover. Some schemes are restricted to achieving eligible energy savings in residential dwellings, whereas other schemes place no restrictions at all on the sector or type of facility in which eligible energy savings may be achieved.

In contrast to the question of fuel coverage, it is not necessarily the case that increasing the number of sectors and facilities covered increases the complexity of the scheme. One consequence of tightly restricting sector and facility coverage is that assessing compliance becomes more onerous.

The decision on sector and facility coverage will depend on the overall policy objectives the scheme is designed to achieve. In addition, the choice of sector and facilities to be covered should be made on the basis of estimates of energy efficiency potentials for the different fuels.

Best Practice: Decide the end-use sector and facility coverage of the EEO scheme according to the overall policy objectives for the scheme and estimates of energy efficiency potentials for the different sectors and facilities. If it is intended to tightly restrict sector and facility coverage, consider whether assessing compliance will become too onerous.

4.5 Energy Saving Target

There are several parameters involved in setting an energy saving target:

- the actual level of the target;
- whether the target will be set in terms of primary energy or final energy;
- the units that will be used for denominating the target;
- the timeframe over which the target will be in place;
- the time period over which eligible energy savings from energy efficiency measures will be calculated;
- if energy savings are calculated over the lifetime of an energy efficiency measure, how annual scheme targets will be set; and
- whether to set sub-targets and portfolio requirements that address particular policy objectives.

The EEO schemes covered in this report vary greatly in relation to how these various parameters are set:

- annual target levels generally vary from less than one percent of energy sales up to five percent or more of sales. The level should be set in the light of the overall policy objectives for the EEO scheme. The aim is to strike a balance between making progress and judging what is practically possible based on an assessment of energy efficiency potential;
- most schemes set targets in terms of final energy, but some use primary energy. Final energy is more closely related to the energy quantities delivered by energy providers and used by consumers, but primary energy accounts for the different conversion factors achieved in converting primary fuels to final energy sources (e.g., in converting coal or natural gas to electricity);
- most schemes use energy units to denominate the target, but some schemes with policy objectives that relate to GHG emissions reductions use CO_2-e units;
- in most schemes, the target will be in place for between 10 and 20 years. Setting a relatively long timeframe provides assurance to the obligated parties that costs involved in setting up systems and procedures to meet the target will be justified;
- some schemes calculate eligible energy savings over the first year after an energy efficiency measure has been implemented; other schemes calculate savings over an estimated lifetime for the measure. Selecting

first-year savings may favour low-cost, short-lifetime measures over more costly measures that save more energy over longer time periods and that may be more cost effective in the long run. Focussing on low-cost measures may also encourage projects that install only one measure in a facility rather than carrying out comprehensive energy efficiency retrofits that capture all available cost-effective energy savings;

- some schemes in which energy savings are calculated over the lifetime of an energy efficiency measure use energy savings from the measure that were accrued only in the target year ("annual savings"); other schemes use all energy savings from the measure accrued from the date when the measure was installed to the end of the target year ("cumulative savings"). The decision on which method to use has no effect on the actual energy savings claimed for the scheme—it actually only affects how the target and savings are expressed; and
- a few schemes set sub-targets and portfolio requirements in which the scheme has policy objectives that are not solely related to achieving energy savings.

Best Practice: Set the level of the energy saving target for the EEO scheme according to the overall policy objectives for the scheme and aim to strike a balance among making progress, the cost to consumers of meeting the target, and what is practically possible based on an assessment of energy efficiency potential. Set the target in terms of final energy (i.e., the quantities of energy delivered to, and used by, consumers), unless the scheme covers several different fuels, in which case use primary energy. Denominate the target in energy units unless the scheme has a policy objective that relates to GHG emissions reductions, in which case consider using CO_2-e units. Set a relatively long timeframe for the target, preferably between 10 and 20 years. Calculate eligible energy savings over the estimated lifetime for each energy efficiency measure. Consider setting sub-targets and portfolio requirements where the scheme has policy objectives that are not solely related to achieving energy savings.

4.6 Obligated Parties[612]

The obligated parties in the EEO schemes are determined mainly by each scheme's fuel coverage. The majority of the schemes place obligations on providers of networked energy, electricity, and natural gas. A few schemes place obligations on providers of other fuels, such as LPG, heating oil, transport fuels, and district heating.

The other parameter to be considered when deciding the obligated parties for a scheme is the type of energy provider to be obligated. Schemes in traditional regulated energy markets obligated vertically integrated energy utilities. In competitive electricity markets with unbundled energy providers, some schemes obligated energy retailers and others obligated energy distributors. Some schemes restricted the obligation to larger energy providers where small energy providers lacked the requisite systems, infrastructure, and capability to manage the delivery and/or procurement of eligible energy savings.

Almost all schemes allocated individual energy saving targets to each obligated party by dividing up each overall scheme target according to each obligated party's market share of energy sales in the jurisdiction. Some schemes implemented carve-outs for energy-intensive, trade exposed industries and/or other specified groups of end-users. In these cases, sales to these end-users were excluded from the calculation of market shares.

Best Practice: Determine the obligated parties in the EEO scheme according to the fuel coverage of the scheme and the type of energy provider that has the infrastructure and capability to manage the delivery and/or procurement of eligible energy savings. Consider restricting the obligation to larger energy providers. Allocate individual energy saving targets to each obligated party on the basis of that party's market share of energy sales. Consider whether to implement carve-outs for energy-intensive, trade-exposed industries and/or other specified groups of end-users.

612 This report considers only EEO schemes that place obligations on energy providers. However, other entities may also be considered as obligated parties. For a detailed discussion of the issues to be considered in determining the best obligated party for a EEO scheme see Neme, Gottstein and Hamilton (2012).

4.7 Compliance Regime

Most EEO schemes have a procedure for obligated parties to report claimed eligible energy savings to an appropriate authority (typically the Scheme Administrator) and a process for checking and verifying these savings. Some schemes impose penalties on obligated parties that failed to meet their individual energy saving targets, but some schemes do not impose a penalty.

Best Practice: As an integral component of the EEO scheme, establish a procedure for obligated parties to report claimed eligible energy savings to an appropriate authority and a process for checking and verifying these savings. Establish a penalty to be imposed on obligated parties that fail to meet their individual energy saving targets. Set the level of the penalty high enough to mobilise energy providers to meet their targets.

4.8 Performance Incentives

Some schemes include performance incentives awarded to obligated parties that exceed their energy saving targets and some schemes do not. Most of the schemes that include performance incentives are integral components of resource planning and acquisition by the obligated energy providers, and the performance incentives are the main drivers for energy providers to implement energy efficiency projects.

Best Practice: Consider whether to include performance incentives in the EEO scheme to be awarded to obligated parties that exceed their energy saving targets.

4.9 Eligible Energy Savings

Some schemes allow only obligated parties, and in some cases their contractors or agents, to implement energy efficiency projects to produce eligible energy savings that contribute to the scheme energy saving target. Other schemes enable non-obligated parties to implement projects. Enabling contractors and non-obligated parties to implement projects can stimulate the development of an energy services industry.

Some schemes require parties to be authorised or accredited before they are allowed to implement energy efficiency projects to produce eligible energy savings. Some schemes also require preapproval of individual projects, or even individual energy efficiency measures or products, before they can be implemented or installed to produce eligible energy savings. Other schemes have no restrictions on projects or measures. Requiring preapproval of energy efficiency projects and/or measures can significantly limit the energy saving activities that can be carried out in a scheme and, in particular, can prevent the implementation of comprehensive energy efficiency retrofits that capture all available cost-effective energy savings.

Best Practice: Enable non-obligated parties in the EEO scheme to implement energy efficiency projects to produce eligible energy savings. Do not place unnecessary restrictions on the energy efficiency projects or measures that can be implemented to produce eligible energy savings, provided that the energy savings can be verified.

4.10 Eligible Energy Efficiency Measures

The EEO schemes vary in how they determine the energy efficiency measures that will be eligible to produce energy savings. Some schemes establish a list of preapproved energy efficiency measures with deemed energy saving values. Deemed values can significantly reduce the transaction costs of implementing eligible energy efficiency measures. All EEO schemes that have lists of preapproved measures have established procedures for approving further energy saving measures and assigning them deemed values. Some schemes have also established procedures for calculating the energy savings from measures not on the approved list, or for calculating, on a case-by-case basis, the energy savings from complex energy efficiency projects that employ a range of energy efficiency measures.

Other schemes accept any energy efficiency measure and rely on procedures for calculating energy savings on a case-by-case basis.

Best Practice: Consider establishing in the EEO scheme a list of preapproved energy efficiency measures with deemed energy saving values, but do not limit the measures that can be implemented to produce eligible energy savings to only those on the list.

4.11 Measurement, Verification, and Reporting

All the EEO schemes have established systems for measuring, verifying, and reporting energy savings and other activities that contribute to scheme targets. Some

schemes use ex ante deemed energy saving values to reduce transaction costs. Other schemes use ex post engineering estimates adjusted for site conditions to estimate energy savings on a case-by-case basis.

Most schemes carry out audits on energy efficiency projects; in some schemes these audits are carried out on a random basis to achieve cost-effective verification.

None of the schemes have established robust procedures to verify whether energy savings are additional (i.e., energy savings that would not otherwise have occurred).

Best Practice: As an integral component of the EEO scheme, establish a robust system for measuring, verifying, and reporting energy savings and other activities that contribute to scheme targets. Consider whether to also establish procedures to verify whether energy savings are additional to what would have happened in the absence of the EEO scheme.

4.12 Trading of Energy Savings

Some of the EEO schemes allow trading of energy savings, some among obligated parties only, and others among obligated parties and third parties. The purpose of trading is to broaden the pool of opportunities to produce eligible energy savings and to enable market forces to identify the most cost-effective opportunities.

In most schemes that allow trading, the Scheme Administrator does not provide a trading platform. Some EEO schemes require disclosure of prices, whereas in other schemes price disclosure is voluntary. In some schemes, trading is carried out through the creation and sale of energy efficiency certificates. In other schemes trading of energy savings can be carried out bilaterally without the necessity to create energy efficiency certificates.

Best Practice: Consider enabling trading of energy savings among both obligated parties and third parties.

4.13 Funding

The EEO schemes vary in how the costs incurred by obligated parties in meeting their individual energy saving targets are recovered, and who pays them.

In schemes where regulated energy providers are the obligated parties, regulators have usually established regulatory mechanisms to enable energy providers to recover their costs, and sometimes also to provide compensation for reduced energy sales.

In schemes in competitive energy markets, cost recovery is achieved either by the government making direct budgetary appropriation, or through price surcharges on regulated "wires and pipes" energy providers. Alternatively, in some schemes the costs incurred in meeting energy saving targets are treated as a cost of doing business, and obligated energy providers adjust their prices to recover these costs.

Best Practice: Establish an appropriate mechanism in the EEO scheme to enable recovery of the costs incurred by obligated parties in meeting their individual energy saving targets.

5. Conclusion

This report includes detailed case studies of 19 different EEO schemes implemented in a range of jurisdictions around the world. The report identifies three broad types of schemes from Australia/Europe, North America, and Asia. Each of the three types of schemes is the product of quite different ways of thinking about how to use energy providers to deliver energy efficiency.

For the first time, information about the three different types of schemes has been systematically classified into categories that apply to all the schemes. Through a comparative analysis of this information, the report identifies best practices in designing and implementing an EEO scheme. Adopting these best practices in designing and implementing new schemes, and updating existing ones, should improve the effectiveness of the schemes in delivering cost-effective energy efficiency.

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Appendix: Comparison of Key Design Parameters Among Energy Efficiency Obligation Schemes

Design Parameter	Australia – New South Wales	Australia – South Australia	Australia – Victoria
Policy Objectives	Reduce electricity consumption and costs; complement a national emissions trading scheme; reduce cost of additional generation and network capacity	Improve residential energy efficiency and reduce GHG emissions Assist households to prepare for energy price increases Reduce energy costs for households	Reduce GHG emissions; encourage the efficient use of electricity and gas; encourage investment, employment, and technology development in energy services
Legal Authority	Combination of legislation and regulation	Combination of legislation, regulation, and ministerial determinations	Combination of legislation and regulation
Fuel Coverage	Electricity	Electricity and natural gas	Electricity and natural gas
Sector and Facility Coverage	Residential, commercial, and industrial sectors; all facilities	Residential dwellings	Residential dwellings and commercial and other non-residential premises
Energy Saving Target	0.4% of total electricity sales in 2009, increasing to 4.0% in 2014	Set levels of annual tCO_2-e reductions increasing each year	2.4 $MtCO_2$-e per annum from 2009 to 2011; 5.4 $MtCO_2$-e per annum from 2012 to 2014
Sub-targets and Portfolio Requirements	None	Set number of energy audits in low-income households	None
Obligated Parties	Electricity retailers; electricity generators that supply customers directly; and customers who purchase electricity directly from the wholesale market	Licensed energy retailers with 5,000 or more electricity or natural gas residential customers in South Australia	Electricity and gas retailers with 5,000 or more customers in Victoria and who purchase electricity or gas from specified sources
Compliance Regime	Surrender of energy efficiency certificates	Undertake activities to meet emissions reduction and energy audit targets	Surrender of energy efficiency certificates
Penalty	AUD 24.86 per tCO_2-e shortfall in 2012, adjusted annually for inflation	AUD 70 per tCO_2-e shortfall; AUD 500 per energy audit shortfall	AUD 40 per tCO_2-e shortfall in 2010, adjusted annually for inflation
Performance Incentives	None	None	None
Eligible Energy Savings	Energy savings from preapproved energy efficiency projects; accredited non-obligated parties may implement energy efficiency projects	Energy savings from energy efficiency activities undertaken by, or on behalf of, obligated energy retailers	Energy savings from installing preapproved energy efficiency products; accredited non obligated parties may install products
Eligible Energy Efficiency Measures	Preapproved measures with deemed energy saving values, plus methodologies to assess other measures on a case-by-case basis	Preapproved measures with deemed energy saving values, additional measures added from time to time	Preapproved products with deemed energy saving values, additional products added from time to time
Measurement, Verification, and Reporting	Random audits of energy efficiency projects	Audits of retailers' operations re compliance with REES obligations	Audits of records of product installations
Trading of Energy Savings	Trading of energy efficiency certificates	Limited transfer of credits among obligated parties	Trading of energy efficiency certificates
Funding	Obligated parties' costs are treated as a cost of doing business	Per-customer amount included in regulated price determination	Obligated parties' costs are treated as a cost of doing business

Design Parameter	Belgium – Flanders	Canada – Ontario	China
Policy Objectives	To encourage efficient use of energy in a liberalised market	To promote and expand energy efficiency in Ontario	To prioritise DSM in tight supply situations
Legal Authority	Legislation	Combination of legislation and regulation	Regulation issued by central government agency
Fuel Coverage	Electricity	Electricity	Electricity
Sector and Facility Coverage	Household and non-energy-intensive industry and service sectors	Residential, commercial, industrial, institutional, and low-income customers	All economic sectors and any facility including transmission and distribution networks
Energy Saving Target	From 2012, the energy saving target has been replaced with specific "action obligations"	1,330-MW reduction in peak demand by 2014 and 6,000 GWh of energy savings by 2014	Savings of 0.3% of electricity sales and load reduction of 0.3% of maximum load in the previous year
Sub-targets and Portfolio Requirements	None	Distributors assigned targets proportional to share of provincial peak demand and annual electricity consumption	Load-monitoring equipment on 70% of peak load and load-control equipment of 10% of peak load
Obligated Parties	Electricity distributors	Electricity distributors	Government-owned grid companies
Compliance Regime	Compliance with the action obligations is based on evaluation of annual reports prepared by electricity distributors	Electricity distributors must file for approval a strategy that describes how the distributor intends to achieve its targets	Score a minimum of 70 points in a system that uses quantitative and qualitative measures to score performance from 0 to 100 points
Penalty	EUR 0.1 per kWh of shortfall	None	None
Performance Incentives	None	Allowed on a sliding scale between 80 and 140% of goal achievement	Available pending a result of "Excellent" (90 points or higher); no further details available
Eligible Energy Savings	Savings from energy efficiency actions implemented by obligated electricity distributors	Savings achieved through distributor's own programmes, or through contracted government programme	Savings achieved by grid companies and energy service company subsidiaries of grid companies
Eligible Energy Efficiency Measures	Measures specified or approved by central government agency	Government-run programmes or programmes approved by the regulator in the distributor's service territory	Measures not specified; energy savings from other fuel types may be converted into electricity saving
Measurement, Verification, and Reporting	Preapproval of energy efficiency programmes and calculation methods for energy savings; only first-year savings credited	Distributor programmes must be evaluated by a third party; the regulator must publish result annually	100% of savings can only be claimed if audited by third party or recorded by equipment
Trading of Energy Savings	No	No	Obligated parties may purchase savings from customers and ESCOs under bilateral contracts
Funding	Regulator approves cost recovery through tariffs	Collected from all ratepayers based on energy use or contribution to peak demand	City utility surcharge, revenue from differential electricity prices, and other funding sources

Design Parameter	Denmark	France	Italy
Policy Objectives	To decrease total energy consumption by 2% in 2012 and 4% in 2020	To realise the available potential of energy efficiency in France	To serve as the primary driver for end-use energy efficiency
Legal Authority	Voluntary agreements by obligated parties within a legislative framework	Combination of legislation and regulation	Combination of legislation and Ministerial Decrees
Fuel Coverage	Electricity, natural gas, district heating; and heating oil	All fuels, including district heating and cooling and transport fuels	Electricity and natural gas
Sector and Facility Coverage	Residential, public, private business, and energy-intensive industry end-users	Residential and commercial buildings, manufacturing industries, networked industries, transport, and agriculture	All sectors including transport, and all end-uses including small-scale co-generation and photovoltaics
Energy Saving Target	2.95 PJ for 2006-2009 (0.7% of consumption); 6.1 PJ for 2010-2012 (1.2% of consumption)	54 TWh cumac for July 2006 to June 2009; 345 TWh cumac for January 2011 to December 2013	2.2 Mtoe cumulative in 2008; increasing to 6.0 Mtoe cumulative in 2012
Sub-targets and Portfolio Requirements	None	90 TWh cumac for transport fuels	None
Obligated Parties	Distributors of electricity, natural gas, district heating, and heating oil	Energy retailers that sell the covered fuels to end consumers	Distributors of electricity and natural gas
Compliance Regime	Energy savings must be well documented and they must be verifiable by an independent party	Surrender of energy efficiency certificates; banking is allowed for up to nine years	Surrender of energy efficiency certificates; one-year grace period before penalty is assessed if at least 60% of target is met
Penalty	EUR 0.1 per kWh of shortfall; possibility for distributor to lose license	EUR 0.02/kWh lifetime final energy shortfall	EUR 25,000 to 155 million assessed on case-by-case basis
Performance Incentives	Weighting factors for longer lifetime energy efficiency measures	None	Possible 5% premium over achieved savings
Eligible Energy Savings	Distributors must engage third parties to achieve energy savings within own or any other energy type except for transport	Savings can be produced by obligated parties, local authorities, and social housing landlords	Savings can be produced by obligated distributors and accredited energy service providers
Eligible Energy Efficiency Measures	Many types, including energy audits, targeted information, subsidies for efficient appliances and equipment; also small scale renewables	Standardised and non-standardised measures plus contributions to programmes targeting fuel poverty, education, or innovation	Preapproved list of measures with deemed energy saving values plus other measures assessed on a case-by-case basis
Measurement, Verification, and Reporting	Distributors verify and report savings; can be calculated or deemed savings	Deemed savings for standardised measures; regulatory approval required for others	Deemed savings, partial on-field measurement, or measures subject to preapproval
Trading of Energy Savings	Energy savings may only be traded among obligated energy distributors	Over-the-counter trading of energy efficiency certificates	Trade of energy efficiency certificates through over-the-counter market or spot market
Funding	Cost recovery through tariffs	Cost recovery through tariffs is possible but has yet to be allowed	Fixed contribution to cost recovery through a tariff contribution; transport measures not eligible for cost recovery

Design Parameter	Korea	Poland	United Kingdom
Policy Objectives	Improve efficiency in production, conversion, transport, storage, and utilisation of energy	Drive energy efficiency in the public sector	Reduce fuel bills and the carbon impact of homes by improving energy efficiency
Legal Authority	Combination of law and regulation	Combination of law and regulation	Legislation and statutory instruments
Fuel Coverage	Electricity, natural gas, and district heat	Electricity, natural gas, and district heat	Electricity and natural gas
Sector and Facility Coverage	Commercial, industrial, educational, and residential customers	End-use sectors; energy savings in obligated parties' own activities; reductions in grid losses	Residential dwellings including those of low-income households and disadvantaged groups
Energy Saving Target	None	53,452 GWh by 2016	Lifetime savings of 293 $MtCO_2$-e for 2008 to 2012 and 19.25 $MtCO_2$-e for 2009 to 2012
Sub-targets and Portfolio Requirements	None	80% of energy efficiency certificates are to be issued for end-use measures	40% of the target must be met with savings in households with low-income and/or elderly people
Obligated Parties	Energy utilities	Electricity, natural gas, and district heating companies and brokers	Electricity and natural gas retailers and certain electricity generators
Compliance Regime	Energy utilities must submit a DSM plan and report the results to a government agency	Surrender of energy efficiency certificates	Determined by the regulator based on the final measurement of carbon reductions achieved by each obligated party
Penalty	None	Up to EUR 2 million for non-compliance	Penalty may be imposed for non-compliance
Performance Incentives	None	None	Uplifts that increase the carbon reductions claimable for certain measures
Eligible Energy Savings	Savings from energy efficiency projects implemented by energy utilities, ESCOs, and energy efficient equipment vendors	Savings achieved through energy efficiency projects selected through annual auctions	Savings from energy efficiency projects implemented by obligated parties or by contractors engaged by the obligated parties
Eligible Energy Efficiency Measures	No preapproval required; energy efficiency improvements or load management measures	Measures specified or approved by a government ministry	Energy efficiency measures implemented in residential dwellings
Measurement, Verification, and Reporting	Verification of actual energy savings by an independent third party	Projects exceeding 100 toe of savings must be verified through an audit	Deemed savings or calculated savings approved by the regulator
Trading of Energy Savings	None	Energy efficiency certificates are fully tradable on the Polish Power Exchange	Transfers of emissions reductions and trading of obligations allowed among obligated parties
Funding	Through a customer charge for electricity and from energy utility revenues for gas and district heating	Costs are passed through to consumers via tariffs for electricity, heat, and natural gas	Costs are considered a cost of doing business and are passed on to the customer through increased prices

Design Parameter	United States – California	United States – Connecticut	United States – Massachusetts
Policy Objectives	Obtain 100% of cost-effective energy efficiency and reduce total consumption by ten percent within ten years	Acquire all cost-effective energy efficiency	Acquire all available energy efficiency and demand reduction resources
Legal Authority	Combination of legislation and regulation	Combination of legislation and regulation	Combination of legislation and regulation
Fuel Coverage	Electricity and natural gas	Electricity, natural gas, propane, and heating oil	Electricity and natural gas
Sector and Facility Coverage	New construction; heating, ventilation, and air conditioning; and low-income customers	All customer classes in all sectors, including low-income customers	All customer classes in all sectors, including low-income customers
Energy Saving Target	6,965 GWh (0.9% of sales), 1537 MW, and 150 million therms in 2010-2012 for investor-owned utilities; 700,000 MWh for publicly owned utilities	Energy saving targets for each obligated party are specified in annual Conservation and Load Management Plans approved by the energy regulator	1.4% of retail electricity sales in 2010, 2% in 2011, and 2.4% in 2012; 0.6% of retail gas sales in 2010, 0.9% in 2011, and 1.15% in 2012
Sub-targets and Portfolio Requirements	None	None	Minimum spend on low-income residential customers of 10% of budget for electricity and 20% for gas
Obligated Parties	Investor-owned and publicly owned electricity and natural gas utilities	Electricity distributors, municipal utilities, and natural gas utilities	Electricity and gas distributors and municipal aggregators
Compliance Regime	Obligated utilities implement approved energy efficiency programmes and report the results	Obligated parties must prepare and implement annual plans detailing energy saving targets and programmes	Obligated utilities must jointly file a three-year statewide energy efficiency plan; regulator determines compliance
Penalty	Yes, if achievement is below 65% of target	None	USD 0.05/kWh or USD 1 per therm shortfall
Performance Incentives	Starting at achieving 80% of the target and capped at USD 450 million for investor-owned utilities	For achievement of between 70 and 130% of targets; based on program expenditures	For achievement of between 75 and 125% of targets; based on program net benefits
Eligible Energy Savings	Savings from programmes implemented by the utilities themselves or by contractors	Savings produced by obligated parties through implementing approved annual plans	Savings produced by obligated parties through implementing approved three-year plans
Eligible Energy Efficiency Measures	Measures included in 12 statewide energy efficiency programmes	Measures included in annual plans approved by the regulator	Measures included in three-year plans approved by the regulator
Measurement, Verification, and Reporting	Rigorous protocol carried out by third-party contractors	Deemed energy saving values and engineering calculations	Utilities are responsible for evaluation, measurement, and verification
Trading of Energy Savings	None	Obligated parties may purchase energy efficiency certificates from third parties	None
Funding	Public goods charge and natural gas DSM charge; additional funding through rate cases	System benefits charges, funding from carbon and capacity markets, plus other funding sources	System benefits charges, funding from carbon and capacity markets, plus other funding sources

Design Parameter	United States – Minnesota	United States – New York	United States – Texas
Policy Objectives	Reduce per capita use of fossil fuel by 15% by 2015	A reduction in electricity use of 15% by 2015 and end-uses of gas to be as efficient as possible	Reduce system peak demand, energy consumption, and energy costs
Legal Authority	Combination of legislation and regulation	Regulation	Combination of legislation and regulation
Fuel Coverage	Electricity and natural gas	Electricity and natural gas	Electricity
Sector and Facility Coverage	All end-use sectors and all facilities; large customer facilities may petition for exemption	All end-use sectors and all facilities	All facilities and all customers in the residential and commercial sectors
Energy Saving Target	1.5% of retails sales for both electricity and natural gas	0.5% electricity savings in 2008 increasing by 2% each year through by 2015; 4.34 Bcf annual natural gas savings through 2011, and 3.45 Bcf after 2011	15% of load growth by 2008, 20% by 2009, 25% by 2012, and 30% by 2013
Sub-targets and Portfolio Requirements	None	None	5% of energy savings must be to "hard-to-reach" customers
Obligated Parties	Electricity and natural gas utilities	Investor-owned electricity and natural gas utilities and government energy efficiency agency	All investor-owned electricity utilities plus large municipally owned electricity utilities
Compliance Regime	Utilities implement energy efficiency programmes included in a plan filed with the regulator	Obligated parties prepare reports on energy efficiency performance for the regulator	Obligated utilities must file an annual energy efficiency plan and report with the regulator
Penalty	None	For utilities achieving 70% or less of energy saving target	None
Performance Incentives	Increasing proportion of net system benefits when achieved energy savings exceed 90% of target	Increased return on equity for utilities achieving 80% or more of energy saving target	One percent of program benefits for every two percentage points that utilities exceed their targets
Eligible Energy Savings	Savings from programmes delivered by the utilities or by contractors	Savings from energy efficiency programmes implemented by any party that can substantiate savings	Savings produced in energy efficiency programmes implemented by third party energy efficiency providers
Eligible Energy Efficiency Measures	Preapproved list of measures with deemed energy saving values plus other measures assessed case by case	Measures for residential, multifamily, low-income, commercial, and industrial customers must be preapproved	Measures in standard offer and market transformation programmes defined by the regulator
Measurement, Verification, and Reporting	Deemed savings or by using a measurement and verification protocol, plus third-party certification for larger projects	Obligated parties prepare measurement and verification plan for each program for approval by the regulator	Obligated utilities are responsible for establishing measurement and verification protocols for standard offer programmes
Trading of Energy Savings	None	None	None
Funding	Energy efficiency cost-recovery charge determined in rate cases	System benefits charges, and funding from carbon market	Obligated utilities recover program costs through base rates or cost recovery tariffs

Design Parameter	United States – Vermont
Policy Objectives	Reduce the need for power purchases, reduce GHG emissions, minimise costs, and provide energy efficiency as part of a comprehensive resource supply strategy
Legal Authority	Combination of legislation and regulation
Fuel Coverage	Electricity
Sector and Facility Coverage	Residential, commercial and industrial sectors; facilities covered must include new construction, low-income households, and dairy farms
Energy Saving Target	320,000 MWh energy savings for 2012-2014; 60.8 MW summer peak reduction
Sub-targets and Portfolio Requirements	Demand reductions targeted to transmission-constrained areas
Obligated Parties	Regulated electricity distribution utilities, with the obligation satisfied for most utilities by energy efficiency programmes delivered by an energy efficiency utility
Compliance Regime	Regulator executes contracts with the energy efficiency utility for specified amounts of energy savings and demand reductions
Penalty	None
Performance Incentives	Administrator of the energy efficiency utility can earn up to 2.7% of the total three-year budget
Eligible Energy Savings	Savings produced by the energy efficiency utility through delivering energy efficiency services
Eligible Energy Efficiency Measures	Measures in energy efficiency programmes approved by the regulator
Measurement, Verification, and Reporting	Deemed energy savings verified by third parties
Trading of Energy Savings	None
Funding	Volumetric wires charge to customers and funding from carbon market

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors. We provide technical and policy assistance on regulatory and market policies that promote economic efficiency, environmental protection, system reliability and the fair allocation of system benefits among consumers. We have worked extensively in the US since 1992 and in China since 1999. We added programs and offices in the European Union in 2009 and plan to offer similar services in India in the near future.
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