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Saving Energy in Europe: 15 Good Practice Case Studies

CLIMATE AND ENERGY

EUROPE'S LARGEST FEDERATION OF
ENVIRONMENTAL CITIZENS' ORGANISATIONS

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The European Environmental Bureau (EEB) is a federation of over 140 environmental citizens' organisations based in most EU Member States, most candidate and potential candidate countries as well as in a few neighbouring countries. These organisations range from local and national, to European and international.

EEB's aim is to protect and improve the environment by influencing EU policy, promoting sustainable development objectives and ensuring that Europe's citizens can play a part in achieving these goals. EEB stands for environmental justice and participatory democracy. Our office in Brussels was established in 1974 to provide a focal point for our members to monitor and respond to the EU's emerging environmental policy.

EUROPEAN
ENVIRONMENTAL
BUREAU

CONCEPT/DESIGN/PRODUCTION

Contents

Introduction

Over the years, the European Union has introduced a number of directives, regulations and initiatives to encourage and support Member States, regional authorities, individuals and so on to increase energy efficiency in the different sectors, including buildings, transport and products. The span of policies, have yet to change our combined thinking, capacity and ambition to capture significant savings. Although everyone agrees with the importance of saving energy, it has enjoyed little high level political attention and as such we are a long way from achieving the indicative 20% energy savings target by 2020. Analysis shows that we will miss the primary energy saving target by about half[1]. This lack of progress means we are missing out on significant benefits – benefits we cannot afford to miss including potential cost savings of up to €78 billion annually by 2020; a million new local, permanent jobs; and improved security of supply and greater economic competitiveness. Since energy saving offers the easiest and cheapest solutions to reducing emissions, meeting our energy savings target will be essential to fulfil our climate objectives. In so doing, and combined with other policy measures, a target of 40% would be all the more possible. Only in this way can the EU sufficiently contribute to the overarching objective of limiting global warming to well below 2°C, and preferably below 1.5°C.

We too often hear of the challenges to energy saving where we are told of the many reasons why energy saving is so difficult to achieve, yet the schemes presented here tell a different story. Across all sectors and constituents, industry, businesses, domestic consumers, policy makers and community leaders alike have managed to penetrate the barriers, bringing the benefits of saving energy to many. While a large number of leading good practices exist, the beauty and simplicity of the schemes and their potential are not widely known or explored. As a consequence we fail to learn from them or promote them sufficiently. The EEB has compiled here a great showcase that will hopefully inspire similar projects all over Europe. If we are to achieve our energy saving goals and reap the benefits they offer we can no longer afford to see these good practice schemes as isolated cases, as the 'select exemplary few'. Instead they should be replicated, expanded, developed and deepened so that these approaches become the norm, every day practice - not the alternative.

However, if we are to see a 'joining of the dots' we need a clear and determined increase in ambition and urgency. For this we look to the European Commission and Member States for political leadership at the highest level of intervention. We can no longer afford the complacency that energy savings will happen on their own. Developing the right, stable conditions to provide certainty to investors and risk avoidance for third party finance will help to build effective schemes elsewhere. An appealing programme for long term investment will help to reward those practices that deliver the greatest savings, given that they often incur longer pay back periods. If we are to see schemes develop on the necessary scale, delivery tools, such as a trained, professional workforce and reliable, easy to find, independent advice will need to be invested in. As the renewable energy target has done for the renewable energy industry, we would expect that a binding energy savings target would open up a thriving, competitive energy savings market; a market that turns the traditional business model on its head. From now on, business can and should be made in saving energy.

This booklet is for EU and national policy makers, NGOs (including EEB member groups) and associations who are interested in increasing the efficient use of energy. By bringing this list together, we want to demonstrate how energy saving incentives/schemes introduced at different levels (state, borough, city etc.) can result in reduced energy use. We hope you will find it a useful source for ideas and recommendations. For further details and elaboration on any of the issues we touch upon, please contact us at the European Environmental Bureau or use the information we provide on each scheme. We hope that you will be inspired, as we have been, by these exemplary projects.

[1] Energy Efficiency Plan 2011 (COM(2011) 109/4)

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Campaign Information

The European Environmental Bureau is working with a number of member groups in our network on a targeted campaign to reduce energy use across the EU, funded by the European Climate Foundation. This campaign in particular follows existing and proposed legislation as essential tools to drive ambition and real action, recognising the huge potential of savings to be made with concrete targets and policies. We work with member groups to co-ordinate informed lobbying at the Brussels and national level. Please refer to the EEB website energy pages for further information on our work in this area.

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Methodology

From the outset of this project, we were keen to highlight a small selection of impressive and outstanding examples of good practices, with the broader assessment of how they could work elsewhere. We looked for projects that resulted in extensive energy savings, greenhouse gas emission reductions and return on investment. We did not define how extensive the energy saving, reduction in CO_2 emissions and return on investment had to be, however we made sure these were appropriate and not negligible. Some projects which have not delivered significant savings were chosen due to their potential. Thus, the list we have compiled will not refer to all 'good practice' examples and this is by no means an exhaustive compilation. Furthermore, the question of what makes these 'best' in the field is not fully answered. These are however exemplary and commendable projects. Each project description was divided into:

1) Aims and Objectives
2) Implementation Timeframe
3) How it Works
4) Results
5) Lessons Learned

The 'Aims and Objectives' define the purpose for each scheme or project. The 'Implementation Timeframe' states the beginning, duration and end of the project.

'How it Works' goes into the details of how the scheme or project was implemented and the costs involved. In the 'Results' section, we present the achievements, most often in terms of energy or money saved and CO_2 emission reductions. Most of the projects used different data categories and measurements to present their results, and some key data was unavailable, making meaningful assessments and comparisons of the schemes impossible.

'Lessons Learned' offers our assessment of the potential for the scheme and important recommendations for the future, such as government intervention to help successfully implement and deliver other schemes like this. It must be pointed out that the 'Lessons Learned' are our interpretations and do not necessarily correspond to the opinions of the people or organisations involved in the projects.

In most cases the project text was consulted with those involved to make sure that the text was accurate and relevant, and for permission to publish it.

1) Financing and Delivery of Energy Saving Measures

A) KfW, Germany

Aims and Objectives

KfW (Kreditanstalt für Wiederaufbau) is a promotional bank in the Federal Republic of Germany which supports change and encourages forward-looking ideas in Germany, Europe and throughout the world.

Implementation Timeframe

KfW began promoting energy efficiency in housing in the early 90s and launched in 1993, along with the CO_2 reduction programme, the first programme strictly focussed on energy efficiency. The CO_2 rehabilitation programme (today renamed to energy-efficient construction and rehabilitation) started in 2001 and is sponsored by the federal Government.[2]

How it Works

The KfW Financing Programmes for energy efficiency support a financial framework for investments targeted especially at residential buildings. The investors are given long term, low interest loans supported with professional, independent advice. The loans have fixed interest rates ranging over 10 years with repayment starting after two years. The loans can amount up to €75,000. In addition to the reduction in CO_2 emissions, KfW's financing schemes provides thousands of jobs, mainly in the construction industry. Once successful, the loan applicant has to inform KfW about the use of the funds according to the programme conditions. This programme has contributed significantly to help meet the climate goals of Germany.[3]

Results

The loans granted by KfW in 2008 to German entities for the financing of energy efficiency investments in residential buildings added up to €6,343 million. This initiated an annual reduction of greenhouse gas emissions amounting to 837,000 tonnes of CO_2 emissions. In 2009 the loans given to finance energy efficiency investments in residential buildings amounted to €8,864 million and resulted in annual greenhouse gas emission savings of 1,175,000 tonnes of CO_2 emissions. In 2010 the loans amounted to €8,746 million and resulted in annual greenhouse gas emission savings of 1,049,000 tonnes of CO_2 emissions. Further effects were achieved by KfW financing measures for energy efficiency investments in firms and municipalities.[4]

Category

Financial and delivery of energy saving measures

Country

Germany

Implementation timeframe

The CO_2 reduction programme launched in 1993. The CO_2 rehabilitation programme (today renamed to energy-efficient construction and rehabilitation) started in 2001

Loans granted in 2008

€ 6,343 million

Reduction of greenhouse gas emissions in 2008

837,000 tonnes

Loans granted in 2009

€ 8,864 million

Reduction of greenhouse gas emissions in 2009

1,175,000 tonnes

Loans granted in 2010

€ 8,746 million

Reduction of greenhouse gas emissions in 2010

1,049,000 tonnes

For more information

www.kfw.de

[2] Lang F. (KfW Bankengruppe) 2011
[3] Ibid
[4] Ibid

Lessons Learned

KfW's schemes show that when supported by expert advice and low interest loans, people are more likely to invest in energy efficiency improvements in their homes. The concept of combining access to loans with access to impartial, professional advice via one agency helps to simplify an often complex and overwhelming process. A history of poor and unreliable services and unaccredited agencies delivering below par improvements has done little to build trust for the householder. With good promotion these loan schemes can start a 'wave' of energy saving investments that can also help businesses and create jobs. National Energy Efficiency Funds could provide an essential role in developing packages that can help leverage private capital for energy saving projects. They could act as one stop shops for service providers and customers, to identify, direct and access finance for energy saving in a transparent and quality controlled manner.

B) Sweden's Carbon Tax

Category

Financing and delivery of energy saving measures

Country

Sweden

Implementation timeframe

1991-

Reduction in greenhouse gas emissions 1991-2009

9%

Economic growth 1991-2009

48%

Aims and Objectives

The carbon tax was introduced in Sweden to encourage more efficient and less use of fossil fuels and to lead to increased use of renewable energy.

Implementation Timeframe

Introduced in 1991, it is ongoing.

How it Works

The carbon tax is based on the principle of making prices work for the environment. Using economic incentives is one of the most effective ways to reduce greenhouse gas emissions and to encourage consumers to use limited resources more efficiently. Swedes pay an extra 2.34 kronor (€0.26) per litre when they fill the vehicles.[5] At its launch in 1991, the tax was assessed at €27 per tonne of CO_2. Key industries receive tax relief or are exempted. The tax is easy to administer, and was introduced with the broad acceptance of the public, stakeholders and all political parties.[6]

Results

Since the tax was introduced in Sweden greenhouse gas emissions have dropped by 9% while the economy has grown rapidly by 48%.[7] The tax resulted in non energy intensive industries such as the services sector to favour investment in Sweden. Between 1990 and 2005 CO2 emissions in transport saw a reduction of between 1.5 and 3.2 million metric tonnes. Today, the Swedes have the lowest CO_2 per capita in Europe, with 6.7 metric tonnes p.a. against the EU average of 9.3 tonnes.[8] Fuels from 'renewable' sources such as ethanol, methane, biofuels, peat and waste have been exempted, and as a result the tax led to increased reliance of biomass for heating and industry. In 2010 Andreas Carlgren, the Swedish Environment Minister, stated that the carbon emissions would have been 20% higher without the carbon tax.[9]

Lessons Learned

The Europe 2020 Strategy supports a shift in tax burden from labour to energy and environmental taxes, and calls for a coordinated EU-wide move in this direction. As we have seen in Sweden, introducing a carbon tax over a few years can help to influence consumer behaviour through incorporating the true costs of energy and fuels, therefore reducing energy consumption and making a shift to renewables. Attention would need to be given to certain fuels, since for example peat is not renewable and biofuels are not always CO_2 neutral and exemptions should be kept to a minimum. Design and implementation are key to ensure the scheme and its motivations are well understood by consumers and that measures are having the desired environmental impact.

[5] Gwladys F. 2010
[6] Le Monde 2009
[7] Ibid
[8] Ibid
[9] Gwladys F. 2010

The revenue could be re-invested into energy savings, public transport and other abatement measures. Carbon taxes also exist in Finland, Denmark, Ireland, Norway, Switzerland and in the form of a general fuel tax in the Netherlands. Energy saving interventions in households could also be deductible from taxes, for example reduced VAT, in order to encourage household owners to take on additional steps. A carbon tax should be supported by an energy tax on the energy content of each fuel, as is the case with the proposal to revise the Energy Tax Directive[10].

[10] European Commission, COM(2011) 169/3

A) Warm Front Scheme, England

Category

Financial Initiatives for Buildings

Country

England

Implementation timeframe

2000 – December 2010; reopened 14th April 2011

Number of households affected

233,594

Tonnes of CO_2 p.a reduced

6.6 to 5.2

For more information

www.warmfront.co.uk

Aims and Objectives

This Government scheme is targeted at combating fuel poverty in the privately owned and rented property sector in England. It aims to make homes warmer, healthier and more energy efficient. The scheme consists of a grant developed as part of the UK's Fuel Poverty Strategy (published in November 2001) through which up to £3,500 (€4107) is given per applicant for housing improvements related to insulation and heating.[11]

Implementation Timeframe

The scheme started in 2000 and ran until December 2010 when it was suspended. It reopened on 14 April 2011.

How it Works

The householder has first to apply for a grant. To be eligible to apply the applicant has to have a privately owned home or a rented household from a private landlord. The applicant also has to be over 60 and in receipt of certain state benefits or have a child under 16 or in receipt of state benefits. After applying, a technical surveyor/assessor visits the household and assesses the condition of the boiler, central heating and insulation systems. The householders select from a list of local registered installers accredited under the scheme for the improvement works to be carried out. The scheme is funded by the Government and managed through Eaga, an outsourcing company, which regularly checks that the installations (boilers, insulation etc.) are of the required quality.[12]

Results

In terms of energy efficiency the results have been exceptional and on average in 2008/2009 each household saved between 5.2 and 6.6 tonnes of CO_2 per year. Since the start of the scheme 1,950,437 households have been improved. In 12 months alone, between 2008 and 2009, 233,594 households received help from the scheme. Each of these households has the potential of saving £362.23 (€425.07) in energy bills each year. The maximum amount of money saved by one household has topped £700 (€821) per year. Calculating all the yearly savings, an estimate of around 3611kWh savings per household can be saved each year for the coming 20 years. 86% of the customers have been very satisfied with the scheme.[13]

[11] Klinckenberg Consultants for EuroACE 2010
[12] Ibid
[13] Ibid

Lessons Learned

A study by EuroAce[14] reveals that schemes delivered by agencies other than central governments can be equally effective. In Europe an estimated 50 to 125 million people might be suffering from energy poverty.[15] The Warm Front Scheme shows that grants for energy efficiency improvements in housing can bring relief to residents who are energy poor.

However, the criteria for eligibility in the scheme have been shown to exclude some who are in fuel poverty.[16] Therefore for future schemes the criteria of participation should be considered very carefully. In order to overcome this, and to help alleviate and eradicate fuel poverty, EU funding directed to energy efficiency schemes in Member States should contain a clause to encourage part of that funding to be targeted at renovations in homes of the fuel poor. The Energy Efficiency Plan (2011) Impact Assessment[17] suggests that the energy efficiency improvements among the customers of the utility companies should require a given proportion of improvements to be targeted at 'energy poor' households. An important and urgent first step is to establish a common definition of 'energy poverty' in the EU, i.e. what it means to be energy poor.

[14] Klinckenberg Consultants for EuroACE 2010
[15] European Fuel Poverty and Energy Efficiency 2009.
[16] Klinckenberg Consultants for EuroACE 2010
[17] European Commission SEC(2011) 277 final

B) Deep Renovation in Upper Austria

Category

Financial Initiatives for Buildings

Country

Austria

Implementation timeframe

1993, ongoing

Energy savings in 74,000households

350 million kWh/year

CO_2 reduction in 2007

147,000 tonnes

For more information

www.esv.or.at

Aims and Objectives

One of the nine federal states in Austria, the state of Upper Austria which borders Germany and the Czech Republic, announced that by 2030 all electricity and space heating will be met by renewable energy sources. It was recognised that in order to achieve this target extensive improvements in energy efficiency were essential. The region passed an Energy Efficiency Strategy in 2004 with the aim to increase energy efficiency by 1% each year, and 1.5% in the public sector until 2010.[18]

Implementation Timeframe

1993, it is ongoing.

How it Works

The O.Oe. Energiesparverban is an energy agency in Upper Austria that promotes energy efficiency, renewable energy and innovative energy technologies. The agency manages a soft loan programme targeted at homeowners. The homeowners receive information on the energy savings potential of their home in an advice session, and an energy performance indicator is then calculated and identified on an energy performance certificate. A soft loan is then given, the size of which is dependent on the energy savings potential of the building. From 1993 to 2007 more than 74,000 homes met the programme requirements and received financial assistance.[19]

Results

The 74,000 households achieved 350 million kWh/year in energy savings. In 2007 alone this amounted to a CO_2 reduction of 147,000 tonnes.[20]

Lessons Learned

Homeowners might be reluctant to invest in their household for improvements unless they are sure of the benefits. Personal advice sessions help home owners understand the benefits and give more confidence to the benefits of investing in energy saving improvements. Raising awareness on the general need to reduce energy wastage as well as specific improvements in their homes can help consumers to become more energy literate and therefore more likely to make simple changes and more informed investment decisions. If more schemes like this are to be implemented, local and regional governments must be involved, resourced and empowered in delivering binding energy saving measures. A larger, skilled workforce is needed to facilitate the communication of energy saving projects and schemes for the renovation of houses.

[18] (2) Egger C. & Öhlinger C. 2011
[19] Ibid
[20] Ibid

3) Schemes for Energy Efficient Products

A) Incentives for Efficient Gas Boilers in Denmark

Category

Schemes for Energy Efficient Products

Country

Denmark

Implementation timeframe

1999 – 2001

Market share of condensing gas boilers

1999, between 10% and 15%; 2000, 35%; 2001, 50%;

Aims and Objectives

To help new, more efficient boilers penetrate the market and break through the first cost barrier and to increase their share of the boilers market from 15% to 33%.[21]

Implementation Timeframe

1999 – 2001.

How it Works

A subsidy scheme was introduced in 1999 to improve the market share of gas fired condensing boilers. The Danish Energy Agency gave a bonus of 2.500 DKK (€335.21) or a rebate of the same amount for purchases of a new condensing gas boiler.[22]

Results

In 1999, before the scheme began, the percentage of condensing gas boilers on the market was between 10 and 15%. By 2000 the Danish Energy Agency reported that the percentage had grown to 35%. Although the scheme was closed in 2001 due to budgetary limits, the market share of gas fired condensing boilers had reached over 50%. The percentage kept growing until the sold gas boilers in Denmark today account for 100% of the market. This share persisted because the retail sector accepted condensing boilers and became familiar with them. They have also continued to recommend this boiler technology to home owners.[23]

Lessons Learned

This scheme for condensing boilers shows that once an economically viable energy efficient product is established on the market, the removal of the scheme does not necessarily mean a reversal in the purchasing numbers of the product. Dynamic schemes for efficient appliances together with ambitious ecodesign requirements are essential to hasten an increase in the uptake of efficient products. The Ecodesign Directive[24] is not delivering as much as the Energy Efficiency Plan (2011)[25] seems to assume. There have been numerous delays on the finalisation of product requirements and 2010 was a disappointing year for ecodesign policy implementation in the EU. We must grasp the full potential of energy efficiency and related savings from the ecodesign of energy using products. Ecodesign requirements need to show ambition and challenge industry to move from business as usual.

[21] Baden S. et al. 2006.
[22] Dyck-Madsen S. 2011.
[23] Ibid
[24] European Commission 2009/125/EC
[25] European Commission COM(2011) 109

4) Energy Service Companies (ESCOs)

A) Schloss Retzhof – Landesimmobiliengesellschaft Steiermark (State Real Estate Company, Styria) with the support of Grazer Energieagentur Gmbh, Austria

Category

ESCOs

Country

Austria

Implementation timeframe

2008-2009

Investment for energy efficiency

€ 27,000

Savings in energy bills

€ 2000 per year

Savings in energy bills

15%

Reduction in CO_2

35%

Aims and Objectives

The project focused on a small group of buildings consisting of a 16th century castle and two seminar and guest houses (dating to 1960 and 2009) covering an area of approximately 4,000 m². The aims of this project were to:

- **Replace the old boiler installation**
- **Outsource energy supply and financing of investments**
- **Reduce energy demand and costs through demand side saving measures as well CO^2 reduction[26]**

Implementation Timeframe

The project started in 2008 and the implementation measures finished in 2009.

How it Works

Largely due to an inefficient gas boiler and a castle without insulation, energy bills for the buildings were high. The project was implemented through the use of Integrated Energy Contracting. Integrated Energy Contracting has two main objectives: reducing energy demand through energy saving installations and technologies, and supplying the remaining demand from renewable energy sources. The total project value over 15 years was €530,000. Investment costs totalled €110,000 and the building tenant co-financed €38,000. The project consisted of installing a condensing gas boiler and micro Combined Heat and Power (CHP) for heat and electricity baseload. The upper floor of the castle was insulated in such a way that respected and maintained the character of the historical building by using cellulose insulation. Primagaz Austria (ESCO) was awarded the contract in a combined competition of prices and solutions.[27]

Results

The investment cost for the energy saving measures amounted to €27,000. The savings achieved through reduced energy use reached €2000 per year, equating to 15% savings in energy bills and a 35 % reduction in CO_2. [28]

[26] Jan, W. B. A. 2009.
[27] Jan, W. B. A. and Reinhard U. 2009.
[28] Jan, W. B. A. 2009.

Lessons Learned

This case shows that even a historical or heritage building can become more energy efficient while respecting specific needs and characteristics through the appropriate use of technologies and practices. If we want to establish a thriving energy services market, providing access to third-part financing is a must. The differently sourced private capital could be combined into one, single entry agency to simplify access for private residents or smaller businesses. Energy Performance Contracts and loans for renovations should be linked to the property not to the owner. Since split incentives are proving to be a considerable market barrier to greater energy saving measures and deep renovations in the home, much more must be done, including reforming tenancy laws in a number of Member States. The rent increase in the property after renovation needs to make it possible that the landlord gets his money back in a reasonable amount of time. However, the rent increase for the tenant after renovation must be in a reasonable ratio to the expected reduction of the tenant's energy bill. Many public buildings are well known, symbolic, and often nationally cherished; renovating these buildings can help as a tool to raise public awareness on the issue.

B) First Lighting ESCO in Latvia; Effective Lighting In Cities - Tukums

Category

ESCOs

Country

Latvia

Implementation timeframe

2001-2012

Investment for energy efficiency

€ 395,000

Estimated reduced energy Use per year

630,000 kWh

Savings in energy bills

€37,000

For more information

http://www.managenergy.net/download/nr22.pdf

Aims and Objectives

The project had three main objectives:

- **To increase the efficiency of the street lighting in Tukums.**
- **To initiate the role of an ESCO in Latvia**
- **To improve aesthetic and social life in the area**[29]

Implementation Timeframe

Started in December 2001 and will run until 2012.

How it Works

Ekodoma, an engineering consulting company, carried out an energy audit for the street lighting system in Tukums municipality and a business plan was prepared for Tukums Council. In 2002 a tender was issued to select an energy service company (ESCO) to carry out the project. In September of that year the Council signed a cooperation agreement with the selected ESCO. The ESCO's main measures included changing luminaries in 21km of main streets, changing luminaries in all inner and small streets, new street lighting systems in 2,7km of the main streets and replacing distribution panels. The changes have included the introduction of lighting units with higher optical efficiency and luminous light sources with high specific output that has led to consumption savings. The total cost of the project amounted to €395,000. Tukums Council paid €127,000 on loan from the Nord Investment Bank and the contribution of the ESCO was €268,000, of which €136,000 was on loan from the Latvian Environmental Investment fund and €132,000 on loan from the Latvian Hipotek Bank.[30]

Results

The street lighting system has been extensively improved both in reducing its energy consumption and physical degradation. The ESCO has implemented the project providing third party financing. The new lighting has made the area safer at night. The estimated energy saving per year totals to 630,000 kWh leading to €37,000 saved per year. Most important of all, municipalities in Latvia now know and are more aware of the potential financial savings behind energy efficiency projects. Latvian ESCOs are also more aware of third party financing projects. The project has been successful because at the same time there was extensive dissemination of information about energy efficiency projects, seminars and training courses.[31]

[29] Rochas C. (Ekodoma Ltd.), 2011
[30] Ibid
[31] Ibid

Lessons Learned

The scheme showed that there is a huge potential in energy saving in street lighting. The project not only saved energy and money but also benefited the residents by making the area safer at night. To help encourage ESCOs to engage in the residential sector, which is an unappealing sector for them, it may be necessary to combine or ‘bundle’ together certain housing types or regions into one project in order to help match to their scale. More measures are needed to help ESCOs access credit and risk guarantees - so that they increase their work scope and activity.

5) Broader Benefits of Investing on Energy Efficiency

A) Denmark: A Pioneer in Energy Conservation

Aims and Objectives

In 1990 a national energy plan was adopted in the Danish parliament. The plan envisaged a reduction in CO_2 emissions from 61.1 million tonnes in 1988 to 48.9 million tonnes by 2005, a 20% emission reduction.[32]

Implementation Timeframe

In 1990 a national energy plan was adopted in the Danish parliament on energy consumption in general. In 1993 the first rebates on the CO_2 tax for companies joining an agreement were introduced. In 1995 the voluntary agreement scheme was changed to look more like it does today. In 2001 the Danish Energy Management standard was introduced. This became one of the necessary requirements for companies with voluntary agreements to comply with the standard. In 2010 the scheme was narrowed, when fuels were removed so that the same consumption is not regulated from both the ETS system and national legislation.[33]

How it Works

Denmark has promoted investment in energy efficiency and CO_2 reduction by offering tax concessions to those companies that take steps to achieve energy savings/ CO_2 reduction. Electricity is taxed at the consumption level and not at the production level. Together with general energy and CO_2 taxation measures, the following initiatives have also been implemented to enhance energy savings and improve energy efficiency in the industrial sector:

- A voluntary agreement scheme closely integrated with the Green Tax Package, which provides rebates on green taxes for companies participating in the scheme.
- Emissions trading with CO_2 cap for bigger industries.[34] [35] [36]

The Danish Energy Authority has extensively carried out campaigns to encourage and assist the implementation of improved energy management within industry. The concept of energy management was developed in the 1990s, by the Energy Authority and industrial organisations. This cooperation culminated in the development of the Danish Standard for Energy Management.

Category

Broader Benefits of Investing on Energy Efficiency

Country

Denmark

Implementation timeframe

1993- ongoing

Companies reduction in energy consumption

15% to 30%

Industrial sector energy efficiency, 1990 to 2007

Improved by 16.9%

For more information

www.ens.dk

[32] Ericsson K. 2006
[33] Ibid
[34] Ibid
[35] (1) Danish Energy Authority 2002
[36] (2) Danish Energy Authority 2002

Since 2001, through this standard, companies have developed their own energy management systems.[37] [38] [39] The first step was taken by the top management of the companies who established an energy policy to define and guide their efforts for increased energy efficiency. The next step was to review the energy consumption of machinery, equipment and activities and identify the potential savings. Concrete targets were consequently set and announced. The company encouraged the employees to change their work practices and introduced procedures for more energy conscious procurement, operation and maintenance of equipment. The company monitored and reviewed progress, and additional measures were taken if targets were not met. Changes to the energy management system could also be introduced to continue to improve the performance.[40] [41]

Results

Demonstration projects in energy efficient design have helped companies achieve approximately 15 to 30% reduction in energy consumption if they conduct energy assessments when building or rebuilding factories. The return on these investments is typically realised within four years maximum. The efficiency of the industrial sector improved 16.9% from 1990 to 2007. In the food and tobacco industry, energy efficiency increased by 17.7%, while the energy efficiency in the non-metallic industry decreased by 15.4%. From 2000 to 2007, the energy efficiency for the industry sector as a whole increased by 9.6%. Denmark has held its energy consumption levels constant while doubling GDP.

In Denmark strong government efforts have increased energy efficiency, reduced CO_2 emissions and enhanced energy security.[42]

Lessons Learned

The Danish experience with voluntary agreements shows that the administrative costs for the implementing authority can be significantly reduced over time as a result of learning-by-doing, continuous revisions and increased systematisation of the administration. The EU's energy saving policy should make it mandatory that every public office undertakes a full energy audit and subsequent deep renovation in order to meet targets set for the public sector. Not only must the public authorities have binding obligations upon them in order to address energy wastage in this sector, but they must take the lead, and be seen visibly by the public to take the lead. European energy saving policy needs to make it mandatory for large companies to carry out energy audits and achieve specified savings.

[37] Ericsson K. 2006
[38] (1) Danish Energy Authority 2002
[39] (2) Danish Energy Authority 2002
[40] Ibid
[41] (1) Danish Energy Authority 2002
[42] ODYSSEE 2009

B) British Telecom Italia, Minimising Energy Use through Innovative Design

Category

Broader Benefits of Investing on Energy Efficiency

Country

Italy

Implementation timeframe

Not known

Savings per month in energy bills

€800,000

CO_2 emission reductions pa

4,200 tonnes

For more information

http://tiny.cc/ewmft

Aims and Objectives

British Telecom Italia wanted to create a system to cool their hardware centre which contained several hardware systems. Their aim was to introduce a system which is environmentally friendly and financially viable.[43]

Implementation Timeframe

Unknown.

How it works

British Telecom Italia is a company focused on providing solutions for internet based companies. It identified a location that had a naturally replenished waterbed 40 metres beneath the surface. This was essential in developing a sustainable cooling system. The system works by using four wells from which water is pumped into a reservoir under the data centre. The walls of the centre were built to conceal pipes and a heat exchanger. When the cold water is pumped up it serves cooling units on each floor of the building. Fans blow cold air through the cooling units which enter a duct leading to the rooms containing the hardware. The warm water is used in farms nearby for irrigation.[44]

Results

Power in the building is only needed for the pumps and for the fans. In contrast with conventional systems, this scheme has saved energy by around one megawatt. The company is also saving €800,000 per month in energy bills. This in turn helps to provide the customers with a cheaper service than other companies. CO_2 emissions were reduced by 4,200 tonnes a year.[45]

Lessons learned

Innovative technological setups can be created to save energy in a particular context. For a business, introducing less conventional methods for cooling (and heating) may be harder to implement, however the reduced energy bills are evidence enough. Energy saving policy should make it mandatory that industrial installations are upgraded to best available technology above a certain defined level (Best Available Technology - BAT).

[43] International Chamber of Commerce, Commissions on Environment and Energy, 2009.
[44] Ibid
[45] Ibid

6) Neighbourhood Projects to Save Energy

A) Hadyard Hill Community Energy Project, Energy Agency – Scotland, UK

Aims and Objectives

The project was targeted at reducing the demand for energy and to reduce the number of fuel poor.

Implementation Timeframe

Established in December 2006. Insulation measures were installed between March and August 2007.

How it Works

The Hadyard Hill wind farm was built near Girvan in South Ayrshire by Scottish and Southern Energy. The wind farm generates enough electricity to power 80,000 homes. Scottish and Southern Energy set aside £300,000 (€352,046) to increase energy savings in the area by offering free insulation for properties in the community. The Energy Agency ran the project and an awareness raising campaign was organised that included posters in local shops, meetings with community councils, a launch event and direct mail. The use of a brand and an easily identifiable image in the form of a house with a scarf helped to give a more consistent image.[46]

To show more clearly the energy wastage of the household, surveyors were commissioned to take thermal images of the majority of properties in the area. The images also helped to identify exactly where in the building heat was being lost, the best interventions needed and what kind of insulation was most suitable for the household. Further surveyors were contracted to carry out door to door data collection on the building and structure of the properties. The surveyors also asked questions to identify the ecological footprint of the household. A report was subsequently sent to the household giving them a summary on their household and later insulation measures were installed.[47]

Results

The insulation brought a total reduction in energy consumption of 2,900,000 kWh for the 480 insulated households, from 830 targeted in the area around the wind farm. This means that there has been an average reduction of 6,200 kWh per household per annum. The community is producing over 744 tonnes less CO_2 per annum. The amount of people living in fuel poverty in the neighbourhood was reduced by 10% thanks to this scheme.[48]

Category

Neighbourhood projects on energy efficiency

Country

Scotland

Implementation timeframe

2006-2007

Total reduction in energy consumption for 480 houses

2,900,00 kWh

Average reduction per household per annum

6,200 kWh

Emissions reductions by the community pa

744 tonnes

For more information

http://tiny.cc/wqc5j

[46] Carr M. (Energy Agency), 2011
[47] Ibid
[48] Ibid

Lessons Learned

This project shows that investment in renewable energy can be coupled with an investment in energy efficiency and saving. In this case, the use of a brand helped build trust and visibility, and this coupled with professional advice were instrumental for the success of the project. A National Energy Efficiency Fund should be established in every Member State. If these funds are linked to other funding and in particular revolving funding streams they can help maximise the number of households that invest in energy savings. These funds need to include quality criteria and a monitoring system for the measures they support.

B) Energy Neighbourhoods

Aims and Objectives

The aim of the Energy Neighbourhoods project was to inspire and encourage the reduction of energy use and a change in energy related behaviour in households in a number of EU countries.

This aim was divided into several objectives, namely:

- **Reaching and informing households about the different ways they can save energy and generally increasing energy awareness**
- **Applying theoretical knowledge**
- **Starting a dialogue between the municipalities and citizens on climate issues to create a common spirit to reduce the amount of energy consumed.[49]**

Implementation Time frame

The European project took place between 2007 and 2009 in nine countries. It is still ongoing as a national project in France and Belgium. A new European project will begin in May 2011 and is expected to be implemented in 16 countries by 2013.[50]

How it Works

The project took the form of a competition for teams consisting of between eight and 12 households, named an "Energy Neighbourhood". The city offered a bet to the Energy Neighbourhoods. Neighbourhoods that reduced their energy consumption by at least 8% compared to the previous year in a period of 6 months won the bet. The total project cost €1,198,331. Fifty percent of the project funding came from Intelligent Energy Europe. The remaining funding was from national resources, including regional departments of economy or environment, city budgets etc. The project was not restricted to one country or neighbourhood but was implemented by different energy agencies and NGOs in several countries, including Belgium, Bulgaria, France, Italy, Spain, Sweden, Germany, Ireland and England. In the different countries and cities, steering committees were established. These committees developed communication kits which included posters, leaflets, campaign manuals and standard press releases. The committees also prepared special communication kits for the Energy Masters. The Energy Masters were trained to coach, motivate and lead the teams through providing sound energy saving advice and tips. A website was also used to help the municipality, the Energy Master and their residents with the project and an online tool was provided to measure the energy consumption of the participating households compared to the previous years.[51]

Category

Neighbourhood projects on energy efficiency

Country

European Project in 9 countries 2007-2009

Implementation timeframe

2007-2009; Ongoing as national projects in France and Belgium. New European Project starting in May 2011 and will be implemented in 16 countries by 2013.

Total reduction in energy consumption for 6000 households

9,150,000 kWh

Average reduction per household pa

1,598 kWh

Total CO_2 emission reductions

3,320 tonnes

For more information

www.energyneighbourhoods.eu

[49] Merziger A. (Beratungs- und Service- Gesellschaft Umwelt mbH) 2011
[50] Ibid
[51] Ibid

The municipality and partners provided information on how to save energy through information events and through making sure that the different Energy Neighbourhoods obeyed the rules. Debates on climate change were also initiated on the local level involving both citizens and municipalities.[52]

Results

578 neighbourhoods took part in the competition totalling 5727 households. An average energy saving of 10.09% was achieved in each household. 60% of the neighbourhoods that took part in the competition won the bet while 81% saved energy. The changes were mostly related to room temperature, stand-by modes and energy saving lamps. However the greatest impact was to instil a long term interest in reducing the amount of energy consumed in these households. The winning team was from Sweden, who reduced 37% of their energy through simple measures like disabling stand-by, using energy efficient lamps etc.[53]

Lessons Learned

Thanks to the success of the competition it is now planned to be held each year. A promotional campaign alongside the competition helped to increase a sense of fun and a friendly atmosphere. Energy was saved in several neighbourhoods with little expense. It has been proven that this project concept can work in many different European countries and can be easily transferred to new regions. Based on the experiences made with Energy Neighbourhoods, the project idea has been further improved and will be applied as a European project (financed by the Intelligent Energy Europe) in 16 countries, starting in May 2011.[54] A large part of this project was taken up by the initiative of household owners. In Europe there is currently a trend of introducing smart meters to households. It is crucial that smart meters indeed empower the consumers to become more aware of their energy consumption and thus be able to save energy. Smart meters need to be introduced while providing consumer protection and upholding privacy rights. Further technical and social assessments of the contribution from smart meters are still required.

[52] Merziger A. (Beratungs- und Service- Gesellschaft Umwelt mbH) 2011
[53] Ibid
[54] Ibid

7) Campaigning and Raising Awareness on Energy Efficiency and Savings

Category

Campaigning and Educating on energy efficiency and savings

Country

Crete, Greece

Implementation timeframe

2002-on going

For more information

http://tiny.cc/42mky

A) Energy Thrift Information and Regional Energy Agency of Crete

Aims and Objectives

The project initiated by the Regional Energy Agency of Crete (Greece) was aimed at raising awareness of renewable energy sources and at measuring efficient energy use and behaviour of school children and their families. The project was also targeted at teaching energy saving practices and behaviour.[55]

Implementation Timeframe

2002, it is ongoing.

How it Works

The Cretan teachers involved in this project received an information session series and also information about other teaching experiences and educational programmes. These programmes focused on environmental administration, energy saving, renewable energy and the link between energy and the environment. There were several different materials used during this educational project. This included special teaching material for children with theory as well as fun and light hearted games. Materials were made to remind the children about energy, such as mouse pads, wall pictures, pencils etc. The project encouraged the creativity of the children by organising an art competition and a popular game called the Energy Goose. The questionnaire which was distributed before and after the scholastic year was taken home by the children to their families thus also serving as a tool to teach the children and their family on saving energy.[56]

Results

The results of the project were checked by a survey first completed before the scholastic year and a second one completed at the end of the scholastic year. The questions were targeted at establishing what changes in energy efficient related behaviour 'if any' the educational programme had achieved. The survey not only targeted the school children themselves but also their parents, to verify if there had been wider changes. The survey included 321 pupils covering 10 educational levels and their parents.[57]

[55] Zografakis N. *et al* 2008
[56] Ibid
[57] Ibid

The report 'Effective Education for Energy Efficiency', Zografakis N. *et al* concluded that '*Pupils and their parents seem to behave more conscientiously after their involvement in the education process, namely they are more energy efficient.*'[58]

Lessons Learned

In this project the school children were taught early on in life how to influence their own energy consumption patterns but more importantly they shared the information with their families thus creating a multiplier effect from one simple project.

[58] Zografakis N. *et al* 2008 : page 3229

B) Portugal's Energy Performance Certificate

Aims and Objectives

ADENE is the Portuguese energy agency responsible for administering the Energy Performance Certificates throughout Portugal. The main objective was to implement the Energy Performance Certificate as part of the Energy Performance of Buildings Directive and as a useful tool to achieve energy savings in households.[59] [60]

Implementation Timeframe

Scheme was launched in 2007 and it is ongoing.

How it works

ADENE worked hard to explain the energy performance certification process to several stakeholders, especially municipalities. As a result, all Portuguese municipalities request the Energy Performance Certificate in a licensing process. ADENE approached the key players in buying and selling houses, namely notaries, estate agencies and banks. According to Paulo Santos at ADENE, the man behind the Energy Performance Certificate system in Portugal, 'this brought the attention and a 'positive feeling' about the certification process that helped and facilitated market acceptance'. [61]

ADENE made sure that the stakeholders were aware of the certification and that they supported it. This helped create an environment where certificates could be adopted in a fast and simple way. ADENE assesses a portion of the certificate to check that they are of the required standard. Municipalities do not have to do technical verifications as this is carried out by qualified experts. Good compliance was encouraged by the penalties and sanctions for building owners and qualified experts in case of non-compliance. ADENE created a centralised website to enable monitoring of progress with the building certification and to assess the energy and carbon saved through the recommended measures. The website is directed towards the general public, the qualified experts and towards the authorities themselves. The website also serves as a platform to provide an update on any periodic changes in technical requirements related to the certificate. The Portuguese Government established a framework for financial support to specific measures.[62]

Category

Neighbourhood projects on energy efficiency

Country

Portugal

Implementation timeframe

2007 - ongoing

Certificates issued since 20077

400,000

Certificates issues for existing buildings

> 80%

Average certificates for new buildings

3,000 / month

Certificates issued for existing buildings

10,000 / month

For more information

http://www.adene.pt/ADENE.Portal

[59] European Council for an Energy Efficient Economy 2010
[60] The Energy Performance of Buildings Directive (2009) requires that energy performance certificates should be made available when buildings are constructed, sold or rented out. This certificate calculates the energy performance of a building. This helps the owner of a household to consider any cost-effective improvements that could make the building more energy efficient.
[61] European Council for an Energy Efficient Economy 2010: page 6
[62] Ibid

Results

As of March 2010, more than 400,000 certificates had been issued. Since 2009 when the scheme was extended, 80% of the certificates have been issued to existing buildings (the scheme was initially dedicated for new buildings only). There is now an average of 3,000 certificates for new buildings and 10,000 certificates for existing buildings issued every month. [63]

Lessons Learned

It is clear from this case study that for the certificate to become more popular it is necessary to have a wide campaign directed to the main players in the housing sector.

The Energy Performance Certificate needs to be improved so that it helps to guide and inform owners of buildings when prioritising energy saving interventions in their houses. Recommendations in the certificate need to be linked to obligations and financial/fiscal incentives, thus acting as key enablers of the actual implementation of real energy saving measures. Binding measures should target residential buildings.

[63] European Council for an Energy Efficient Economy 2010

Part 8: Refurbishing and Building Energy Efficient Multi-Dwelling Residential Buildings

Category

Refurbishing and building energy efficient multi-dwelling residential buildings

Country

Portugal, Lisbon

Implementation timeframe

Not known

Total cost of project

€ 2.19 million

Costs per apartment

€ 3,490

Estimated energy saving per year

50 kWh/m2

For more information

http://tiny.cc/ubbld

A) Ceuta Norte, Energy Efficiency in Two New High-Rise Buildings, Portugal

Aims and Objectives

The high rise building project was an idea developed by the City of Lisbon to tackle the housing needs of Casal Ventoso, a neighbourhood that was identified as an area in need of urban renewal. The aim was to create new social housing which is thermally comfortable, of good visual quality and with high indoor air quality. To achieve these aims a number of energy saving measures were employed in the construction of the buildings.[64]

Implementation Timeframe

Not known.

How it works

The high rise building was part funded as a demonstration project under the SUNH programme. It was also supported through the ENERGIE funding stream of the European Commission's former Directorate for Transport and Energy (DG TREN). The project has been promoted as one of the 15 European projects demonstrating best innovative practice through 'Spread CD-RES', also partially funded by DG TREN's ALTENER programme. The National Institute for Industrial Engineering and Technology acted as the project manager and the company Somague was employed as primary contractor. In total, 62 apartments were constructed over two sites, forming two blocks of 31 apartments each. High levels of thermal insulation were used for the exterior walls and roofs. Double glazed low energy windows, the optimisation of daylight and a thermo-mechanical ventilation system also provided good air quality and ventilation. The project cost €2.19 million. The costs per apartment included €3,400 for low energy glazing and €90 for ventilation.[65]

Results

The project achieved an estimated 50 kWh/m² of energy saved per year. High levels of comfort were reported by tenants in both summer and winter months. The building achieved impressive reduced heat gain and reduced heat loss.[66]

[64] Texeira A. (INETI) , 2005
[65] Ibid
[66] Ibid

Lessons Learned

National building codes should encourage the construction of buildings that avoid overheating and that use solar based cooling. Pilot projects that optimise daylight and thermo-mechanical ventilation in public buildings and buildings regularly used by the public can help to raise awareness. While the Energy Efficiency Plan (2011)[67] proposes that public authorities be required to refurbish at least 3% of their buildings (by floor area) each year, this may not lead to shallow renovations where only minor improvements are made, risking lock-in of inefficient technologies and practices. A specific amount in Mtoe of energy saved should be set for the renovation of public buildings each year.

[67] European Commission COM(2011) 109/4

B) Energy Efficiency Refurbishment in a Multi-Dwelling Residential Building in Sofia, Bulgaria

Aims and Objectives

The objective of this project was to renovate and carry out maintenance of a multi-dwelling residential building, Block 10 in the Zakharna Fabrika housing estate in Sofia, Bulgaria, for low income families (who cannot afford to pay for renovation). The renovation aimed at reducing the consumption of energy by the residents of the block and to help target the fuel poor in particular.[68]

Implementation Timeframe

2003 – 2004.

How it Works

The project was started and managed by the Bulgarian Housing Association in partnership with the Housing Association De Nieuwe Unie, Rotterdam and the housing Association Woondrecht, Dordrecht (both from the Netherlands) in the framework of the ''Sustainable Housing Management in Bulgaria; improving the capacity of homeowners associations of multi-family apartment buildings''. The multi-residential building's roof, basement, windows and external brick walls were in poor condition. The building, dating from 1947 had 13 flats, all of them privately owned. The residents of the whole housing estate were approached with the idea for the project in September 2003 and were invited to participate in the pilot project. The owners of Block 10 were registered as a legal entity. An energy audit was carried out before the works started and some monitoring also took place after the works were done. The external walls were insulated, the roof was water proofed and thermally insulated. The basement was also thermally insulated and the heating system was improved by the balancing and insulation of pipes. The two attic rooms were transformed into small flats. The rent paid by the tenants for these two small flats helped pay for the loan needed for renovation. The renovation was completed by the end of 2004. The project costs were about € 60,000, and it was financed by a loan from a Dutch bank. The 20 year, monthly payment of the loan totalled €420 - 40% of it is paid for by the rent from the two new flats.[69]

Results

The renovation has increased the lifetime of the building and led to energy savings above 50%.The residents also have increased comfort. The building received a certificate A according to the Bulgarian certification. This certification exempts the residents from paying a building tax for ten years.[70]

Category

Refurbishing and building energy efficient multi-dwelling residential buildings

Country

Bulgaria, Sofia

Implementation timeframe

2003-2004

Total cost of project

€ 60,000

20 year monthly payment

€ 420

Increase in energy saving

50%

For more information

http://tiny.cc/s3dgp

[68] Christiane B. and Maike B (Wuppertal Institute for Climate, Environment and Energy) 2008.
[69] Ibid.
[70] Ibid.

Lessons Learned

There are numerous multi-owner buildings across Europe with enormous energy saving potential. The biggest challenge is for residents in such a building to support the project since they will be most affected on a practical level by the actual renovations. This requires good communication of the incentives and a solid understanding of the needs of the residents. An association of apartment owners was registered in Bulgaria for the first time in order to apply for the long term soft loan for renovation.[71] The creation and strengthening of networks of homeowners associations would help facilitate housing renovation activities in many eastern European Member States in similar ways. Alternatively, grouping together similar types and styles of buildings into a larger project would make it more appealing to potential investors, contractors, or ESCOs.

[71] Georgiev G. (Bulgarian Housing Association) 2011

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http://www.energysavingtrust.org.uk/business/Business/Information/Publications-and-Report-Library/Publications-and-Case-Studies

2) The BUILD UP initiative was established by the European Commission in 2009 to support EU Member States in implementing the Energy Performance of Buildings Directive (EPBD). The BUILD UP web portal is intended to reap the benefits of Europe's collective intelligence on energy reduction in buildings for all relevant audiences. It will bring together new practitioners and professional associations while motivating them to exchange best working practices and knowledge and to transfer tools and resources.

http://www.buildup.eu/

3) The Power House Europe project is part of the EU-funded Intelligent Energy Europe (IEE) Programme and serves to accelerate empowerment of residents and up-skilling of professionals working to reduce the carbon footprint of the social housing sector by drawing on the existing European pool of know-how and resources and facilitating the exchange of success stories and lessons learned. Over 39,000 non-for-profit housing organisations from 19 EU member states, which together manage over 25 million homes, are brought together at European level by CECODHAS - Housing Europe who is leading the Power House Europe project.

http://www.powerhouseeurope.eu/

4) The Sustainable Energy Europe Campaign – The European Union created the Sustainable Energy Europe Campaign in 2005 as its major effort to promote energy efficiency and renewable energy sources. Now managed by the EU's Executive Agency for Competitiveness and Innovation (EACI), more than 1 200 energy projects comprise the Campaign. Sustainable Energy Europe is designed to spread best practices in sustainable energy technology, build alliances, and inspire new energy ideas and actions.

http://www.sustenergy.org/

5) Intelligent Energy Europe - There are many untapped opportunities to save energy and encourage the use of renewable energy sources in Europe, but market conditions do not always help. Intelligent Energy Europe is the EU's tool for funding action to improve these conditions and move towards a more energy intelligent Europe.

http://ec.europa.eu/energy/intelligent/

6) ManagEnergy is a technical support initiative of the Intelligent Energy - Europe (IEE) programme of the European Commission which aims to assist actors from

the public sector and their advisers working on energy efficiency and renewable energy at the local and regional level.

http://www.managenergy.net/best_practice.html

7) The European Council for an Energy Efficient Economy - ECEEE is a non-profit, membership-based European NGO. The goal of ECEEE is to stimulate energy efficiency through information exchange and co-operation.

http://www.eceee.org/

8) The International Energy Agency (IEA) is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 28 member countries and beyond. The following link is a database of energy efficiency policies from around the world.

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