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Energy/emission saving policies in urban areas – sustainable cities: Best practices "Building efficiency and household emissions and energy use"

Note

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Authors:

Christiane Beuermann, Maike Bunse
Wuppertal Institute for Climate, Environment and Energy
Research Group Energy, Transport, and Climate Policy
Döppersberg 19
42103 Wuppertal
Germany
Tel.: ++49 (0)202 2492-170
Fax: ++49 (0)202 2492-250
Email:
christiane.beuermann@wupperinst.org

Administrator:

Yanne Goossens
Policy Department Economy and Science
DG Internal Policies
European Parliament
Rue Wiertz 60 - ATR 00L046
B-1047 Brussels
Tel: +32-2-283 22 85
Fax: +32-2-284 90 02
E-mail: yanne.goossens@europarl.europa.eu

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1 Introduction

In May 2007, a Temporary Committee on Climate Change (CLIM) was set up in the European Parliament. This briefing document has been requested by the CLIM in the context of its 8th Thematic Debate, to be held on 23 June 2008, on "Achieving significant CO2 emission reductions in short time: learning from Best Practices regarding successful policies and technologies".

In Europe, numerous good practice examples can be found. A high number of cities and towns have implemented local energy action plans, local emission reduction targets or even plan to become carbon neutral (e.g. Utrecht, Växjö). These targets usually include a whole package of different measures and instruments. As a broad package of measures usually heavily depends on local circumstances, in this compilation of good practice examples, the focus lies on single measures, which can be replicated more easily. The aim of the following compilation is to identify medium-scale examples that are innovative, show short-term emission reductions and are replicable to other urban areas throughout Europe.

The focus lies on *energy efficiency in buildings*, *household emissions* and *energy use*. The good practice examples shown in this compilation, will be assigned to these categories. However, some examples could fall into more than one category, as there might be overlaps. In the following, the three categories will be described shortly:

a. Energy efficiency in (public) buildings

Potential for energy efficiency in buildings is very high. Especially public buildings are of great interest, as municipalities own a building stock and have the possibility to relatively easily implement measures with a broad effect. The focus of many projects is on schools, using the additional benefit of teaching energy efficiency and renewable energy in a practical manner. The following sub-categories will be covered:

- *Administrative buildings*
- *Schools*

b. Household emissions

Adding the number of households, there is also great potential for energy efficiency in the residential building stock. However, dealing with a high number of individuals, it is a more complex task to reach each household. Next to increasing the efficiency of residential buildings, use of energy efficient appliances and consumer behaviour are the main issues. Often, programmes for reducing household emissions are implemented at national level, not at city level. Additionally, several homepages exists that provide information on how to save energy in households, on energy efficient products etc.[1] However, the number of good practice examples for reducing household emissions at city level is limited. The following sub-categories will be covered:

- *Residential buildings*
- *Energy efficiency measures*

[1] E.g. www.energysavingtrust.org.uk.

c. Energy use

The third category of energy use leaves the dimension of single buildings and individual households behind, and focuses on issues that are effective at city-level. This includes for example a city's electricity generation from renewable energy, broad district heating and cooling facilities, etc. Therefore, the following sub-categories will be covered:

- *Renewable energy*
- *District heating and cooling*
- *Efficient street lighting*
- *Transport*

Selection of good practice examples

Although uniquely designed for a particular setting and problem, the projects presented can be adapted to different situations or can provide valuable information from their implementation phase. It has to be stressed, that the selected projects are not intended to represent the only possible courses of action to take, as there are several other good practice examples. Some of these are shortly highlighted in the *additional good practice* section of each chapter.

The identification of good practice examples is based on a desk-study research. The websites and online databases used are shown in Annex 1.

The selection of good practice examples is based on a set of criteria:

- **Location**

  All good practice examples are located in the European Union. Additionally, the focus is on cities.

- **Short-term emission reduction**

  All good practice examples are designed in such a way, that they lead to a considerable amount of CO_2 emission reduction in an appropriate timeframe.

- **Replicability**

  All good practice examples are designed in such a way, that they could be replicated in another city throughout Europe.

- **Sustainability**

  All good practice examples show a high level of sustainability regarding technical and financial issues. The continuity of the project after the initial phase is secured.

- **Successful implementation**

  All good practice examples are successfully implemented.

Additionally, another important criteria is the availability of sufficient information in English.

For each category two examples were chosen, so that the following **six exemplary good practice examples** will be displayed in the following:

1) Communicating environmental benefits of renovating existing buildings to the public, Lithuania
2) Solar&Save, Germany
3) Energy Efficiency Refurbishment in a privately-owned, multi-dwelling, residential building – Sofia, Bulgaria
4) CAKES – Calderale & Kirklees Energy Savers, UK
5) District heating and cooling in Helsinki, Finland
6) Trendsetter Graz – Biodiesel-fuelled public busses, Austria

2 Energy efficiency in (public) buildings

2.1 Communicating the Environmental Benefits of Renovating Existing Buildings to the Public – Kaunas, Lithuania

City	Kaunas, Lithuania
Duration of the project	June – August 2004
Main field of action	Renovation of public buildings (focus on kindergartens and schools)
Short description	There is a great potential for energy efficiency in buildings in Kaunas. Meant as a trigger for a more wide-spread renovation of buildings, Kaunas Regional Energy Agency (KREA) started with the renovation of a public high school. Results are monitored by "Display" posters, using the same energy label as the European label for household appliances.
Benefits	• Reduction in energy use and in CO_2 emissions • Improved classroom environment • Awareness raising among pupils and teachers

2.1.1 Approach and overall aim of the project

Kaunas is one of most active cities regarding sustainability issues from the Central and Eastern European region. The city announced their interest in signing the covenant of Mayors that strongly urges the European Union to take action on climate issues. Additionally, Kaunas is a partner city in the current EU project SESAC (Sustainable Energy Systems in Advanced Cities).

There are some other good practice examples from Kaunas (e.g. efficient street-lighting, energy saving potential in residential buildings, biogas plant), but the one chosen for presentation in this compilation focuses on the renovation of public buildings, especially of kindergartens and schools. This project is regarded as a "Shining Example" by the Display-Campaign - European Municipal Buildings Climate Campaign.[2]

Kaunas with its nearly 400,000 inhabitants is one of the most significant Lithuanian cities. It is not only a city of traditions, but also a large centre of business and industry. With its seven universities and numerous schools, it is a very young city. But it is still affected by the problems which are common for many of the former Eastern block countries. Most buildings are old and do not have a good energy performance. Greenhouse gas emissions are still very high and many of the inhabitants do not sufficiently take care of water and energy consumption.

[2] www.display-campaign.org

Nowadays climate change is already perceptible and it is obvious that everyone has to play their part within their own restricted means. The city of Kaunas as a role model started a project in order to move in the right direction via renovating the Kazio Griniaus High School in the heart of the city.

Due to the fact that there are still too many buildings in Kaunas that are not efficient, this project was aimed at getting the building renovation 'ball rolling' in the city with a visible renovation project at a local high school. The results of the renovation will be monitored using the "Display" posters[3].

The renovation of the school building contributes to the implementation of the "Energy Performance of Building Directive[4]". Furthermore, the renovation is also part of Kaunas City Municipality's entry to the European Energy Award and it forms part of the city's Energy 21 project under the Agenda 21 programme.

Through renovating the school, the city had the double aim of improving the energy performance of the building as well as the quality of the classroom environment. The renovation took three months (June - August 2004).

The school was constructed in 1982. It has a floor area of about 7172 m^2 and its operating hours amount to 45 per week. Gas stoves supply the school with heating.

During the renovation a new heating system was installed including new radiators, pipelines, and a new heat substation with heat exchangers. Additionally, the roof was insulated. All windows and frames were replaced and are now double glazed and equipped with a 5 chamber system. A ventilation system with heat recovery system was also installed. The recovered heat is used for the canteen, sports hall and the changing-room. The classrooms are still ventilated by manual ventilation (via opening the windows). In addition to that the windows are provided with a duct system and air vents, which improve natural ventilation.

Figure 1: "Display" poster for Kazio Griniaus High School

Source: http://www.display-campaign.org/rubrique638.html

[3] The European Display Campaigns aims at encouraging local authorities to publicly display the energy and environmental performance of their public buildings using the same energy label that is used for household appliances. www.display-campaign.org

[4] Directive 2002/91/EC on the energy performance of buildings

In January 2007, a “Display” poster was hung above the front door of the school. The aim of the poster is to catch the attention of all building users and ensure that the performance of the building is visible.

The total renovation cost amounted to Lt 3,000,000 (EUR 868,860 with EUR 1 = Lt 3.4528). Funding for the project was provided by three sources, with the following split: World Bank loan: 50%, Lithuanian Government: 25%, Kaunas city municipality: 25%.

2.1.2 Benefits

Prior to the renovation, the school had old wooden window frames, which resulted in heat loss. Also, the noise level inside the classrooms was quite high, because of their poor protection from outside noises. Furthermore the old heating system did not allow heating to be regulated for individual rooms. The renovation has minimised heat loss via the window frames, reduced the level of outdoor noise heard in the classrooms and enabled the heating system to be adjusted for each room individually. The results of the renovation for improving energy performance and reducing CO_2 emissions have been monitored using the Display Campaign. The performance of the school in 2005 improved significantly compared to the reference year 2003.

Concrete numbers for the reduction in energy, CO_2 emissions and water use are not available on the Display homepage. Following the display poster using the same energy label that is used for household appliances, reductions were achieved as shown in table:

Table 1: Benefits (Efficiency ranges between "A - More efficient" to "G - Less efficient")

	2003	**2005**
Energy	D	C
Water	B	B
CO_2 emission (kg/m_2/year)	D (54)	C (34)

Source: http://www.display-campaign.org/rubrique638.html

The renovation of the school building in Kaunas also provides pupils and teachers with an improved classroom environment (not noisy or cold). A general benefit of this project is that combining a renovation programme with the Display communication campaign (using the Display poster), allows the improvement of the performance of the school to be visible to pupils and other building users and thus improves their awareness of energy and water consumption.

2.1.3 Replicability

For all those involved, the renovation was a great success. That is why it is planned to renovate all schools and kindergartens in Kaunas. Discussions have already taken place in order to source finances for the renovations. The building managers have already performed a first check of the present situation of the radiators, windows and pipelines of the buildings.

Concerning the Display communication Campaign, Kaunas Regional Energy Agency (KREA) acted independently and did not receive any advice or support from other organisations in the city. It would be helpful to involve more people with this Campaign in order to reach even more citizens and to make them aware of energy and water consumption. Thereby even other buildings in Kaunas can achieve tangible results like the Kazio Griniaus School.

The Display project is the first step in Lithuania and especially in Kaunas; there are no similar projects in other Lithuanian cities. It raises awareness concerning energy and water consumption and promotes the interest and know-how of people who are working in this field. Hopefully this kind of project will multiply in the near future as it is a good example that shows the way for other municipalities who want to improve the environmental performance of their buildings.

2.1.4 Sources

www.display-campaign.org/rubrique638.html

www.energie-cites.eu

www.krea.lt

www.grinius.kaunas.lm.lt/

www.european-energy-award.org

2.1.5 Contacts

Kaunas Regional Energy Agency (KREA)

Feliksas Zinevicius

E-mail: krea@techpark.lt

2.2 Solar&Save - Renewable energy and energy efficiency for schools through citizen contracting, Germany

Cities	Engelskirchen / Emmerich / Gelsenkirchen / Cologne, Germany
Duration of the project	Ongoing, since November 2000
Main field of action	Renewable energy and energy efficiency in public buildings, citizen contracting
Short description	The Solar&Save project introduced a new approach in energy performance contracting: Climate protection in public buildings as a profitable capital investment by private citizens. The project combines the construction of solar power plants with measures to modernise lighting and introduces other possibilities to save energy.
Benefits	• Reduction in electricity consumption by about 50% • Reduction in heat consumption by 14% to 32% • Reduction of CO_2 emissions of around 3,000 t

2.2.1 Approach and overall aim of the project

The aim of the Solar&Save project is to demonstrate that the high energy efficiency potential within state schools can be developed economically. However, the budgetary situation of many local authorities, as well as an administrative structure that does not allow financing energy efficiency investments through the energy costs saved and therefore – to some extent – provides a negative incentive for authorities to act, contribute to the reasons why many public properties suffer from the need for renovation. The consequence is an increasing lack of modernisation and an accumulation of equipment in bad repair, which can be seen in many local authority schools today.

A model had to be found that was attractive for the public and could be achieved without the local authority budget bearing additional costs. The Solar&Save idea was born: its principle is to allocate the predicted energy cost savings as payback for the investment in energy efficiency and renewable energy that generates revenues from the German feed-in tariffs for electricity.

A characteristic of the project is that solar and energy efficiency measures are transformed into "green investment" opportunities, available to the public. Interested students, parents, teachers and other school staff can invest a minimum of EUR 500 and, in return, benefit from the companies' potential financial success. Additionally, interested individuals can also invest, with a minimum of EUR 2,500.

Pilot Solar&Save projects were run in four schools in Engelskirchen, Emmerich / Rhine, Gelsenkirchen and Cologne. The necessary steps towards energy efficiency at the Aggertal High School in Engelskirchen and at the Willibrord High School in Emmerich / Rhine have already been completed. Since summer 2005, the solar power systems in Gelsenkirchen (at Bergerfeld comprehensive school) and in Cologne (at the European school) have been operating. The energy efficiency measures are close to final implementation.

In the project, sustainable technologies are used in the following six areas:

1) pollution free photovoltaic power plants;
2) energy-efficient lighting systems in school rooms;
3) circulating pump reorganisation and improvement of the heating cycles as well as automatic control engineering;
4) reorganisation of the ventilation;
5) development of further economic potentials for energy efficiency; and
6) measures for water saving.

For the first phase of planning and implementation, the Solar&Save project received support from the North Rhine-Westphalian Ministry for Economy, Medium-Sized Businesses and Energy. The costs for realising the four Solar&Save projects were exclusively financed by citizen capital.

The Solar&Save project is a master project of the "North Rhine-Westphalian State Initiative on future Energies". The individual projects received financial subsidies from the "North Rhine-Westphalian support programme for energy efficiency and clean energy" (REN) for the installation of the solar panels.

2.2.2 Benefits

By implementing the intended measures, participating schools' electricity consumption has been reduced by about 50%, while energy consumption for heating has been reduced by between 14% and 32%. This also results in a considerable reduction of CO_2 emissions. Taken collectively, the Solar&Save projects lead to a reduction of about 3,000 tCO_2 emissions.

The realisation of Solar&Save projects leads to a classic win-win situation for all participants: the schools, which are local authority property, benefit from dynamic renovation without denting the local authority budget; conditions for learning are improved by the new flicker-free lighting; pupils and teachers, as well as parents, learn about the importance of careful usage of energy and water resources.

In the annual accounts, saved kilowatt-hours are multiplied by current energy prices. Project participation can, therefore, be seen as reinsurance for shareholders against rising energy prices. Rising energy prices lead to an accordingly higher profit.

After completing all intended solar and energy efficiency measures at the four schools, a total investment of more than EUR 3 million will have been made. In this way the projects make a significant impact on the local and regional economy and contribute to higher employment levels. The costs for gas and oil will be replaced by the costs for production and installation of efficiency technologies.

The cost-benefit ratio of the four Solar&Save projects can be assessed as being very good. Taking all costs into consideration, the incomes achieved (= saved energy costs) and the investment led to a positive result and an attractive return of the assigned capital. The savings achieved by all four Solar&Save projects are so high that the return on investment is between 5% and 8%. In addition, schools and local authorities are sharing in the economic success.

2.2.3 Replicability

The biggest obstacle that had to be overcome in this project was to convince local authorities of the advantages offered by the Solar&Save project. Many discussions with various local government departments and councils took place prior to the commencement of the projects. This is not surprising because the project idea was completely new and much persuasion was necessary.

Once the first successful project at the Aggertal High School in the city of Engelskirchen was underway and could serve as an example, the situation became easier: convincing the decision-makers became much more straightforward.

The concept of Solar&Save projects can only be implemented at large schools with high energy consumption and an accordingly high energy cost saving potential. The minimum value needed for annual energy cost savings is about EUR 40,000.

A basic condition for successful project implementation is a good database as well as close collaboration with local partners.

The concept of Solar&Save was already transferred to the European level by the implementation of the PRIME project in the framework of the EC's Intelligent Energy Europe programme. PRIME (Private Investments Move Ecopower) promoted participatory sustainable energy projects in public buildings. The necessary investments needed for projects involving Rational Use of Energy (RUE) and/or Renewable Energy Sources (RES) in public buildings are raised using private capital from citizens and local stakeholders.

2.2.4 Sources

www.wupperinst.org/solarundspar/

www.agenda21nrw.de/21nrw/practice.html

www.wisions.net

2.2.5 Contact

Wuppertal Institute for Climate, Environment, Energy

Mr. Kurt Berlo

e-mail: kurt.berlo@wupperinst.org

URL: www.wupperinst.org

2.3 Additional good practice examples for energy efficiency in (public) buildings

No	Project Title	Location	Duration	Main field of action	Short Description	Benefits	Source of information	Contact
	PUBLIC BUILDINGS							
1	**Gaia Lighting - Because tomorrow is important for us!**	Vila Nova de Gaia, Portugal	Since 2008	Public Lighting System	The objective of Gaia Lighting project is to optimise the lighting system by reducing energy consumption by 40% within the identified sample of 100 Public Lighting facilities.	Energy savings of 30% to 40% per year by facility; around 7.7GWh per year; estimated annual reduction of CO_2 around 3,400 tCO_2 emissions	www.energie-cites.org www.energaia.pt	Energy Agency of Gaia, Luís Castanheira, lcastanheira@energaia.pt
	SCHOOLS							
2	**9th Primary School – Many hands make light work as whole school skips to low energy beat**	Egaleo, Greece	Since 2004	Rational use of energy, renewable energy, awareness raising	The 9th Primary School has been involved in a number of environmental projects over several years; step by step its pupils, parents and teaching staff have become increasingly aware of the issues to the extent that sustainability has become institutionalised. Beginning in 2004, the school undertook the initiative Rational Use of Energy and Renewable Energy Sources.	In 2005 the School achieved the "Display" energy label Class A in energy consumption and B in both CO2 emissions and water consumption.	http://www.display-campaign.org/rubrique323.html, www.energie-cites.org	9th Primary School, Katerina Berli, berli@egaleo.gr

3 Household emissions

3.1 Energy efficiency refurbishment in a multi-dwelling residential building and formation of the first Bulgarian 'Association of Flats Private Owners' – Sofia, Bulgaria

City	Sofia, Bulgaria
Duration of the project	2003 - 2004
Main field of action	Renovation of privately owned multi-dwelling residential building
Short description	A multi-dwelling residential building with low-income owners was renovated. The project was financed by low interest rate loan and by renting new flats in the reconstructed attic floor. The owners registered the first legal entity of private flat owners in Bulgaria.
Benefits	• Reduction of energy consumption by 46%

3.1.1 Approach and overall aim of the project

The objective of the project was to renovate and carry out follow-up maintenance of the multi-dwelling residential building, overcoming the problems connected with the low incomes of the owners that could not afford to pay for the renovation. The renovation was expected to reduce resident's energy consumption and improve their comfort.

The multi-residential building of this project is situated in the Zakharna Fabrika housing estate in Sofia, Bulgaria. All of the flats are privately owned by the residents. There were several issues concerning the renovation of the building. Not only were the building and its systems in a poor state, another problem was that the owners were low income families that could not afford to pay for the renovation. The variety of interests and priorities for different residents was another issue that had to be dealt with.

Prior to the renovation, the building's roof was in poor condition, the basement and the external brick walls - almost without plaster - were not insulated and the double glazed windows were in worn-out wooden frames. The building was erected in 1947 with 1,100m^2 living area and 13 flats, all of which are now privately owned. Heating source is district heating.

The project costs amounted to EUR 52,375 and it was financed by a loan from a Dutch bank. The 20-year loan was provided at the lowest interest rate available. The monthly payment of the loan is approximately EUR 350, but half of this is paid for from the rent of the two new flats built after the reconstruction of the attic.

This pilot project for the rehabilitation of Block No. 10 in the Zakharna Fabrika housing estate was initiated and carried out 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" project financed by Matra Projects Programme of the Netherlands.

In September 2003 the idea of the project was presented to the owners of flats from the Zakharna Fabrika housing estate with active support of the local municipal administration. In parallel, neighbouring buildings were assessed for their suitability for the project. After this investigation, the project partners decided to make an offer to the owners of Block No. 10 to participate in the pilot project.

At the end of 2003 the owners of Block No. 10 flats registered the first legal entity of private flat owners in Bulgaria. This entity and the good partnership between the Bulgarian and Dutch housing associations ensured the success of the project. By the end of 2004, the renovation was complete.

The energy audit undertaken before the renovation and the regular monitoring undertaken after the renovation helped to ensure that the project would be a success, with guaranteed, long-lasting results.

The project started in 2004. Since then, the following energy saving measures have been installed in the building:

- Thermal insulation of the external walls (0.52 cm)
- Water proofing and thermal insulation of the roof (0.5 cm)
- Replacement of the wooden window frames with PVC frames
- Thermal insulation of the basement ceiling
- Improvement of the heating system – balancing and insulation of pipes
- Total reconstruction of the attic floor. Two attic rooms were transformed into small flats. Rent from the tenants of the new flats will help the building owners to pay off the loan used to finance the renovation.

3.1.2 Benefits

The owners of the flats are highly satisfied with the results of the project. The renovation lengthened the life of the building by 40 years. In addition, the insulation of the building envelope led to improved comfort for residents and lower energy bills. There was a 46% energy saving.

The energy audit undertaken before the renovation and the regular monitoring undertaken after the renovation helped to ensure that the project would be a success, with guaranteed, long-lasting results.

After the renovation the building got certificate A according to the Bulgarian certification rating, which has two categories - A and B. All buildings that get an A rating after auditing are released from paying a building tax for ten years. The reference value for certificate A is 121.7 kWh/m^2/year.

The change of energy consumption of the building was:

	Before	**After**
	kWh/m^2/year	kWh/m^2/year
Heating	162.6	60.2
Hot water	30.5	43.8
Total	193.1	104

3.1.3 Replicability

Considering that 97% of residential buildings in Bulgaria are privately owned, there is huge potential for this project to be replicated. There are a lot of residential buildings that need urgent repairs and could be improved to provide greater comfort for residents, lower energy consumption and bills and higher market value of the property. This project can easily be replicated in the neighbouring buildings, as they are structured in the same way.

This pilot project provides a good example that can be used to encourage and stimulate other owners of multi-dwelling buildings to undertake similar activities in their properties. This successful experience should be broadly promoted, particularly given its wide applicability in the Bulgarian residential building stock and the impact that such activities can have on reducing energy consumption and protecting the environment.

The following key issues should be considered by implementing such projects:

- It is necessary to involve all owners and to organise them into a legal entity.
- The costs of the refurbishment can be covered by a low interest, long-term loan. But they can be also be covered, at least partially, by either reconstructing the attic or building an extra floor to create flats and using the resulting rent to contribute to the cost of the renovation. Building such flats should be possible for most multi-residential buildings.
- It is important to find financing institutions that are flexible when giving loans for energy efficiency projects. This is important because often the flat owners are on low to medium incomes and this needs to be taken into account by the bank.

This project was the first attempt to undertake an energy efficiency project for the rehabilitation of a privately owned multi-residential building in Bulgaria. In order to undertake the project, the first 'Association of Flats Private Owners' was registered in Bulgaria. The establishment of this association and the strong partnership between the Dutch and Bulgarian housing associations involved in this project were crucial to its success.

3.1.4 Sources

www.display-campaign.org/rubrique726.html

www.bha-bg.org

www.energie-cites.eu

E-bulletin of the Bulgarian Energy Efficiency Network EcoEnergy (http://www.ecoenergy-bg.net/), distributed among all 264 municipalities of Bulgaria. In issue 3/2004 on p. 3, there is an article about the pilot project in Block No. 10 (only in Bulgarian).

3.1.5 Contacts

Bulgarian Housing Association

Georgy Georgiev

E-mail: bha@mail.orbitel.bg

3.2 CAKES – Calderdale & Kirklees Energy Savers, UK

3.2.1 Approach and overall aim of the project

Cities	Kirklees, Calderdale, UK
Duration of the project	2000 - 2007
Main field of action	Increasing energy efficiency in households, energy efficient insulation and heating
Short description	The 'CAKE' scheme offered advice, registered installers, fixed discount prices, preferential credit facilities and cash backs and therefore provided financially viable, easily accessible and energy efficient heating and insulation measures.
Benefits	• Life-time CO_2 savings of about 34,000 tonnes

The Calderdale and Kirklees Energy Savers (CAKES) scheme, launched in September 2000, was co-ordinated by Kirklees Energy Services (KES) which is a SAVE agency, in conjunction with Calderdale Metropolitan Borough Council (MBC) and Kirklees Metropolitan Council (MC). By providing advice, registered installers, fixed discount prices, preferential credit facilities and cash backs (funded by HECA[5]ction, TXU, Scottish Power and the European Commission) this scheme offered householders (ineligible for other government funded Home Energy Efficiency schemes) in Calderdale and Kirklees financially viable, easily accessible and energy efficient heating and insulation measures.

'CAKES' aimed to install more energy efficient measures in Kirklees and Calderdale households, thereby reducing CO_2 emissions and assisting Britain to obtain their CO_2 target. To do so, 'CAKES' offered householders a 'one stop shop' that offered financially viable and easily accessible installation of energy efficient insulation and heating. Specific strategies included:

- Promoting the 'CAKES' scheme and offering Energy Efficient advice;
- Developing a local installer network and tendering registered installers for energy efficient insulation and heating;
- Offering householders discounted fixed prices for energy efficiency work;
- Offering householders preferential loan facilities for energy efficiency work;

[5] Home Energy Conservation Act (HECA)

- Offering householders cash backs if applicable – 25% off the cost of insulation or improving their heating system, by putting in a condensing boiler, up to a maximum of £300 per household.

'CAKES' was accessed by contacting KES on a free phone number. KES offered householders a 'one stop shop' to energy efficiency advice; discount installation prices and information about how to access cash backs and preferential loan schemes. Householders eligible for other energy efficient schemes were re-referred, while eligible householders were referred to an approved installer, who arranged an inspection with the householder. After completed works, the installer invoiced the householder and, upon payment, householders were eligible to receive relevant cash backs from 'CAKES'.

To make these measures financially viable and thus more appealing for householders, KES negotiated discounted, fixed, competitive prices and stringent quality and customer care standards for insulation and heating works with installers. The contract was tendered, via newspaper adverts, and awarded to appropriate, registered installers. The successful installers attended KES energy efficiency training in order to signpost the householder to other areas of savings in energy efficiency.

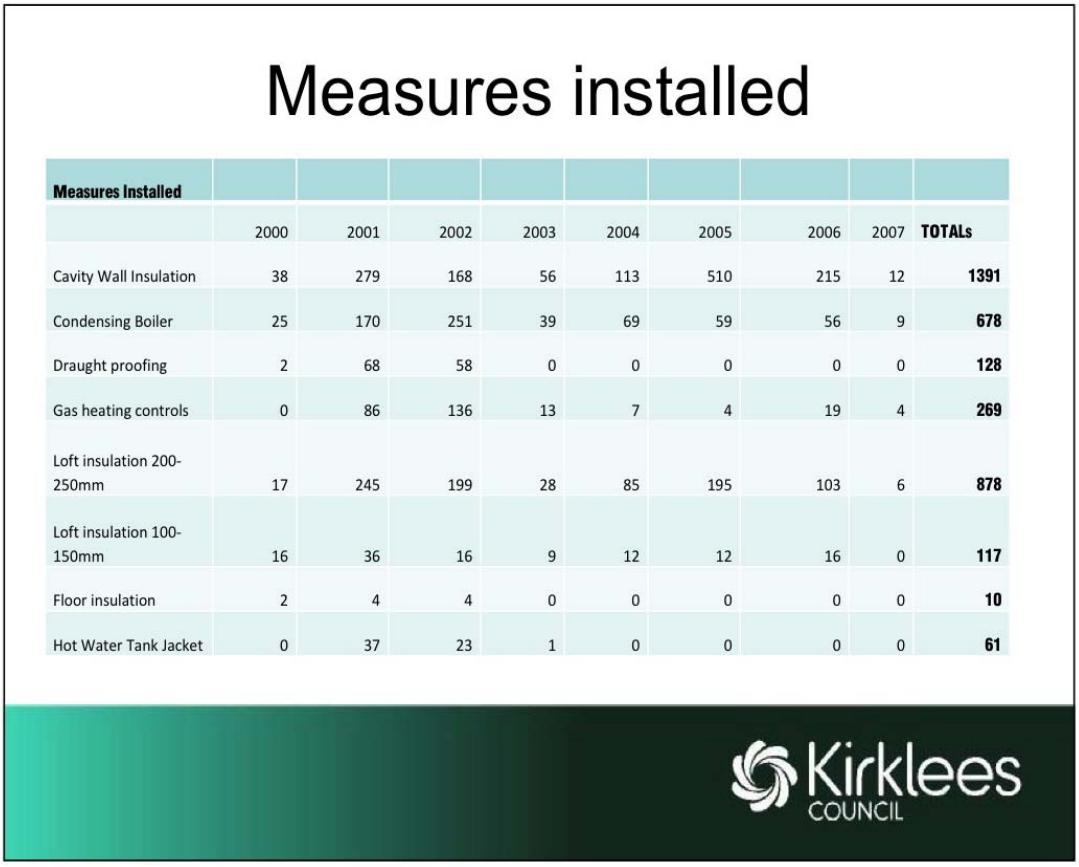
To enable more households to access 'CAKES', terms and legal agreements for a credit package (secure loan), to pay for householder's energy efficiency measures, were negotiated with three Credit unions. Loan funds were transferred to appointed credit unions, and energy awareness training was offered to increase referrals to the scheme.

Installers were charged a 10% referral fee for insulation measures and 5% for heating, these fees funded 'CAKES' administration. Credit unions offered preferential loans to householders. Initially, the energy saving trust, under the HEC-Action initiative, funded the cash backs, when these funds were depleted TXU and Scottish Power (utility companies) funded them as part of their Energy Efficient Commitment obligations. Household contributions made up the majority of the installation costs.

3.2.2 Benefits

A total number of 2889 households in Kirklees, Calderdale and Wakefield were involved in 'CAKES'. The majority of these households were in Kirklees and the greater part of work took place in 2001 and 2005.

Figure 2: 'CAKES' – Measures installed



Measures Installed									
	2000	2001	2002	2003	2004	2005	2006	2007	TOTALs
Cavity Wall Insulation	38	279	168	56	113	510	215	12	**1391**
Condensing Boiler	25	170	251	39	69	59	56	9	**678**
Draught proofing	2	68	58	0	0	0	0	0	**128**
Gas heating controls	0	86	136	13	7	4	19	4	**269**
Loft insulation 200-250mm	17	245	199	28	85	195	103	6	**878**
Loft insulation 100-150mm	16	36	16	9	12	12	16	0	**117**
Floor insulation	2	4	4	0	0	0	0	0	**10**
Hot Water Tank Jacket	0	37	23	1	0	0	0	0	**61**

Source: Presentation by Cllr Martyn Bolt, Kirklees Council, 2008

Figure **2** shows that a total of 3532 energy efficient measures have been installed. Cavity wall insulation has been most often installed, followed by loft insulation and condensing boilers, while floor insulation has been installed least of all.

Table 2 shows a lifetime CO_2 saving of 34,304.24 tonnes when compared with the life cycle of the measures installed. Overall the above results suggest that 'CAKES' has achieved high installation levels of energy efficient measures in a number of households in Kirklees and Calderdale. In turn this has assisted to reduce CO_2 emissions.

Table 2: 'CAKE' – Savings achieved through installation

	kWh saved / year	**EUR saved / year (kWh saved x EUR 0.046)[2]**	**CO_2 savings (kg/year)**
2000	307,808	14,159	58,392
2001	2,796,250	128,627	533,183
2002	2,333,216	107,328	446,878
2003	496,343	22,832	95,575
		Total Lifetime tCO_2 savings	**34,304.24**
Note: Results for kWh saved and CO_2 savings calculated from HEED database calculations			

Source: http://www.managenergy.net/products/R451.htm

Alongside the above savings, 'CAKES' has helped to develop an approved discount local installer network. This will not only benefit subsequent schemes within KES but may result in prices of energy efficient measures being driven down in the general community. Most importantly, 'CAKES' has increased thermal comfort in households, alongside increasing individuals' disposable income (savings in utility bills). Moreover, 'CAKES' has helped to raise energy efficiency awareness in West Yorkshire and had increased local employment.

3.2.3 Replicability

As the scheme developed some problems became apparent. Firstly, a number of installers were not turning up for appointments. This was rectified by specifying more stringent 'customer care' in the re-tender. Also, the selected credit unions set certain criteria for loans, making them inaccessible to some households. Therefore, KES developed an internal loan scheme. Additionally, the 5% referral fee for installers for heating measures was not sufficient to fund CAKES' administration; therefore it was necessary to increase it to 10%.

Funding the scheme also proved problematic, as, once the original funding was distributed, utilities only offered £ 75 cash back on condensing boilers. Resolving this involved KES requesting council's to raise the cash back. However, only two local authorities have obliged to date.

Overall, 'CAKES' was very successful, fulfilled most of its objectives and had many positive aspects in its implementation. Primarily, 'CAKES' offered householders a 'one-stop-shop' for the installation of energy efficient heating and insulation, thus saving individual's potential cost and eliminating potential difficulties involved when locating a quality installer. Scheme accessibility was furthered by offering financially viable energy efficient measures (alongside loan schemes), offering installation by approved and registered installers, and having an organisation (KES) to resolve any problems with installers and to provide reliable, detailed and quality energy efficiency advice.

The key lessons leant from this scheme to date include:

- Specifying stringent 'customer care' standards in the tender to installers was essential to ensure on-going community involvement.
- Building a team of registered and reputable installers who offer superior customer service and have an interest in energy efficiency was crucial for customer satisfaction and thus the ongoing success of the scheme.
- The setting up of a loan scheme that offers open criteria is more accessible for householders and thus generates more implementation of measures.
- Substantial cash backs are essential for householder involvement. Establishing these involves finding attractive reasons for organisations/ companies to fund a scheme. I.e. councils fulfilling their HECA commitments and utilities fulfilling their energy efficiency commitment.
- A referral fee of 5% for heating measures was insufficient for administration costs for this scheme, 10% was more appropriate.

3.2.4 Sources

http://www.managenergy.net/products/R451.htm

www.energy-help.org.uk

3.2.5 Contacts

Kirklees Energy Service
Lynne Ellis
E-mail: lynne@energy-help.org.uk

Kirklees Council
Martyn Bolt
E-mail: martyn.bolt@kirklees.gov.uk

3.3 Additional good practice examples for reducing household emissions

No	Project Title	Location	Duration	Main field of action	Short Description	Benefits	Source of information	Contact
	RESIDENTIAL BUILDINGS							
1	**Improving energy efficiency of housing**	Nyíregyháza, Hungary	Since 2001	Renovation of multi-residential buildings	The aim of the project is to reduce energy costs for citizens, to improve their comfort, and to prevent the development of urban slums, through renovations to the housing stock and heating systems to improve energy efficiency.	The project has resulted in energy savings of 26.8 TJ/year. An evaluation of the retrofitting measures has shown that an overall 68% energy saving can be achieved.	http://www.display-campaign.org/rubrique682.html	City of Nyíregyháza, Péter Nagy, nyhvaruz@nyirhalo.hu
	ENERGY EFFICIENCY							
2	**Energy Box**	the Netherlands, e.g. Zoetermeer	since 2006	Energy efficiency in low-income households	Distribution of a free energy box to 2,400 households with minimum income. The energy box contains 3 energy efficient light bulbs, a stand-by killer, radiator isolation, water savers and a brochure with energy saving tips.	In total, savings amounted to 600,000 kWh, 134,400 m^3 gas, 602,400 kg CO_2 and 38,400 m^3 water.	www.energie-cites.org, www.stichtingerea.nl	Energy Agency Zoetermeer Harry Meerwijk E-mail: h.meerwijk@stichtingerea.nl

4 Energy use

4.1 District heating and cooling in Helsinki

City	Helsinki, Finland	
Duration of the project	District heating since 1953 District cooling since 2001	
Main field of action	District heating and district cooling	
Short description	Helsinki has an environmentally and economically viable system of district heating and cooling. A world-leading heat pump plant is playing an important role by recycling sewage to generate heating for the city - its one of a number of innovative strategies that are cutting fossil fuel use in Helsinki and helping to meet the City's targets to reduce greenhouse gas emissions by more than a third of the current levels by 2030.	
Benefits	• Average annual reduction of 2.7 Mt CO_2, equals a reduction of emissions in the city by 40% annually.	

4.1.1 Approach and overall aim of the project

Helsinki has an environmentally and economically viable system of district heating and cooling, that reduces emissions in the city by 40% a year compared to a system based only on gas and coal - an average of 2.7 Mt CO_2 annually. Primary energy savings amount to an average of 9700 GWh in the Helsinki energy system. A world-leading heat pump plant is playing an important role in improving this success further by recycling sewage to generate heating for the city - its one of a number of innovative strategies that are cutting fossil fuel use in Helsinki and helping to meet the City's targets to reduce greenhouse gas emissions by more than a third of the current levels by 2030.

Combined Heat and Power (CHP) and District Heating (DH) have long been the basis of Helsinki's energy supply – without this system, emissions would be much higher in the city. Energy consumption in heating is a critical part of the Helsinki's struggle with CO_2 emissions. Of Helsinki's consumption-based greenhouse gas emissions, 44% comes from heating, 30% from the use of electricity and 20% from traffic. In 1998, trials with District Cooling (DC) systems began and by 2001 they were permanently introduced to the city. The production of DC is based on renewable and other energy sources otherwise wasted.

Helsinki Energy produces over 90% of the heat demand of the city in CHP plants with over 93% of buildings connected to the DH network. Power is generated in the same process, exceeding the consumption in Helsinki. So excess electricity is sold to the Nordic market, generating revenues for the city. DH and DC are local products available to households - they compete with other heating and cooling methods and customers choose what to buy on a free market.

While the main sources of CHP production in Helsinki are gas and coal, a growing part of DH and DC energy is based on resources that otherwise would be wasted. This means the efficiency of the CHP system exceeds 90%, generating an annual saving of 40% CO_2 emissions. Future plans will shift generation further away from fossil fuels to renewable sources.

District Cooling (DC) is outsourced production and distribution of cooling energy for air-conditioning and cooling of offices and residential buildings. DC is delivered to customers via chilled water in a separate distribution network. During winter, cooling energy is obtained from cold seawater through heat exchangers. In summer, condensing heat from power generation is diverted to absorption chillers for DC, which increases the efficiency of thermal power plants.

Additionally, a heat pump plant utilizes waste heat energy from purified sewage. This facility opened in 2006 and is the world's largest heat pump energy production plant, combining DH, DC and heat capture from sewage water and sea water. This plant has a 90MW capacity for DH and 60MW capacity for DC, and is projected to cut CO_2 emissions by 80% compared to alternative forms of production.

The city-owned Helsinki Energy company is responsible for infrastructure investments and operations. Investments have focused on improving the eco-efficiency of DH and DC plants (from 2005-2007, total investment USD 77 million) and were mainly self-financed, with some additional state subsidies in the heat pump plant project. The company operates in free competition, and is very profitable to the city.

Energy remains the leading source of GHG emissions in Helsinki and consumption of energy is projected to rise. Thus, extending DH in new suburbs, DC in the city centre, maintaining the efficiency of the system and improving the efficiency on the consumer side, are key issues now and further on. The substitution of fossil fuels with biomass and other carbon-neutral sources will take place in the future. Other measures will focus on low-energy city planning and buildings, efficiency and energy saving training for proprietors and consumers, improved procurement, etc.

4.1.2 Benefits

The Helsinki Metropolitan Area, comprising four cities and 1 million people, has high per capita energy consumption compared to other large Nordic cities - over 6 t CO_2eq per person. This, however, is relatively low in Finland, as there is little heavy industry in the region. The Helsinki Met Area has reduced its GHG emissions from 1990-2000 by 5.7%, a cut largely due to a 12.8% fall in Helsinki city. This fall is largely attributed to improved energy efficiency in energy production and reduced use of coal for generation.

Local air quality has improved through DH, as it has practically replaced house-specific heating equipment and chimneys. Moreover, CHP and DH lead to decreased energy bills and much lower emissions. DC has the same effect, using natural resources and technical measures for services that could be inefficiently produced using building-specific equipment.

DC frees up space in buildings by reducing the need for compressors, fans and condensers. It also reduces urban noise and vibrations from cooling equipment. This means property owners can increase their space, reduce installation and maintenance costs of equipment, plus improve the indoor environment, as well as reduce emissions. The overall lifetime of DH or DC systems is much longer than that of a building-specific unit.

In the European Union, the "Primary Resource Factor" (PRF) is used to measure and compare the efficiency and emissions of different heating and cooling systems. Low PRF value means an efficient, low emission system has been developed, and in recent years, there has been a rise in market share for these systems.

Helsinki Energy´s average emission of CO_2 is 4,2 Mt per year. The DH and DC system saves 2,7 Mt of CO_2 each year[6].

In 2006, fuel energy used in CHP production amounted 17,070 GWh in Helsinki. This represents less than 64% of fuel which would have to be used in separate production of electricity in condensing power plants and heating in separate boilers in buildings. The estimated saved energy use was 9,319 GWh corresponding to 826,000 tons of heavy fuel oil. Based on the mean fuel price of EUR 419/ton in 2006, the annual financial saving for Helsinki was EUR 346 million. Similarly, CO_2 emitted was about 3 million tons less.

4.1.3 Replicability

The demand for centrally produced district cooling has increased rapidly in the past few years. The reason for the popularity of the system is its environmental friendliness and cost-effectiveness compared to conventional compressor technology.

Helsinki is a good example of growing cooling demand. Despite of relatively cold climate and short summers, almost every office block, hotel and shopping centre is equipped with a cooling system. The reason for cooling is to promote a healthy and productive indoor climate. The most environmentally friendly way to cover increasing demand is use of local resources that otherwise would be wasted. District cooling provides efficient cooling deliveries to a building as well as profitable business for the cooling provider. Furthermore it has a significantly better energy performance of building compared to alternative cooling solutions.

Due to higher demand, Helsinki Energy will increase its district cooling production capacity significantly in the near future. A second cooling plant is already under construction at the Salmisaari power plant site. A pipe network and cooling plants are being planned for the centre of Helsinki and the district of Sörnäinen. As the newest form of production, Helsinki Energy is investigating possibilities to utilise the heat of purified waste water in the production of district heating and district cooling based on the use of a heat pump.

It is estimated that in 2010 the connection power of district cooling will exceed 100 MW.

Helsinki Energy's vision: District cooling is the primary form of cooling energy production in Helsinki Energy's customer areas.

4.1.4 Sources

http://www.c40cities.org/bestpractices/energy/helsinki_heating.jsp

http://www.helsinginenergia.fi/kaukojaahdytys/en/

http://www.sisailmayhdistys.fi/attachments/clima07ws/ws16_summary_draft.doc

4.1.5 Contacts

Helsinki Energy

Dr. Martti Hyvönen

Environmental Director

martti.hyvonen@helsinginenergia.fi

[6] www.helsinginenergia.fi/en/tuotanto/benefits.htm

4.2 Public buses fuelled with biodiesel from waste oil - Graz, Austria

City	Graz, Austria	
Duration of the project	Since 1999	
Main field of action	Municipal bus fleet, waste vegetable oil	
Short description	With the slogan “from the frying pan into the tank”, the "Ökodrive" (i.e. Ecodrive) programme was born in 1999. “Ökodrive” provides a sustainable cycle turning waste vegetable oil from harmful waste into a valuable raw material, resulting in biodiesel, which is used as a renewable, low-emission fuel for the operation of buses in the public transport fleet in Graz.	
Benefits	• Using biodiesel reduces CO_2 emissions by 50-80%	

4.2.1 Approach and overall aim of the project

The displayed project in Graz was implemented in the framework of the European Trendsetter project. In total, Trendsetter involves 54 individual projects. Their common aim is to

- improve mobility, quality of life, air quality, and to
- reduce noise and traffic congestion.

Next to Graz, four other European cities (Lille, Pecs, Prague and Stockholm) participate in the project with the aim to ensure real impact, by setting good examples and encouraging others to follow. For this compilation of good practices, the example of Graz was chosen. One of the aims in the trendsetter programme of Graz is to increase the use of biodiesel, in public transport as well as in taxi fleets.

In an average year the Grazer Verkehrsbetriebe (GVB), the Graz municipal public transport company, transports 98.2 million passengers in 150 buses, covering a distance of 8.5 million kilometres, consuming 3.8 million litres of diesel and producing significant levels of emissions.

With the slogan “from the frying pan into the tank”, the "Ökodrive" (i.e. Ecodrive) programme was born in 1999. “Ökodrive” is the only project that provides a sustainable cycle turning waste vegetable oil (WVO) from harmful waste into a valuable raw material, resulting in biodiesel, which can be used as a renewable, low-emission fuel for the operation of buses in the public transport fleet.

In order to investigate the suitability of biodiesel as a fuel for operating conventional diesel vehicles, the city of Graz began the project in 1994 with two buses from the municipal public transport service.

Waste oil from private households and 250 restaurants is collected and recycled into biodiesel. This oil is then delivered to SEEG (Südsteirische Energie- und Eiweißerzeugungsgenossenschaft) located in Mureck, South Styria, as valuable raw material for the production of biodiesel.

SEEG is a co-operative with 570 members that produces biodiesel from rapeseed (10% of total biodiesel production) and converts used cooking oil into biodiesel (90% of total biodiesel production). As the world's first, and for a long time only, company, SEEG makes biodiesel out of used cooking oil. Communities and food-serving businesses can become members of this cooperative. The used cooking oil is collected and turned into biodiesel (850 litres biodiesel from 1000 kg used cooking oil). This biodiesel is returned to the members for use in their own vehicles. More than 100 communities and the public transport operator of Graz are part of this cycle. In total, the supply volume of biodiesel (RME) by SEEG in 2006 was 8,739 tonnes, of which 2,346 tonnes were supplied to Graz City Transportation Corporation.

The technology for the conversion of waste vegetable oil to biodiesel was developed by the University of Graz in cooperation with the Technical University of Graz and Biodiesel International (BDI), the knowledge leader in this field. Using research from the Technical University of Graz, particle filters have been successfully implemented in the bus fleet. As part of the EU programme “Life/Kapa GS”, most of the buses will now receive particle filters to reduce exhaust levels, thereby increasing the city’s attractiveness.

Local politicians, as well as the GVB, are pro-environment and they sponsored the 100% conversion of the bus fleet. Support was also forthcoming from the EU to promote a sustainable transport future in Europe in the form of several EU programmes (Civitas /Trendsetter) which supported the projects financially.

Graz has been collecting used cooking oil and recycling it for 16 years in increasingly large quantities. The product was first used to create soap, and now biodiesel.

Used frying oil has caused a lot of problems in the past. Many private households were using their lavatories for disposal, resulting in high costs for the maintenance of the drain system as well as for wastewater treatment. Used frying oil from restaurants in most cases was shipped abroad were it was processed to animal food or even to margarine, re-entering the food chain and creating serious problems.

The aim of „Ökodrive” (Ecodrive) has been:

- to convert the entire public transport bus fleet of Graz to biodiesel,
- thereby to reduce emissions and environmental impacts from the public transport system,
- the creation of a sustainable cycle from used frying oil as harmful waste to valuable raw material, ending up with the renewable low emission biodiesel,
- development of a free-of-charge collecting system for restaurants,
- further improvement of the collecting system for private households, and
- conversion to biodiesel for a taxi fleet.

Between 2002 and 2006 the biodiesel initiative was supported by the EU programme CIVITAS/ TRENDSETTER. Today, the entire bus fleet of the Graz public transport company (GVB) has been converted to biodiesel.

Converting the 220 taxis of the largest fleet, the 878 City Funk GmbH, to biodiesel is the next step. The use of fossil fuels causes emissions that are harmful to the environment. The local government, therefore, undertook measures to reduce private car usage, for example by limiting free parking spaces in the city. Taxis are seen as a means of transport that complements the public transport network.

A biodiesel service station was conveniently constructed next to the headquarters of 878 City Funk GmbH, making it unnecessary to drive long distances to obtain biodiesel. The biodiesel station is also open to the general public. By 2005, approximately 65 taxis had been converted to biodiesel.

4.2.2 Benefits

The modifying of the existing bus fleet to biodiesel and purchase of 41 new biodiesel buses took about 42 months. Today, the bus fleet consists of 100 percent suitable biodiesel buses. The biodiesel buses have consumption rates that are between 5% and 7% higher than those fuelled by fossil fuels, but the price of the biodiesel is lower. Despite the higher consumption rates, using biodiesel reduces CO_2 emissions by 50-80%. The concrete amount of reduction depends on the way in which the vegetable oil was produced. Additionally, biodiesel can be produced locally, leading to shorter transportation routes and lower emissions. Moreover, through the use of particle filters, 3.2 tons of particles can be saved per year.

The fuel used at the GVB, which is generally called biodiesel, is a waste cooking methyl ester (FAME) generated from waste cooking oil or fat after a respective cleaning. A relevant part of this waste cooking oil is collected in a systematic way by 250 restaurants of the City of Graz; also private households have the possibility to bring their waste cooking oil to specifically created containers at collection points.

In 2004, 280,000kg of waste oil was collected from restaurants and 75,000kg was collected from private households to be converted to biodiesel. This represents 70% and 17%, respectively, of the estimated total capacity from these two sources. This used oil is not only turned into a valuable raw material that produces biodiesel, but eliminating the used oil from its previous usage cycles also has dramatic benefits. The oil, which is otherwise difficult to dispose of, is prevented from re-entering the food chain (e.g. in the form of animal feed or margarine) which, in turn, stops it from causing the associated negative health consequences. In addition, eliminating used oil from the waste treatment process lowers the maintenance costs of municipal purification plants and also increases their capacity. Finally, the processes necessary to collect and convert the waste oil create valuable jobs in the region.

Due to a contract between the SEEG and Eco-Service concerning the payment for the collected waste oil, the project's running costs are low, requiring only a minimal level of support from the municipality. Other systems also derive benefit from the project, such as the sewage system and wastewater treatment plant, where about EUR 30,000 has been saved on maintenance due to the removal of waste oil from this loop.

An innovative financing plan, based on a special leasing model for buses to include maintenance, allows for quick renewal of the fleet and provides customer-friendly buses that are modified for the disabled.

4.2.3 Replicability

Some technical problems arose during the initial phase of the Taxifleet project. Therefore, two biodiesel experts, from the chemistry department of the Karl Franzens University of Graz and the Institute for Internal Combustion Engines and Thermodynamics at the Technical University of Graz, were recruited. With their help, the problems were solved and the project was a success.

Based on the experience of Ökodrive, the model could be applied universally. An essential prerequisite would be to structure the project in the same way as in Graz. Within Europe, the transferability to similar types of companies would be easily achievable. All measures that have been implemented could easily be transferred to other companies working in similar areas. Many other cities in Europe have already asked for detailed information on this sustainable project and intend to adopt this system, as waste oil is also a problem in these other cities.

4.2.4 Sources

www.trendsetter-graz.at

www.trendsetter-europe.org

www.civitas-initiative.org/

www.graz.at

www.seeg.at/en

www.wisions.net

4.2.5 Contact

City of Graz

Dipl.-Ing. Gerhard Ablasser

e-mail: gerhard.ablasser@stadt.graz.at

4.3 Additional good practice examples for energy use

No	Project Title	Location	Duration	Main field of action	Short Description	Benefits	Source of information	Contact
	RENEWABLE ENERGY							
1	**Barcelona's solar hot water ordinance**	Barcelona, Spain	since 2000	Solar hot water, ordinance	Barcelona is the first European city to have a Solar Thermal Ordinance making it compulsory to use solar energy to supply 60% of running hot water in all new buildings, renovated buildings, or buildings changing their use.	Annual CO_2 reduction: over 4,300 tonnes	http://www.c40cities.org/bestpractices/renewables/barcelona_solar.jsp, www.barcelonaenergia.cat, www.bcn.cat	Barcelona Energy Agency, Toni Pujol-Vidal, tpujol@barcelonaenergia.cat
	DISTRICT HEATING AND COOLING							
2	**Seawater to heat homes**	The Hague, the Netherlands	since 2005	Central heat pump, seawater	The City of The Hague has developed an innovative energy concept that consists of a seawater central supply unit with a heat exchanger and heat pump unit that uses the nearby sea as a temperature source.	Annual CO_2 reduction: approx. 4,012 tonnes	http://www.c40cities.org/bestpractices/energy/hague_seawater.jsp	City of The Hague, Mr. Henk Bakker, h.bakker@dso.denhaag.nl
	EFFICIENT STREET LIGHTING							
3	**Modernisation of Street Lighting**	Kaunas, Lithuania	2002-2006	Efficient street lighting	Between 2002 and 2006 a total of 16,000 old street lights (from 23,000 installed) have been replaced by new sodium lamps (of 70W, 100W, 150W or 250W).	Annual electricity consumption for lighting was reduced from 20,969 kWh to 11,778 kWh (56%).	www.energie-cites.org, www.eu-greenlight.org	Kaunas City Municipality, Pranas Urbanavicius, pranas.urbanavicius@kaunas.lt
	TRANSPORT							
4	**Trendsetter Lille: 120 clean vehicles in Lille municipal car sharing**	Lille CU, France	since 1997	municipal car fleet, car sharing	Lille Metropole has more than doubled the number of clean vehicles in its fleet. The fleet is used for car sharing by the Lille Metropole staff.	CO_2 emissions are reduced by about 30% for gas vehicles compared to diesel.	http://www.trendsetter-europe.org	City of Lille, Claude Legrand, clegrand@cudl-lille.fr

5 Annex: Sources of information

Name	Initiator	Homepage	Short description / Content
Ashden Awards for Sustainability	Ashden Awards for Sustainability. The Awards were founded in 2001 by the Ashden Trust, one of the Sainsbury Family Charitable Trusts (SFCT).	www.ashdenawards.org	The Ashden Awards bring to light inspiring sustainable energy solutions in the UK and developing world and help ensure that they are spread more widely. From an entrepreneur rolling out solar power across rural India to a school adopting clean energy and green learning in England, our winners are passionate about bringing change to their communities and the planet.
CADDET	Centre for Analysis and Dissemination of Demonstrated Energy Technologies, part of an IEA (International Energy Agency) agreement	www.caddet.org	Source of information on commercial energy-saving and renewable energy technologies. Includes a project database.
C40 cities	C40 is a group of the world's largest citites commited to tackling climate change. In partnership with the Clinton Climate Initiative	www.c40cities.org	Includes a section on cities with the topics buildings, energy, lighting, ports, renewables, transport, waste, water
BEHAVE – Evaluation of Energy Behaviour Change Programmes	Senter Novem, supported by the Intelligent Energy Europe programme	www.energy-behave.net	BEHAVE aims to enhance the impact of energy-related behavioural change programmes and projects in the household sector by learning from existing ones and make this knowledge explicit and accessible for policy makers and programme managers, on international, national, regional and local levels. Includes case studies.
Display – European Municipal Buildings Climate Campaign	Project coordinated by Energie-Cités, supported by EU Commission DG ENV (2003-2005), DG TREN (since 2005).	www.display-campaign.org	The European Display® Campaign is a voluntary scheme designed by energy experts from 20 European towns and cities. It is aimed at encouraging local authorities to publicly display the energy and environmental performances of their public buildings using the same energy label that is used for household appliances.
Eco n'Home	Supported by the Intelligent Energy Europe programme. The Eco n'Home consortium involves partners from six different countries: France, Belgium, Germany, Italy, Portugal and the United Kingdom.	www.econhome.net	Eco n'Home is a pioneering initiative to monitor and reduce the energy consumption of over 1000 sample households across Europe. Central to the project is the development and delivery of a new service for advising households on sustainable energy use in their dwelling and travel.
Energie-Cites.eu	Energie-Cités – association of European local authorities for the promotion of local sustainable energy policies.	www.energie-cites.org	Homepage includes a project database with more than 600 projects.

ESMA – European Smart Metering Alliance	Supported by the Intelligent Energy Europe programme.	www.esma-home.eu	ESMA will define and spread best practice in smart metering across European member states and maximise the resulting energy savings.
European Greenlight Programme	Initiative promoted by the European Commission	www.eu-greenlight.org	GreenLight is an on-going voluntary programme whereby private and public organisations commit towards the European Commission to reducing their lighting energy use, thus reducing polluting emissions. Includes case studies.
FEDARENE	European Federation of Regional Energy and Environment Agencies	www.fedarene.org	Homepage includes a best practice section with following topics: integrated approach, renewable energies, rational use of energy, environment. (Case studies mainly in French and Spain)
ICLEI	Local Governments for Sustainability	www.iclei.org	Within ICLEI projects good practice examples can be found, as well as links to additional ones.
ISES	International Solar Energy Society	www.ises.org	Within ISES projects good practice examples can be found, as well as links to additional ones.
ISLENET – European Islands Network on Energy & Environment	ISLENET is an initiative of the Islands Commission of the CPMR (Conference of Peripheral and Maritime Regions) and is supported by the EU Institutions and the Western Isles Council.	www.europeanislands.net	ISLENET is a network of European Island Authorities which promotes sustainable and efficient energy and environmental management. It actively promotes the adoption of local energy saving strategies and renewable energy projects.
kids4energy	Project in the EU's SAVE programme	www.kids4energy.net	Includes a programme database with several case studies.
managenergy	MangEnergy is an initiative of the EU Commission, DG TREN, which aims to support of the work of actors working on energy efficiency and renewable energies at the local and regional level.	www.managenergy.net	The main tools are sectoral advice, training, workshops and online events. Additionally information is provided on case studies, good practice, European legislation and programmes.
reeep	Renewable energy & energy efficiency partnership	www.reeep.org	The Renewable Energy and Energy Efficiency Partnership (REEEP) is an active, global partnership that works to reduce the barriers within policy, regulatory and financial structures that bar and limit the up take of renewable energy and energy efficiency technologies and projects.
SESAC – Sustainable Energy Systems in Advanced	SESAC is a project of the CONCERTO initiative co-funded by the EU Commission within the 6th Framework Programme	www.concerto-sesac.eu	The European SESAC project aims at showing how the local economy is able to thrive at the same time as less CO2 is emitted. Delft, Växjö and Grenoble are all carrying out demonstration

Cities			projects while Kaunas (Lithuania), Miskolc (Hungary) and Vastseliina (Estonia) are gaining knowledge and experience through the local energy studies they are performing.
Solar Schools Forum	open and free source, supported by the EU Commission	www.school4energy.net	The Solar Schools Forum website includes educational material, good practice examples, collection of useful links, and places to visit.
SURBAN	European Academy of the Urban Environment	www.eaue.de/winuwd/default.htm	Database on sustainable urban development in Europe.
Trendsetter – Setting Trends for Sustainable Urban Mobility	Within the CIVITAS Initiative of the EU Commission.	www.trendsetter-europe.org	Trendsetter is a cooperation between five European cities; Graz, Lille, Pecs, Prague and Stockholm. It involves 54 individual projects.
WISIONS of sustainability	Wuppertal Institute for Climate, Environment, Energy	www.wisions.net	The WISIONS homepage includes a good practice section with examples on different sustainability-related topics from all over the world.