



CATALOGUE OF BEST PRACTICE

URBAN SUSTAINABILITY – LEARNING FROM THE BEST



European Green Capital Award 2010 & 2011



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FOREWORD



There are many urban challenges. And we know just how important local authorities are in dealing with them. They have a key role to play: in the protection of the urban environment; in making

a better quality of life for growing urban populations; and in ensuring good urban planning for the cities of tomorrow. Economic growth and urban, green revitalisation are now more important than ever for cities – especially when we all have to look carefully at our finances.

The European Green Capital Award recognises and rewards efforts made at local level to improve not only the environment and the economy but also the quality of life of growing urban populations. Progress is its own reward, but the satisfaction and pride involved in winning a prestigious European award spurs cities to invest in further efforts and boosts awareness and action in other cities.

The European Green Capital Award is all about sharing: sharing experiences, sharing best practices, and sharing a vision of the future. Cities differ enormously and sharing real best-practice examples of what a sustainable city can look like is essential if further progress is to be made. Therefore, I encourage you to share the networks that are now emerging, to be proud of successes – but also to allow others to learn from your mistakes.

You are the closest link with the citizen. Your strength lies in being in touch with the needs and wishes of the people and you know best how sustainability can be achieved for you. And as the world becomes ‘flatter’, we are showing how sharing experiences and best practice between us can in fact help solve wider global problems and protect the environment for all of us.

Janez Potočnik, European Commissioner for the Environment



INTRODUCTION



This report presents a catalogue of best practices of the eight finalists for the European Green Capital Award 2010 and 2011. These eight cities have shown that they can lead the way in environmentally friendly urban living and act as role-models to inspire other cities within the field of sustainable urban development.

A total of 35 cities from all across Europe applied for the 2010 and 2011 European Green Capital Awards.

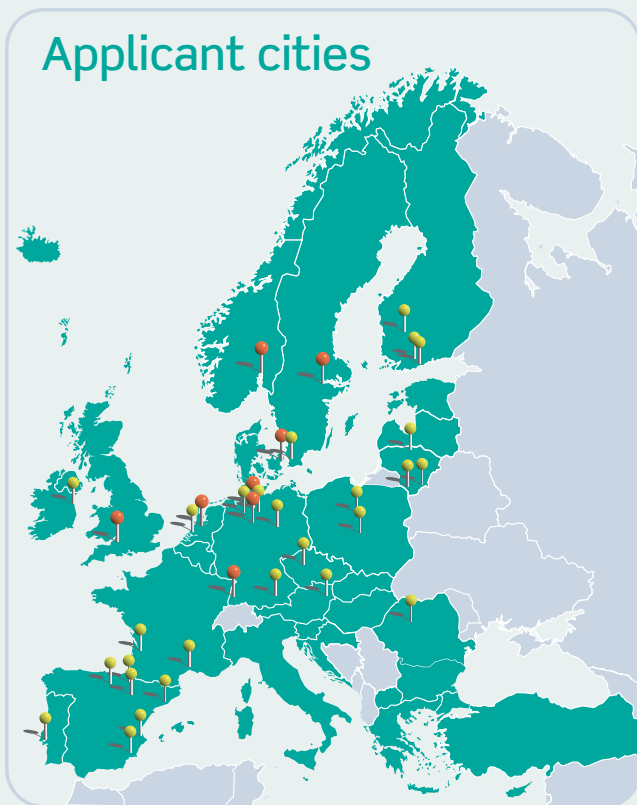
The eight shortlisted finalists were: Amsterdam, Bristol, Copenhagen, Freiburg, Hamburg, Münster, Oslo and Stockholm. Stockholm was selected as the 2010 European Green Capital, while Hamburg will take over the title in 2011.

In this catalogue, best practice examples are given within the 10 environmental indicator areas on which the cities were evaluated. The indicator areas are:

- Local contribution to global climate change
- Local mobility and passenger transportation
- Availability of local public open areas
- Quality of local ambient air
- Noise pollution
- Waste production and management
- Water consumption
- Waste water management
- Environmental management of the local authority
- Sustainable land use.


The aim of this best practice catalogue is to share experiences and visions as well as inspire European cities to introduce measures within these 10 areas to the benefit of their citizens at the same time reducing their impact to local and global environmental problems. One or two examples for each indicator area are given in the catalogue to illustrate how the 2010 and 2011 finalists have tackled these environmental challenges in an effective and efficient manner.

The May 2010 report “Measuring urban sustainability – Analysis of the European Green Capital Award 2010 & 2011 application round” analyses and benchmarks the data provided by each of the cities for the various environmental indicator areas.



 = Finalists

Amsterdam, Netherlands - Bristol, United Kingdom - Copenhagen, Denmark - Freiburg, Germany - Hamburg, Germany - Münster, Germany - Oslo, Norway - Stockholm, Sweden

 = Other applicants

Bordeaux, France - Bremen, Germany - Cluj-Napoca, Romania - Dublin, Ireland - Espoo, Finland - Hannover, Germany - Helsinki, Finland - Kaunas, Lithuania - Lisbon, Portugal - Łódź, Poland - Magdeburg, Germany - Malmö, Sweden - Murcia, Spain - Munich, Germany - Pamplona, Spain - Prague, Czech Republic - Riga, Latvia - Rotterdam, Netherlands - Sabadell, Spain - Tampere, Finland - Toruń, Poland - Valencia, Spain - Vienna, Austria - Montpellier, France - Vilnius, Lithuania - Vitoria-Gasteiz, Spain - Zaragoza, Spain

LOCAL CONTRIBUTION TO GLOBAL CLIMATE CHANGE



Involving citizens, local business and stakeholders in the fight against climate change and urban sustainability is a vital part of European cities' efforts in this area. According to the International Energy Agency (IEA), the urban population in Europe accounts for 69 % of European energy use and thus the lion's share of greenhouse gas emissions in Europe (IEA, 2008). Emissions of greenhouse gases are naturally linked to the material consumption of goods and services, in particular the fossil energy resources used to produce these goods and services.

Due to their population size, Europe's cities hold a great potential to support the implementation of emission reduction plans and measures which are today for the most part implemented at national and regional level. Cities also have a specific competence in mitigation policies; in particular, the potential to carry out city planning in a way that facilitates sustainable urban transport, low energy housing, district heating, etc. Local contribution and involvement in this process is an important step towards improved urban sustainability.



DISTRICT HEATING AND COOLING IN STOCKHOLM

An effective measure introduced in Stockholm is the extension of the district heating system and the establishment of a district cooling system. The city of Stockholm and the energy company Fortum which together own the district heating system constantly connect new areas to district heating in Stockholm. The heating system expands with about 200-300 GWh per year. The emissions of greenhouse gases have dropped by 593,000 tons since 1990 as a result of the conversion from oil-based to district heating.

Also, a new production facility has been constructed, in which cold seawater is used to produce district cooling. District cooling contributes to an annual environmental gain of approx. 60,000 tons in reduced emissions of CO₂. The use of CFC (Chloro-Fluoro-Carbon) is also reduced. This is due to the replacement of small, electricity-driven and therefore less effective air condition systems.



STRONG PARTNERSHIP WITH PRIVATE COMPANIES IN HAMBURG

Among various initiatives implemented by the city of Hamburg within the field of local contribution to climate change is the so-called Eco-Partnership. This is a scheme agreed between Hamburg's administration and Hamburg's industry which dates back to 2003. It offers numerous climate and resource protection services aimed at motivating businesses to participate on a voluntary basis. The measures range from active acquisition of companies through free advice on improving corporate energy efficiency and subsidies for investment in resource-saving measures to the exchange of knowledge and experience via the Eco-Partnership network. One of the cornerstones is the "Enterprises for Resource Protection" programme which assists companies in realising their potential in savings. Target groups are Hamburg's small and medium-size businesses and skilled craft enterprises.

To date, approximately 900 enterprises have received advice, and 470 investment measures have been implemented. As a result 62,000 tons of CO₂ emissions are avoided annually, in addition to reductions in water and chemical usage and waste production.

The Eco-partnership scheme will be expanded in the coming years. In 2013, it is planned to include 5,000 companies. The programme's sub-projects "Enterprises for Resource Protection: heat check, light check, efficiency offensive and drive system check", for which Hamburg pays one third of the consultation costs, are being implemented, and a new focus, cooling technology, is being introduced. This should reduce CO₂ emissions by 170,000 tons per year by 2012. The eleven largest CO₂ emitters in Hamburg have committed themselves to voluntarily reduce their CO₂ emissions by 500,000 tons per year by 2012. Climate protection criteria are taken into account within the framework of economic subsidies.



Mr Erhard Arhelger,
Environmental protection
officer
Daimler AG, Mercedes-
Benz, Hamburg plant
City of Hamburg, Germany

What is the role of companies like Mercedes-Benz in the Hamburg Eco-Partnership? And how does the Eco-Partnership work?

We have been part of the Eco-Partnership since the beginning of the scheme in 2003, and have had a good cooperation with both Hamburg City Council and the other partakers. The Eco-Partnership is a platform for the exchange of knowledge in all environmental-relevant questions. We see it as a possibility to share our experiences with the other members of the Eco-Partnership and to discuss issues such as eco-management, energy saving and resource efficiency. As part of this, we organize a workshop entitled “Environmental key performance data”. It is an initiative which we have only gained from.

What measures have Mercedes-Benz taken to reduce CO₂ emissions?

Over the last years, we have implemented various measures in thermal isolation, power efficiency and energy saving among other

things. Also, as part of the Eco-partnership we have participated in an optional project to reduce CO₂ emissions production. In 2008, an energy optimization project for the Mercedes-Benz group worldwide was initiated. And at the Mercedes-Benz plant in Hamburg, we have been working with changing from compression cooling to evaporation cooling for our production equipment as well as introducing energy optimization for washing processes, and heat recovery through a new weld smoke exhausting system. Furthermore, we are designing and producing light-weight construction parts to reduce the CO₂ emissions of our vehicles.

What do you view as the main challenges in the future?

Development and use of renewable energy at the industrial production is a major challenge. For instance, we are looking at the possibilities of using photovoltaics and biomass, as part of our focus on CO₂ reduction. We must also continue our work towards the enhancement of energy efficiency by introducing new production equipment, and keep our focus on saving energy in the manufacturing process. These are all important elements for the future of our industry.

LOCAL MOBILITY AND PASSENGER TRANSPORTATION



European cities increasingly face problems caused by transport and traffic. The question of how to enhance mobility while at the same time reducing congestion, accidents and pollution is a common challenge to all major cities in Europe.

MÜNSTER - THE ECO-MOBILITY CITY

For more than 20 years, traffic in Münster has been planned in a systematic way with the aim of consolidating eco-mobility (pedestrian, bicycle and bus transport) and limiting individual motor transport.

Already in 1990, the share of bicycle trips and trips with public transport were high. These shares have further increased due to the systematic efforts from the City of Münster.

The main elements leading to this success are a very strong focus on bicycles and public transport in the traffic planning and investments combined with an active mobility advice service.

The overall number of trips performed by Münster residents increased in the period 1990-2007 by 82,000 per year. Due to the active planning in favour of eco-mobility, the increase in trips by car only increased by 11,000, whereas the number of eco-mobility trips increased by 71,000. In 2007,

the total share of eco-mobility trips was 63,6 %, while the share of trips by car was 36,4 %.

Attractive bicycle infrastructure

Bicycles are the main focus in relation to the development of the traffic infrastructure in Münster. The primary bicycle network consists of a circulate promenade encircling the old town, bicycle tracks along the main artery roads and unobstructed thoroughfare through the old town. The total number of bicycle tracks has increased from 270 km in 2003 to 304 km in 2007.

Public transport promotion programme

In 1993, the City Council adopted a public transport promotion programme including measures for speeding up busses along the main road axis as well as bus lanes and traffic light priorities. Furthermore, the programme included the establishment of improved waiting halls as well as bike and ride, and park and ride facilities at all important bus stops.

Mobility advice service

Münster has established a service centre for clever transport choices called Mobilé. Here the customers are provided with information on the best travel options.



Mr Heinrich Bruns,
Head of department
Green Spaces and Environ-
mental Protection
City of Münster, Germany

How has Münster managed to move traffic from cars to bikes?

Münster was much smaller then with only a few bike lanes. This made cycling unnecessarily dangerous. To solve this problem, more bike lanes were built. They follow seven green corridors which connect the outskirts with the city centre. This makes it safer for cyclists and faster too because there are not many traffic lights along these corridors. In the early 1980's the City of Münster set up a wide ranging bike-promoting programme which has been updated regularly since. Because of this long history, cycling today is an integrated part of the life of Münster's citizens, where now 38 % of traffic is by bike.

Tell us about "Mobilé".

At a relatively early stage, the City of Münster decided to inform and advise both its citizens and visitors on choosing an environmentally

and climate friendly mode of transport. For this purpose, the mobility centre Mobilé was established in collaboration with the communal transportation company. Here, customers are provided with information on the best travel options, but also on potential alternatives. Germany's largest parking garage for bicycles with 3,500 boxes is situated in close proximity to Mobilé and also to Münster's central station. It offers a variety of services: a repair shop, a bicycle washing bay, a rental outlet, lockers, and much more. However, with 30,000 bikes around the town centre every day, one Mobilé is not enough. Therefore, we are building a second service centre that is due to be opened in 2011.

What do you view as the main challenges in the future?

Many commuters from towns around Münster drive between 40 and 60 kilometres each way by car to work here. Though we offer a special work-related bus ticket for commuters, still 81 % take the car. Maybe a solution for the future is to increase the number of fast bus lanes on the highway. This is something we are currently working on.





CONGESTION TAX IN STOCKHOLM

Stockholm has introduced a number of measures to make local transport more sustainable, including the promotion of bicycle lanes and public transport, use of alternative fuels and road pricing.

Road pricing was introduced in 2006 in the form of a congestion tax. The tax is imposed on Swedish registered vehicles driving in and out of the Stockholm inner city zone on weekdays between 6.30 a.m. and 6.29 p.m. Vehicles are automatically registered at special control points. Consequently, traffic work and emissions in the city centre are down by 10-15 %.

The CO₂ emission reduction from the congestion taxes has been measured to app. 30,000 tons of CO₂ in 2006.

Before the introduction of the congestion tax, there was a huge majority opposition to the scheme. But once people saw the benefits from the congestion tax, they changed their minds. At the referendum in September 2006, a majority voted in favour of a continued effort. The congestion tax was reintroduced 1 August 2007, and the opinion polls now show a large majority in favour of the scheme.

AVAILABILITY OF LOCAL PUBLIC OPEN AREAS



Green areas are important for the health and mental well-being of citizens because they:

- provide contact with nature, promote recovery from stress, are beneficial for mental health and help improve behaviour and attention in children;
- improve air quality and help reduce heat stress;
- encourage people to be physically active¹.

FREIBURG – PLANNING FOR A GREEN CITY

Freiburg is a green city. This is a result of the location of the city, as well as an active planning for keeping and improving the city's green features.

Among the most interesting planning elements are:

- The establishment of large and interconnecting green areas when planning for new urban development areas;
- Promotion of green roofs;
- The establishment of new roads as boulevards;
- Establishment of children's play areas close to green areas;
- Planting greenery along new tramlines and overhead power cables. In addition to making the city greener, this also contributes to a reduction in noise pollution.

¹ European Environment Agency: "Ensuring quality of life in Europe's cities and towns", EEA Report No 5/2009.





OSLO – THE BLUE AND THE GREEN AND THE CITY IN BETWEEN

The City of Oslo is beautifully situated between the forest and the fjord. The central third of the municipality consists of built-up areas, while the outer two-thirds are protected forested areas. The City of Oslo has cautiously strived to maintain the green structure despite a growing population. This is done through effective development of brownfield sites, inner city development, ecological management of forests and establishment of nature conservation areas.

Furthermore, Oslo is focusing on preserving and further developing the biodiversity within the

city. Between 2002 and 2007, all green areas in Oslo were surveyed by biologists. This has resulted in a unique database of 1,558 valuable natural habitats and 344 important locations where species are threatened. These areas constitute approx. 10 % of the area of Oslo. In order to integrate the database in the general planning activities, the City of Oslo has invested in a modern management tool. Important areas with the most threatened and valuable sites have been defined. Two of these areas have so far been actively protected, and zoning plans for twelve more have been initiated.

3 questions about biodiversity



Ms Signe Nyhuus,
Sector Manager
Agency for Outdoor
Recreation and
Nature Management,
Department of Environ-
ment and Planning
City of Oslo, Norway

How are Oslo's inhabitants involved in the City's biodiversity initiatives?

Our goal is to allow Oslo's citizens to experience nature within the city. To achieve this, we have developed a so-called green structure plan in Oslo which covers all green infrastructure in the City, from parks to cemeteries, brooks and rivers. This plan has been developed with the participation of citizens and organisations.

Why is biodiversity important?

Biodiversity is the foundation of the ecological system. The birds, the bees, the hummingbirds – these are all part of the circle. But it is much more than a scientific area. Biodiversity is what people experience every day when they go about the city. If you ask someone in the street if they would like springtime as much without bird song ... well, there is your answer to why biodiversity is so important.

What do you view as the main challenges in the future?

In terms of biodiversity, urban densification is a looming factor. We need to fight for our green areas and continue our hard work to place this debate in the political management systems. We also need to work more thoroughly with how we handle the problematic of invasive species in the future.

QUALITY OF LOCAL AMBIENT AIR



People across Europe, especially in urban areas, are exposed to levels of air pollution exceeding the air quality standards set by the EU and the World Health Organization (WHO). This is especially the case for fine particulates (PM10), ozone (O3) and nitrogen dioxide (NO₂).

As a result, exceeding air quality standards has seriously increased respiratory and cardiovascular diseases, in particular among young children and the elderly.

OSLO – SPECIAL PROBLEMS DUE TO COLD CLIMATE

There is a widespread use of wood stoves and studded tires in countries with a cold climate like Norway, which increase particulate pollution.

Oslo has introduced effective measures to reduce the problem.

The challenge with studded tires is an increased amount of road dust. In order to minimize this, the

City of Oslo has introduced the following measures:

- A charge has been introduced on studded tires, which has increased the share of stud-free tires from 50 % to more than 80 %. The profit made is invested in improved winter road maintenance;
- Increased cleaning of roads and highways and the use of magnesium chloride in order to remove dust and bind any remnants to the road surface;
- Environmental speed limits on parts of the highway network in order to reduce road wear and tear.

Reduced emissions from wood burning stoves

There are around 63,000 wood burning stoves in Oslo. Only one-third of these are modern models with low particulate emissions. In order to speed up the replacement of the old stoves, citizens can apply for a grant from the City of Oslo's Energy Efficiency Fund. This scheme has so far resulted in the replacement of approximately 4,000 stoves and a reduction of the particulate emissions by 35,2 tons.





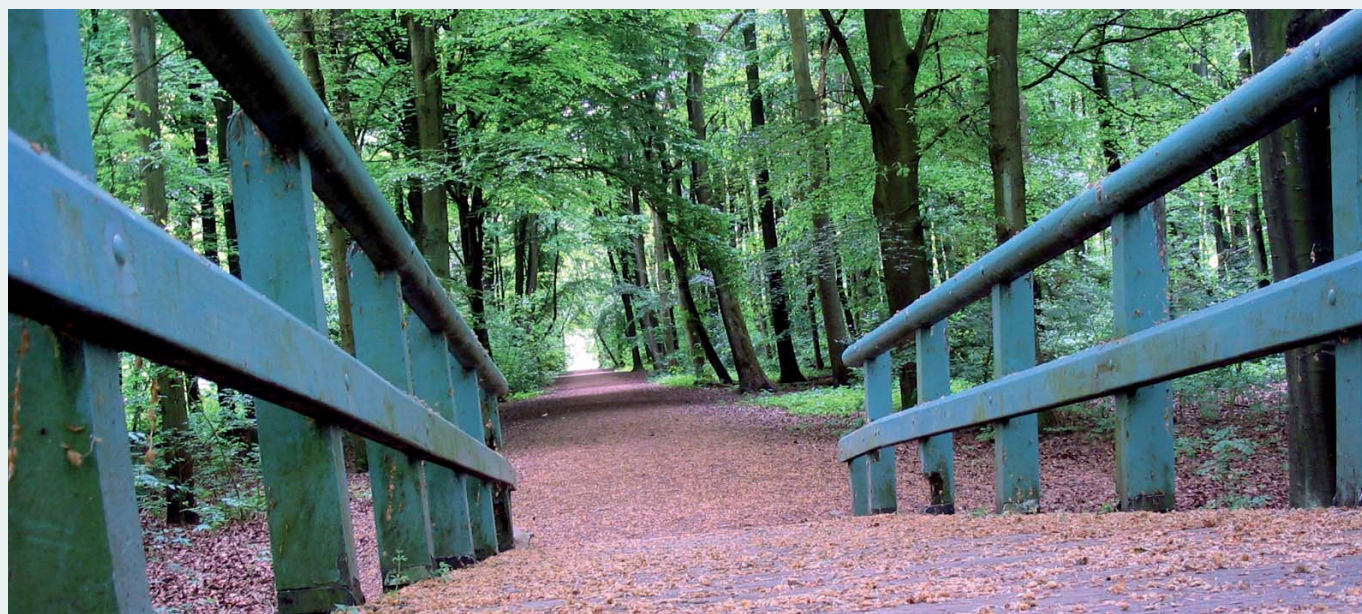
THE AIR IS GETTING FRESHER IN AMSTERDAM – AND PEOPLE KNOW ABOUT IT

Amsterdam has succeeded in considerably reducing air pollution in the city. Thus, the number of days where the EU norms are exceeded have been reduced as follows:

Year	2000	2007
PM10 (Urban background)	42	3
O3	20	2
NO ₂ (Urban background)	36,5	30,5

This reduction in air pollution has mainly been achieved through the stimulation of alternatives to car transport, through policies on parking, cycling, public transport and combined transport methods.

One of the key factors behind the success is the involvement and acceptance by the citizens of the different measures that have been introduced to combat air pollution. Apart from various information campaigns, a Living Environment Atlas has been introduced. It gives each citizen the opportunity to access address-specific air quality information by computer and see how it compares with other addresses in the city.





Dr. Eveline Jonkhoff,
Senior Advisor for
sustainable strategy
Environmental & Housing
Administration
City of Amsterdam,
the Netherlands

In your opinion, why has Amsterdam been successful in reducing air pollution?

One of the main reasons is that we have established an integrated approach to the problematic which deals with elements such as public transport, electric cars, a special focus on bicycles and urban mobility. I think it is important to view these elements as a whole instead of focusing on single issues.

A major contribution has been the special low emission zone for trucks in the city centre.

Only trucks with “clean” engines are allowed there. This has proven to be a great success.

The next step is an ambitious programme with a positive approach, to stimulate clean electric mobility in the city.

Tell us about the Living Environment Atlas.

The Atlas is part of our integrated approach. It is developed as a tool for dissemination in a pilot programme as part of a national initiative. It is a digital platform based on sharing information on the quality of local environment. For example on noise, air quality, green areas etc. The aim of the programme is to inspire our citizens to take action, not in a competitive way, but by working together to secure a better en-

vironment. It is really all about communication and about making our citizens part of creating a sustainable future.

What do you view as the main challenges in the future?

We need to improve further the air quality, meet the European standards and realise our ambitious programme to stimulate clean electric mobility in Amsterdam. We do this in combination with further stimulating the use of bicycles and public transport. We also have an obligation to our citizens to maintain a high quality of living. And it is important that we as local governments set targets on sustainability, and that we involve our citizens and other stakeholders because we cannot do it on our own. To make a transition to a sustainable way of life we need the involvement of our citizens, of knowledge institutions and of local industry.

NOISE POLLUTION



Noise is a serious problem in Europe. Persistent high levels of noise are associated with learning difficulties, loss of memory, inability to concentrate as well as irreversible damage to health, such as heart attacks and strokes². Road traffic is the dominant source of exposure in major urban areas.



STOCKHOLM – A MULTIFACETED APPROACH TO NOISE POLLUTION

Stockholm is fighting noise pollution in several ways. Precautions like noise barriers and improved window insulation are combined with actions aimed directly at the source of noise. Noise issues are considered in infrastructural planning, and regulations can be used. Thus, Stockholm's work to reduce traffic noise can be separated in 4 different ways: Proactive actions, regulations, planning and reduction of noise at the source.

The protective actions include establishment of noise barriers and improved window insulation. The regulations include:

- Restrictions against heavy goods traffic at night time on most city streets;
- Speed limits in residential areas, from 50 to 30 km/h;
- Environmental zones for heavy goods traffic;
- Vehicles older than 8 years are prohibited from visiting the inner city.

Noise is taken into account when new housing areas are planned and in traffic planning.

Reduction of noise at the source includes measures such as low noise road surfaces.

² European Environment Agency: "Ensuring quality of life in Europe's cities and towns", EEA Report No 5/2009.



Mr Magnus Lindqvist,
Environmental Engineer
Environmental & Health
Administration
City of Stockholm, Sweden

How is noise reduction integrated in Stockholm's infrastructural planning?

It is really all about organization and coordination of processes. We try to aim for optimization of the City's work in this area by coordinating closely between different units to make sure that cooperation runs smoothly. Communication and information is essential in this, both internally and when politicians and citizens are involved. We have been quite successful in establishing visibility on the problematic of noise pollution in Stockholm and in integrating it in projects from an early stage. Furthermore, meticulous noise mapping is an essential basis for planning, because it allows us to pinpoint which measures to apply and where. We have a long tradition in the area of noise mapping in Stockholm, dating back to the 1970's.

Is there a particular 'Stockholm method'?

Many cities are making progress in this area. We base our infrastructural traffic planning on a new method for assessing traffic noise, known as Sound Quality Score. This in the

case in all of Stockholm County. The idea is that many of the factors which cause noise can be avoided if they are taken into consideration when new housing areas are built. For instance, we focus on high insulation of exterior walls and on turning building facades and habitable rooms away from traffic in our infrastructural planning, rather than building large noise screens to prevent noise when the damage is done. We also experiment with specially designed balconies to deflect noise.

What do you view as the main challenges in the future?

We need to pay more attention to preventing noise at the source rather than through proactive measures such as noise screens and window insulation which is what we have mainly been focusing on so far. Measures such as low noise road surfaces and possibly more silent vehicles is the way forward, as I see it. In the City of Stockholm, we have for a long time been working locally with the imposition of speed limits and also with regulations for car tires. This is a bit of a challenge because many vehicles in Sweden drive on studded tyres. But we still have to do more than we are doing now. The need is there for more international attention on noise pollution in our cities.

WASTE PRODUCTION AND MANAGEMENT

Waste production causes major environmental impacts and implies the use of material and energy and the depletion of the Earth's renewable and non-renewable resources.

Different types of waste management imply different types of environmental impacts:

- Landfills can cause leaching of contaminants into soil and groundwater if not properly managed
- Landfill sites occupy considerable space with significant impacts on land use and landscape
- Incineration of waste, unless properly regulated, leads to the emission of toxic substances into the atmosphere and to the production of large amounts of contaminated ashes
- Recycling is the least harmful way of getting rid of the waste as it has few environmental impacts and because it saves energy and resources.



HAMBURG – PUBLIC AWARENESS ON WASTE AVOIDANCE AND RECYCLING

Hamburg has established an ambitious separate collection scheme for paper, glass, plastics, metals, textiles, wood, bio-waste and bulky household waste. These efforts are supported by a comprehensive awareness raising program providing information on low-waste consumer alternatives and services regarding the separate collection of waste by way of brochures, campaigns and the internet.

An important part of the awareness raising program is targeted at school pupils. Teaching materials have been produced which can be borrowed free of charge for use at secondary level in Hamburg schools. And the Municipal Sanitation Department arrange guided tours to the city's 15 recycling centres and the incineration plants to give the children comprehensive insight into the issue of waste avoidance and recycling.



FREIBURG – PREVENTION BEFORE DISPOSAL BEFORE DUMPING

The main aim of the City of Freiburg’s waste management strategy is to avoid waste generation. This is pursued through extensive awareness raising activities, shifting the consumers’ attitude away from a “throwaway society” towards a more sustainable attitude. The City has also imposed waste fees as an incentive to avoid waste.

The effort to avoid waste production is combined with a scheme to increase recycling, resulting in a rise in the percentage of recycled waste to 67,3 % in 2007.

Bio-waste has been collected separately in Freiburg since 1997 and has been disposed of at a biogas and compost plant which produces electricity and heat.

The average amount of residual waste produced per citizen has been reduced from 205 kg in 1996 to 100 kg in 2007. The residual waste is incinerated with recovery of the energy produced.





Mr Klaus Hoppe,
Head of Energy Department and Director of
Waste Management
City of Freiburg, Germany

How do Freiburg's waste fees work?

In our differentiated collecting system, one bin is for non-reusable trash, one is for organic trash and another is for paper while lightweight packaging like plastic bags and tin cans are collected in separate bags. Each household in the city pays an annual waste tax depending on the number of members of the household and the size of the non-reusable trash bin. To some extent, households have the opportunity to save waste tax money by reducing and separating waste. Information about our system is crucial. Citizens receive a waste management calendar which includes all information about when waste is collected, tips for recycling, etc. We work with a programme specifically aimed at kindergarten and school children. This includes bi-annual theatre plays which centre on issues such as paper recycling or organic waste. This means that we are able to offer our citizens education about waste management from an early age. And we equip our children with knowledge so that they are able to teach their parents. I have experienced this with my own children.

What have been the main benefits of your strategy?

It is important that our system is easy to understand and manageable for our citizens. So that waste management is incorporated in our daily lives. The first step of the waste management cycle is reduction. But it can be difficult to convince people to reduce their waste.

One answer to that problem is surely to buy high quality instead of poor quality products. Simply because good shoes last longer which means you don't have to change them quite as frequently. The second step is recycling. We have increased our recycling rate so that today nearly 70 % of waste is recycled, and 30 % is sent to incineration. Which leads to the question; is disposing of trash the final solution in future waste management? In my opinion it is important that we move away from a so-called cradle-to-grave mentality and towards the concept of cradle-to-cradle. Products should be produced in a way so that they can be reused not just a few times, but can be part of new products without disposal.

What do you view as the main challenges in the future?

Reduction of waste and intelligent recycling is one issue. But we have to find entirely new solutions instead of "end of the pipe" solutions. Incineration is not the answer to our prayers. If you burn 1 ton of trash, 300 kilos remain as ashes and cleaning fuel gases. It is important to use energy from incineration plants for heating city districts or industry for a good energy efficiency. I am optimistic that human intelligence can solve the puzzle and that we can become more effective in increasing our recycling as much as possible and extract as much energy from waste as possible. Furthermore, products must be constructed in a sustainable and easy way, without using 20 new chemicals each time to make practically identical products. Education is at the heart of the problem. We have to begin with our children. They are our future and we have to respect their opportunity for development in a healthy and sustainable world.

WATER CONSUMPTION



Increased urbanisation, population growth and living standards have resulted in an increase of urban water use in the past century. As a consequence there is a growing concern about the depletion of water resources.

The Sixth Environmental Action Programme of the EU (2001-2010) has as one of its objectives to provide products and services using fewer resources, such as water, encouraging resource efficiency through more sustainable consumption patterns. Among the objectives is to ensure that rates of extraction from water resources are sustainable over the long term.





COPENHAGEN ECONOMIZES ON THE WATER

From 1985 to 2007, household water consumption of drinking water fell from 174 to 114 litres per person. This was partly due to water saving measures, and partly the result of rising water prices.

Water saving measures have included a fund for water saving equipment, campaigns and increased use of water of a lower quality than drinking water such as rain water.

The funds are mainly used to support the installation of meters in apartments in Copenhagen.

The water company measures if the consumers have abnormally high water consumption. Such consumers receive a note with their water bill, informing them that their water consumption is too high and how much the excess consumption is estimated to cost them.

The campaign activities include general media, bus advertisements announcements, press releases and water saving calculators. In addition to this specific campaigning, activities have been carried out targeting school children.





Ms Charlotte Storm,
Water saving consultant,
Copenhagen Energy
City of Copenhagen,
Denmark

The City of Copenhagen has campaigned intensively to promote attention to water consumption. What are the results?

Just a few years ago, we didn't think it was realistic to reach our goal of reducing consumption to 110 litres per capita per day before the end of 2010. But it seems like we will manage that. Therefore, we have set a new ambitious target of 100 litres per citizen before the end of 2012. Realistically, we should at least be able to decimate water consumption to 105 litres per capita per day by 2012. Apart from arranging events and campaigning, we have been working closely and successfully with grass root organisations to get our messages out to the public. In campaigns to come we also plan to integrate information aimed more specifically at school children. After all, they are the future.

What is the typical reaction from citizens who are told by local authorities that they need to reduce their water consumption?

There is a general understanding that water is becoming gradually more precious and that it is a unique situation we have here in Denmark to have fresh spring water in our taps. One

challenge for us is that the vast majority of apartment buildings have no water meters and often complicated installations and plumbing. This will probably be a challenge for the next two or three decades. But we know that water meters efficiently reduce water consumption. And people are usually grateful to hear that we monitor their consumption. They may have a leak somewhere but are not aware of it. Or parents may not realize what their teenage daughter's long baths are costing them - and the environment.

What do you view as the main challenges in the future?

Ground water pollution, mainly from pesticides, is a major challenge. Because of densification, on the island of Zealand (where Copenhagen is located, ed.), 100 % of the ground water is already being used today. Copenhagen's entire water supply is transported to us from drillings around Zealand. At the same time, as the wells are taken out of production due to pollution, no new drillings can be made to replace them. We have to find some sort of solution to this problem. Rain water harvesting, non-portable water from slightly polluted drillings or water from the harbour is an option - it can be used for flushing toilettes, or cleaning purposes. We are working with an agenda to use non-portable water for 4 % of our supply before the end of 2017. Of course, we have to be careful of possible health hazards. But it is an achievable goal, in my opinion.

WASTE WATER MANAGEMENT



Waste water management is necessary to protect the environment from the negative effects of urban waste water. The collection and treatment of waste water plays a vital part in the protection of public health, water resources and wildlife.

SUSTAINABLE WASTE WATER MANAGEMENT – A TOP PRIORITY IN HAMBURG

For more than a decade, Hamburg has worked to make its waste water management sustainable. Among the City's initiatives are:

- The construction of combined water storage basins and sewers in order to reduce the overflow of combined water running into lakes and waterways;
- The development of a so-called Store & Treat process which has been patented. The process is a treatment process for return flows with high ammonia content from the sludge dewatering process. The process allows quantity management and biological treatment of processed water to be carried out in the same basin;
- Energy production from treated sludge. The aim is to make the treatment plants completely self-sufficient with energy;
- Urinals operating without water. Separate collection of urine has been installed in critical and overly polluted locations. Hamburg is now considering developing separate collection of urine on a large scale.

In addition, the City of Hamburg is developing a new housing area for 780 household units in a part of the Wandsbek district which used to be an army barracks area. The project is known as "Neues Wohnen in Jenfeld". The barracks have been dismantled, and a new infrastructure planned. Sustainable waste water management plays an important part in the project which will become the biggest housing area in Germany. A new principle for the disposal of sewage is introduced, and all different streams of sewage are treated separately: storm water, brown water, grey water from showers, washing machines and so on.

Furthermore, storm water and treated grey water will be used for operating a cascade in the area and a small lake as open waters to the benefit of Hamburg's citizens. Brown water from households is collected by a vacuum system and treated anaerobically on-site. The produced biogas is used for operating a combined heat and power machine. Energy from the waste water, heat from geo- and solar-thermal devices is added to this to build an entirely energy autonomous district within the City of Hamburg.



Mr Christian Günner,
Head of Department, Basic
System Development
Member of Management
Board, Hamburg Wasser
City of Hamburg, Germany

The Hamburg Sewage Company has patented a so-called Store & Treat process. Tell us about that.

Store & Treat is a new concept developed for the improvement of the city's sewage treatment in our central waste water treatment plant (WWTP) at Köhlbrandhöft/Dradenau for managing ammonia-rich process waste water from the sewage sludge treatment. There are basically two processes taking place in one tank: storage of the warm zentrates from the dewatering of digester sludge and the transformation of ammonia into nitrite within the storage tanks by aeration. The nitrite-rich treated zentrates is dosed into the de-nitrification zone of the treatment plant, allowing us to match the continuous ammonia/nitrite load of the zentrates from the sewage sludge with the discontinuous carbon load in the sewage flow. The aim is to optimize the de-nitrification process. This means that we increase nitrogen removal and at the same time decrease the total energy consumption of the WWTP at Köhlbrandhöft/Dradenau. We want to make the plant completely autonomous before 2012 so that there is no need for energy input – electricity, heat or fuel – from outside the plant.

A waste water treatment plant self-sufficient with energy? Sounds interesting.

This is the first initiative of its kind in Germany, if not in the world. It is extremely interesting to be part of. For instance, we are well on our way

to produce a surplus by delivering surplus heat from our sludge drying process to climatize a neighbouring office building – a container terminal. Next year we start the operation of a facility improving the quality of our biogas from the anaerobic sludge treatment in a way so that it becomes possible to press into the local supplier's gas net. From there it will be taken as fuel for the new Hamburg Water vehicle fleet, the heating of municipal office buildings in Hamburg or the future operation of decentralized combined heat and power machines for heating and electricity supply of private buildings. It is our and the City of Hamburg's goal that the whole group of public companies of Hamburg Water – the water works and the sewage company – will be energy autonomous by 2018.

What do you view as the main challenges in the future?

When improving the supply of potable water in a city, you produce an increasing amount of sewage which has to be disposed. Treatment – often biological – to eliminate carbon, nitrogen and phosphorus leads to enormous amounts of sewage sludge. This has been a challenge for Hamburg, and it is an increasing challenge worldwide. Previously, we used to deposit the sludge in the North Sea and the Atlantic. Later, we moved the sludge to a dump site in the former GDR. But since 1998, we operate an incineration plant for all sewage sludge from Hamburg at the WWTP at Köhlbrandhöft/Dradenau. The ashes from the incineration process are used by a local copper melting plant which in turn uses its surplus produce as building materials i.e. to fix the banks along the river Elbe.



MÜNSTER AVOIDS RAIN WATER IN THE SEWERS

Over the last 30 years, the City of Münster has gradually developed its mixing sewer system into a modified separation system. The purpose of this development is to separate rain and waste water at an early stage of the recycling process. Today, the portion of the separation systems in new building areas amounts to 95 %. Whenever the sewers are repaired, they are converted to new and environmentally friendly separation systems.

The separation system is combined with a tariff giving incentives to leach rain water and build up ground water. Thus, the tariff is reduced if measures such as area unsealing, planting of vegetation on roofs or rain water utilisation are taken.



ENVIRONMENTAL MANAGEMENT OF THE LOCAL AUTHORITY

In most countries the local authority is responsible for a substantial share of all public expenditure. They deliver a large number of different services to citizens and they are employers for a lot of people. Thus, the local authorities also have a substantial impact on the environment.

Local authorities have the possibility to minimise this impact through sustainable management of all their activities. Furthermore, local authorities may serve as role models for citizens and local business communities.

ENERGY MANAGEMENT IN THE CITY OF BRISTOL

The Bristol City Council has implemented a number of measures in order to reduce energy consumption in all municipal buildings and services including schools, street lightening, leisure centres and social housing.

These measures include:

- Increased energy efficiency in the 29,000 houses managed by the City. This is done through insulation, double glazing and high efficient condensing combi boilers and heating controls. Furthermore, solar terminals and air-source heat pumps are tested;
- Display Energy Certificates (DEC) have been issued for all public buildings in accordance with British law. The DEC shows the actual energy usage of a building, the Operational Rating, and helps the public monitor the energy efficiency of a building. This is based on the energy consumption of the building as recorded by gas, electricity and other meters;
- The Local Authority Energy Finance Scheme (LAEF). Bristol City Council is one of 19 local authorities participating in a pilot LAEF. The aim of the scheme is to support investments in energy efficiency measures and technologies in municipal buildings. A fund is offering local authorities interest free internal “loans”. These loans are repaid using the revenue from the annual energy/cost savings. Once the project loan has been repaid to the fund, the project recipient will continue to benefit from the ongoing energy savings. As repayments are recycled back into the fund, they become available for re-investment, creating a self-sustaining fund.



Mr Paul Isbell,
Energy Manager
City Development
City of Bristol,
United Kingdom

Bristol City Council was one of the first local authorities in the UK to participate in a Local Authority Energy Finance scheme, known as LAEF. What are the benefits?

We have been part of the LAEF scheme for more than five years now, as part of the original 19 local authority pilot. It all started quite slowly, but now people are more familiar with the system, and I think that we have managed to bring other local authorities onboard. The ongoing energy and carbon savings is of course an important benefit for us. But the reduction of the administrative costs when compared with the old system is the real advantage. In the LAEF scheme, all calculations are done beforehand, and paybacks agreed at the outset. This means that we don't have to keep going back to projects every year to calculate savings and are now able to plan ahead on a much larger scale, which makes it all exceedingly more manageable. That is a big help to us and it allows us to set a goal to save 800 tons of carbon per year via the LAEF scheme alone.

What other energy management initiatives are Bristol City Council currently involved in?

We are in the process of developing our renewable energy scheme. We have a programme of installation of biomass boilers, and are introducing automatic meter reading for electricity, gas and oil in all buildings to aid monitoring of use. Furthermore, we are putting up two 2-3 MW wind turbines in the docks area. They are

to be funded and owned by the City Council after a procurement exercise which means that we will be able to supply ourselves with at least 20 % of the councils needs with renewable electricity. This is a new approach in the UK - we believe that Bristol is the only UK council to have developed its own wind scheme in-house. With the introduction of Feed in Tariffs in the UK, we are also considering the potential of using silicon-based photovoltaic panels to assist us in our efforts towards carbon reduction. We await the required equipment tests and permits for installation contractors, but I believe that when this is concluded we will make real progress in this area.

What do you view as the main challenges in the future?

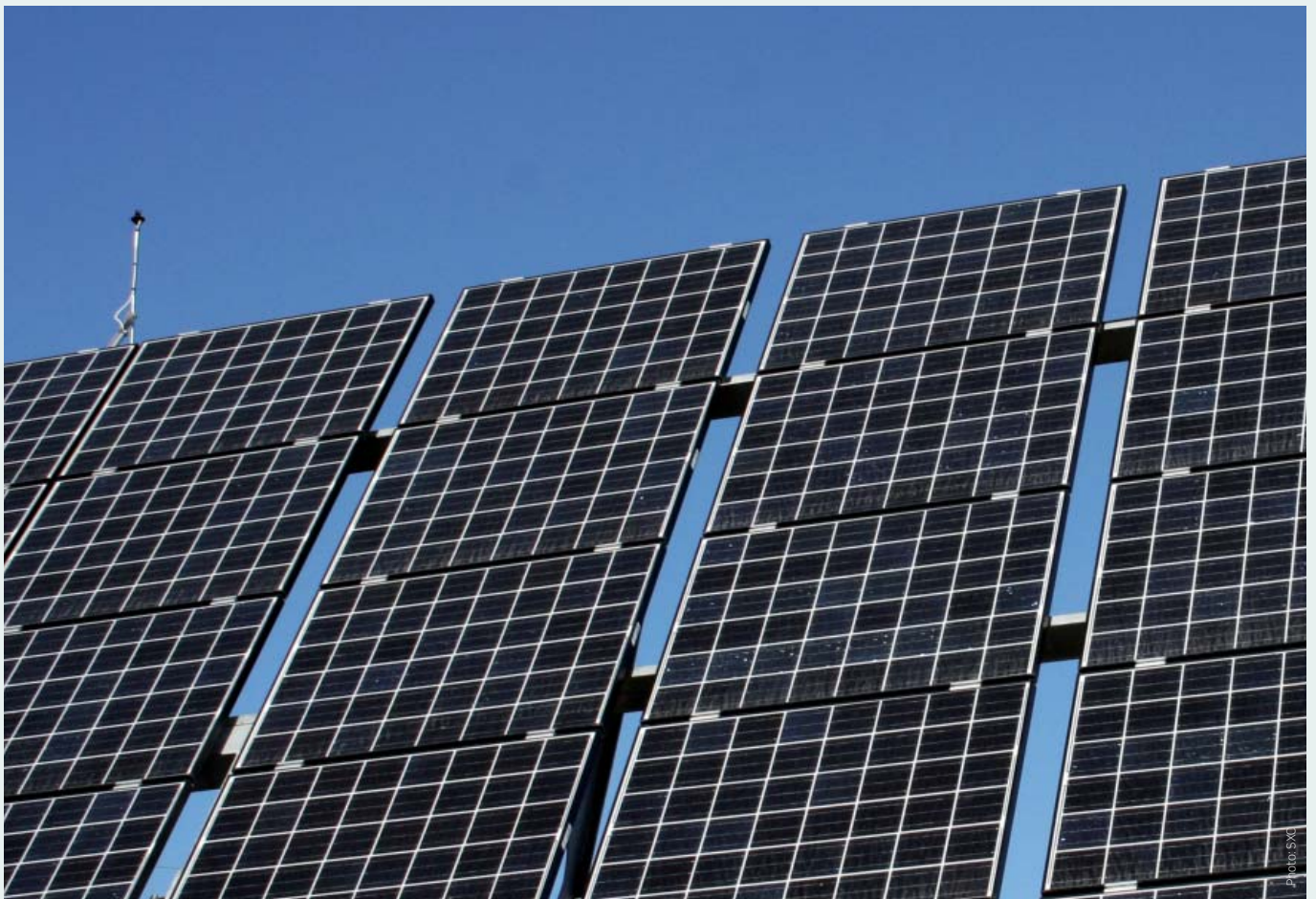
For the City of Bristol, the overall challenge is to decide on a way forward. There are 420,000 citizens in the Bristol area, and many old buildings that do not comply with modern standards. What we have now is effectively a gas fired heating system in most buildings. So do we switch to district heating? Is that really the answer? Is it more efficient? What are the cost and the consequences of digging up roads and laying pipes in the ground? Maybe our money is better spent on insulating more of particularly our old houses, roofs and so on. And if we try to look 30 or 40 years ahead, it may be that hydrogen energy from microbes is the most favourable solution, or something entirely different and new. We are currently looking into this. It is a decision that all cities have to make if they are taking decarbonisation seriously.



COPENHAGEN – ENVIRONMENTAL MANAGEMENT IN ALL INSTITUTIONS

Five out of the seven departments in the municipality of Copenhagen have an environmental management system certified in accordance with the ISO 14001 standard. The remaining two departments are expected to be certified during the course of 2010. Thereby, Copenhagen may be the first capital in the world where all institutions and administrative units are covered by an ISO 14001 certified environmental management system.

Environmental coordinators have been appointed in all the City's administrative units. They are essential for the dissemination of the environmental management system, and they have succeeded in linking the environmental management to the core work of the administrative units.



SUSTAINABLE LAND USE



Management of land resources is essential for sustainability and for improving the quality of life in cities and towns. In order to reduce the total environmental impact of urban activities, land use management must promote:

- resource-efficient settlement patterns that minimise land take and urban sprawl;
- biodiversity and green space within urban areas.

STOCKHOLM BUILDS THE CITY INWARDS

Stockholm has adopted an ambitious planning strategy, aimed at building the city inwards. The strategy is being realised through:

- re-using already developed land;
- locating new development areas in connection with good access to public transport;
- respecting and enhancing the character of the city, e.g. the city-scape, the built environment and the green structure;
- re-developing semi-central areas and transforming industrial areas into urban areas of mixed use;
- establishing focal points in city suburbs;
- developing public spaces.





Ms Ingmarie Ahlberg,
Head of Environmental
Department, Development
Administration
City of Stockholm, Sweden

What does 'building the city inwards' mean?

Since the 1980's, we have been planning new development projects, housing and open green areas close to the city centre, close to metro stations in the inner city and by the waterways surrounding it. The idea is to replace all existing brownfield areas with new and vibrant urban city districts with apartments and office buildings. This has happened and is happening in districts such as Hammarby Sjöstad, Liljeholmen and Nordvestra Kungsholmen. Another example is Norra Stationsområdet just north of the inner city between the city of Solna and Stockholm where we are currently reorganising an 8-track road. With 150,000 cars per day, the road serves as a heavy barrier between different town parts which is why we are now laying it in an 800 metres long tunnel underground. It is all part of a process which we call 'healing the city', and that is what building the city inwards is all about.

Tell us about Hammarby Sjöstad.

Hammarby Sjöstad was an entirely industrial area up until the early 1990's. At the time, Stockholm was aiming for a bid to host the Summer Olympics. As part of this process, high environmental targets were set up for stadia

and for the Olympic village. We worked out an environmental programme for a whole new city district in Hammarby with a new focus on environmental issues and on involving all relevant parties to create a dialogue through all phases of this kind of infrastructural project. So the area was transformed, even though we never got to host the Olympics. But what we have learned from initiatives such as the Hammarby Sjöstad environmental programme is something we can use in other projects in years to come.

What do you view as the main challenges in the future?

Securing a high quality transportation system for our citizens is a major challenge. We still have to become much better when it comes to sustainable transport. I think that we are on our way, and that we are quite good now, but there is always room for improvement. Well-adapted technical solutions may help, but the real challenge is influencing the lifestyle of the people who live here. We need to be able to offer our citizens to live in a sustainable way and lead a sustainable lifestyle - regardless of whether we are talking transport, waste management or shopping habits. For instance, it may not be a necessity to keep your apartment at 23 degrees. 20 may be enough if you put on an extra pair of socks. If we can get people to think in a more sustainable way about everyday issues, then we have come a long way.



COWI

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http://ec.europa.eu/environment/europeangreencapital/index_en.htm