European Commission

Introducing the EU's Green City Tool

Compendium

Environment

Introducing the EU's Green City Tool – Compendium

European Commission
Directorate-General for Environment

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Introduction

This booklet is a beginner's guide to how to become a greener and more sustainable city. It is based on the advice and recommendations of experts in urban planning who are from cities that have actually made the transition to sustainability. It also contains the latest knowledge and expertise from relevant experts in environmental legislation from the European Commission, as well as those involved in managing European funding opportunities for cities, and those who know about EU knowledge sharing networks and research.

This guide is divided into twelve sections based on the categories covered by the European Green Capital Award. The guide has an associated online tool, which is broken down into three parts:

- A simple questionnaire requiring only 'yes/no' answers. The online version provides an indication of how well your city is performing in each topic area. You can also put your city on

the tool's online map, and compare how you are doing with other participating cities. With the PDF/ paper version, you can review the questions and try answering them before going online to register and fill in the questionnaire.

- Handy guides for each topic, explaining them from first principles in a practical way, and setting out the costs and benefits of taking action, based on the real experiences of participating cities. These topic guides also contain links to detailed tools, information, funding opportunities and more for those wishing to take the next steps towards improving their cities and equipping them for the future.

- Real-world best practices, shown in detail, including timings, financial implications, how challenges were overcome, and more, from cities that have been shortlisted for the European Green Capital Award.

Our aim with this guide and the online tool is to inspire cities to move towards sustainability in a more active way. Our experience shows that greener cities are better places to live, work and do business. These cities set a vision of where they want to be in the future, and focus their decision-making processes and urban planning accordingly. In the long term, this planning actually saves money, improves the quality of life of the citizens of the city, and benefits the wider environment.

We hope you find this useful.
Good luck with becoming greener!

For any questions, please write to:
ENV-URBENVPOL@ec.europa.eu

Air

Air

The air we breathe is a vital resource on which all life depends. Clean air is essential for the good health and well-being of humans and for animals and plants. Air quality is influenced by human and industrial activity, climate and geographic conditions.

Introduction

Managing air quality relates to the control of emissions and pollutants and monitoring air quality to ensure that concentrations of various compounds do not pose a risk to human health or the environment. The following is a list of common air pollutants and their sources[1]:

- **Nitrogen dioxide (NO_2)** Nitrogen monoxide (NO) accounts for the majority of nitrogen oxides, or NOx, emissions. NO is subsequently oxidised to form NO_2, although some NO_2 is emitted directly. The major sources of NO_x are combustion processes, which may be stationary or mobile. The proportion of NO_2 (i.e. the NO_2 / NO_x ratio) in vehicle exhaust is considerably higher in diesel vehicles than in petrol, because their exhaust after-treatment systems increase oxidation of NO, generating higher direct NO_2 emissions.

1 Source: European Environment Agency: Air Quality 2017

- **Ozone (O_3)** Ground-level (tropospheric) O_3 is not directly emitted into the atmosphere. Instead, it is a secondary pollutant formed from chemical reactions in the presence of sunlight, following emissions of precursor gases such as NOx and non-methane volatile organic compounds (NMVOCs) of both natural (biogenic) and anthropogenic origin. Near strong emission sources of NO_x, where there is an abundance of NO, ozone is 'scavenged' as it reacts with NO. As a result its concentrations are often low in busy urban centres and higher in suburban and adjacent rural areas. However, ozone is also transported long distances in the atmosphere and is therefore considered a trans- boundary problem.
- **Particulate Matter (PM)** originates from natural sources such as sea salt, naturally suspended dust, pollen and volcanic ash or from human activities including fuel combustion for power generation, domestic heating and transport, industry and waste incineration and and agriculture as well as from brakes, tyres and road wear and other types of man made dust.
- **Sulphur dioxide (SO_2)** is mainly emitted from fuel combustion for stationary power generation, industry, and commercial, industrial and domestic fuel combustion.

Benefits

- ✓ Poor air quality affects not only human health and well-being but also the condition of environmental resources such as water, soil and forests. Every year 400 000 people in the EU die prematurely as a result of air pollution. Monitoring, informing and controlling local emissions can help to improve local air quality, resulting in health benefits for local residents.
- ✓ Reducing air pollution also has an economic benefit as it can reduce external costs. Currently, air pollution in the EU costs over €4 billion a year in healthcare,
- ✓ Air pollution also causes damage to historical monuments and buildings in the form of acid rain and dust or dirt particles. Actions taken to improve air quality can reduce the burden on maintaining buildings and monuments and make a city more attractive.
- ✓ Actions to improve air quality, such as implementing sustainable urban transport and energy production and use, can help to reduce climate change and also improve noise pollution.

Principles

Air quality management should focus on maintaining good air quality levels where they exist and improving areas where there is poor air quality. Cities can play an important role in reducing emissions by promoting more sustainable transport and encouraging sustainable energy production and energy use. However, some actions are beyond the scope of city authorities and require support and guidance from regional and national governments. There are a number of tools the policy makers and practitioners can consider when managing air quality:

- Sustainable urban mobility plans and transport strategies can help to reduce overall mobility demand and promote a shift to more environmentally friendly modes of transport, such as walking, cycling and public transport. Promoting cleaner, more sustainable motor vehicles is also a key element.
- Stationery sources of air pollution such as combustion for power generation and heating systems can often be improved by implementing efficient, clean district heating or by replacing outdated stoves and boilers.
- Mid to long-term urban planning is a key element in designing a compact city with clean, attractive public transport and increased opportunities for walking and cycling. This can improve not only air quality but can also help to improve the overall quality of life within cities.

Implementation

There are a number of measures that can help improve air quality in cities, such as:

Improved heating

Substituting old, dirty stoves and boilers with clean models and banning dirty fuels for household heating and cooking are an effective means of reducing emissions. Depending on the local situation, implementing city or district heating using heat from existing industry or renewable energy sources can help also to reduce greenhouse gas emissions and improve air quality. These measures can be complemented by reducing the need for heating and cooling through more energy-efficient buildings.

Traffic restrictions

Traffic management measures to restrict traffic can help to reduce emissions, congestion and noise in busy, urban areas. Some of these measures include the introduction of Low Emission Zones (LEZs) that restrict access to lesser polluting vehicles, reduced speed limits and congestion charges.

Sustainable transport
Electric buses and trams, as well as new Euro VI or retrofitted buses are an important part of reliable, affordable and clean public transport. Walking and cycling are zero-emission transport modes. They can be promoted with extensive and safe infrastructure, as well as with more bike-parking facilities that provide easy access to public transport.

Challenges

Tackling air pollution requires coordination across a number of different economic sectors like transport, energy, agriculture and industry. It also needs to be integrated with policy areas such as environment, climate and energy, mobility, agriculture, and fiscal policy. Coordination between governments at European, national, regional, and city level is vital to reduce air pollution.

Long-term urban planning is also important to help clean up and improve energy production and energy use as well as urban mobility.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en

The EU provides ample funding opportunities for air quality measures.
More information on this funding is available at
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities/priority-themes/air-quality-cities_en#funding-opportunities-and-advice

Further Information

The Commission is working together with cities to ensure a good quality of life. See how the Commission helps cities to grow sustainably through sharing of knowledge, funding, and other urban policies and initiatives here:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/citiesand-urban-development_enivant

The Green City Tool is a simple self-assessment and benchmarking tool for cities. It identifies possible areas of improvement based on each of the twelve urban sustainability topics. It recommends further actions and is a source of information and advice for anyone wanting to learn more about how we can make our cities greener and more sustainable.
https://webgate.ec.europa.eu/greencitytool/home/

Further information on clean air can be found at the following link:
http://ec.europa.eu/environment/air/index_en.htm

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QUESTIONS

1. **Does your city have an active monitoring system in place to measure local air quality across the city?**

   ☐ Yes ☐ No

2. **Is real-time air quality information available on your city's air quality via the internet?**

   ☐ Yes ☐ No

3. **Do you provide information to citizens on how they can help improve the air quality in their direct environment?**

   ☐ Yes ☐ No

4. **Does your city have an action plan to improve air quality?**

   ☐ Yes ☐ No

5. **BONUS POINTS – If you have answered YES, Does your plan include:**

   - An analysis of the main sources of air pollution?

   ☐ Yes ☐ No

   - Long and short term objectives to improve air quality (i.e. to met the EU air quality limit values)?

   ☐ Yes ☐ No

   - Actions to achieve these objectives?

   ☐ Yes ☐ No

   - An allocation of budget and a time-frame to realise these actions?

   ☐ Yes ☐ No

   - Has the plan been updated within the last 2 years?

   ☐ Yes ☐ No

Mobility

Mobility

Sustainable mobility is central to the success of a city and has a strong influence on quality of life. It can have wide reaching environmental, social and economic impacts and is a key component to creating a sustainable city. Member states need to move towards forms of mobility that respect the environment, are sustainable and energy efficient.

Source: Press Office City of Münster, Germany
Image: http://www.azarask.in/blog/post/remix-challenge-car-bus-bike/

The image above highlights the contrast between the space required to transport 72 passengers by car, bus and bicycle.

Introduction

Sustainable urban mobility is the movement of people and goods within an urban area in a resource efficient way. Pollution and congestion in urban areas is increasing as a result of growing freight and passenger transport. Therefore, sustainable mobility is growing increasingly important.

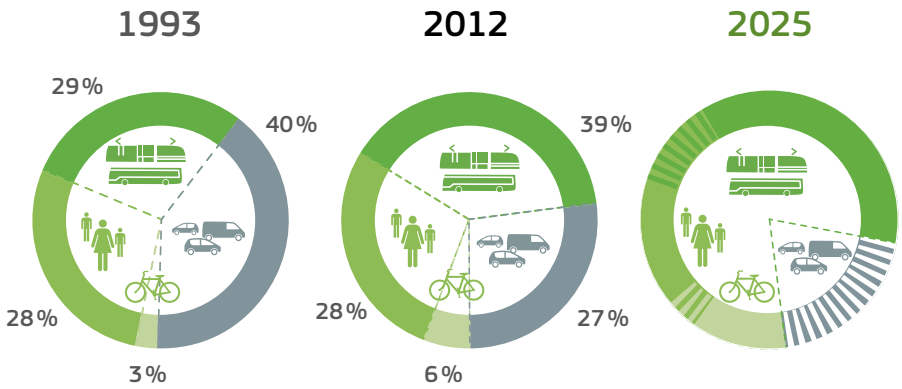
A number of different transport modes contribute to and determine mobility in cities. These include:

Sustainable transport modes		Motorised private transport
Active mobility	Public transport	
• Walking • Cycling	• Bus • Train • Tram and light rail • Metro • Ferry • Shared mobility schemes	• Car • Motorcycle • Van

The different modes of transport used within a city are influenced by a number of factors, including the availability of quality transport infrastructure and societal factors such as the culture and behaviour of citizens and visitors. Promoting sustainable urban mobility requires an understanding of these factors and how they interact with each other and influence the mobility choices that people make.

The modal split of transport within a city identifies the percentage of travellers using a particular type of transportation and is important in understanding urban mobility.

According to Vienna's modal split, as seen below, public transport superseded private cars as the primary mode of transport between 1993 and 2012 and is expected to grow even further by 2025.



Source: Wiener Linien / STEP 2025, p. 106) https://www.wien.gv.at/stadtentwicklung/ studien/pdf/ b008379b.pdf

Delivering sustainable urban transport often requires a modal shift to replace a saturated means of transport with another to make the first less congested. This modal shift can be created through a change in transport infrastructure, for example a new light rail network serving a city can reduce the reliance on motorised private transport. Behavioural changes can also create a modal shift, for example when citizens focus on the health benefits associated with walking and cycling.

Benefits

Promoting sustainable urban mobility in cities can deliver wide reaching environmental, social and economic benefits including:

- **Economic growth**
  Traffic congestion reduces productivity and costs at least € 100 billion, or 1 % of the EU's GDP, annually. Promoting sustainable urban mobility can reduce congestion and journey times while improving access to employment. Sustainable urban transport can also make a city more attractive to investments and enhance competitiveness. In addition, reducing transport related pollution and improving air quality can make a city more attractive to people and businesses.

- **Reduced carbon emissions and enhanced air quality**
  Urban mobility accounts for 40 % of all road transport related CO_2 emissions and up to 70 % of other transport pollutants. Cleaner, lower carbon modes of transport can reduce a city's carbon emissions and improve air quality. Transport interventions that enable efficient mass transit in tandem with walking and cycling can help to achieve this.

- **Reduced noise exposure**
  Road traffic is the most dominant source of noise in Europe and can have a negative impact on human health and well-being. Supporting a modal shift to sustainable urban transport can reduce noise exposure in a city.
  Sustainable urban transport, such as bus, train and cycling, can improve access to services, education and employment and enables increased social interaction. In turn, this provides citizens with increased social and economic opportunities.

- **Health and well-being**
  Reducing transport related pollution and improving air quality can have a direct positive impact on the health of citizens living in urban areas. a city's health. Increasing active mobility, such as walking and cycling, improves physical and mental well-being and reduces the burden on a city's health services. Physical inactivity of EU citizens is estimated to cost approximately €80 billion a year. Mobility choices and transport infrastructure can also improve residents' safety and security.

Principles

Although there is no one single approach to promoting sustainable urban mobility, the following principles can help guide mobility planning:

- Support a modal shift to sustainable transport by promoting walking and cycling within a city and by supporting the increased use of public transport.
- Enable connectivity to allow people to efficiently change from one mode of transport to another, through the creation of successful multi-modal transportation systems.
- Promote accessibility to public transport regardless of age, income or physical ability.
- Integrate transportation and land-use planning to facilitate planning decisions that promote and enable sustainable urban mobility.

Implementation

Local authorities are usually best placed to support sustainable urban mobility in line with the particular circumstances of individual cities. Good practice strategies that are commonly used to promote sustainable urban transport include:

- **Developing defined short and long term objectives and actions to:**
  1. Reduce the overall demand for transport
  2. Reduce the demand for individual motorised transport£
  3. Reduce congestion and improve regional mobility flows
- **Preparing a Sustainable Urban Mobility Plan (SUMP)**
  A SUMP is central to promoting sustainable urban mobility and should identify a long-term vision and clear implementation plan to deliver a shift towards sustainable modes of transport.

Challenges

The four key challenges of sustainable urban mobility are recognised as:

Participation – actively involving local stakeholders and citizens in mobility planning processes

Cooperation – improving geographic, political, administrative and interdepartmental cooperation

Measure selection – identifying the most appropriate package of measures to meet a city's policy objectives

Monitoring and evaluation – assessing the impact of measures and evaluating the mobility planning process.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-andurban-development/funding-cities_en

Further Information

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to sustainable mobility can be found at the following links:

Download guidelines on developing and implementing a Sustainable Urban Mobility Plan (SUMP):
http://www.eltis.org/content/sump-process

Read about the European Commission's guiding principles for the development of Sustainable Urban Mobility Plans:
https://ec.europa.eu/transport/sites/transport/files/themes/urban/ doc/ump/com%282013%29913-annex_en.pdf

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QUESTIONS

1. **Has your city measured the use/share of the following modes of transport in the last two years:**

   - public transport

   ☐ Yes ☐ No

   - private motorised transport

   ☐ Yes ☐ No

   - non-motorised transport (cycling and walking)

   ☐ Yes ☐ No

2. **Does your city systematically collect data about the use and share of different transport modes?**

   ☐ Yes ☐ No

3. Does your city have detailed data on the origins and destinations of the journeys taken by the different modes of transport in the city? (e.g. through household destination surveys)

☐ Yes ☐ No

4. Has your city undertaken an analysis of the likely future demand (i.e. 5 year forecast or more) for the different transport modes in the city?

☐ Yes ☐ No

5. Does your city set goals and objectives in relation to future performance of transport/mobility for the following transport modes:

- public transport

☐ Yes ☐ No

- private motorised transport

☐ Yes ☐ No

- non-motorised transport (cycling and walking)

☐ Yes ☐ No

6. Does your city have an long-term strategy and implementation plan for the future development of transport and mobility infrastructure and services?

☐ Yes ☐ No

7. BONUS POINTS – If you have answered YES:

- Does this plan include a clear timetable and budget for delivery?

☐ Yes ☐ No

- Is this plan publicly available?

☐ Yes ☐ No

- Is this plan up to date? (i.e. less than two years old?)

☐ Yes ☐ No

- Does this plan favour a shift towards active modes of transport? (i.e. cycling and walking)

☐ Yes ☐ No

8. Does your city actively promote walking and cycling as a means of getting around the city?

☐ Yes ☐ No

9. Does your city actively discourage the use of private cars as a means of getting around the city?

☐ Yes ☐ No

10. Does your city have a plan to improve the infrastructure, attractiveness, safety and security of walking and cycling?

☐ Yes ☐ No

11. BONUS POINT – If you have answered YES:

- Does this include plans for increasing dedicated infrastructure for cyclists and pedestrians to separate them from heavy motorised traffic and to reduce travel distances?

☐ Yes ☐ No

12. Does you city have a plan including measures for improving the efficiency of urban logistics, including urban freight delivery?

☐ Yes ☐ No

13. Does your city have a strategy to improve the integration of different modes of transport, including measures aimed and facilitating easy movement between them?

☐ Yes ☐ No

14. In your transport planning processes, do you systematically involve:

- All city departments that might have an interest in how the transport systems functions, including transport; land-use and spatial planning; social services; energy; health; education; enforcement and policing?

☐ Yes ☐ No

- neighbouring urban areas?

☐ Yes ☐ No

neighbouring rural areas?

☐ Yes ☐ No

- different levels of administration and government? (e.g. district, municipality, agglomeration, region, and Member States)

☐ Yes ☐ No

- citizens and/or representatives of civil society?

☐ Yes ☐ No

- major employers in the city?

☐ Yes ☐ No

- schools and/or other educational establishments?

☐ Yes ☐ No

Energy

Energy

The energy consumed by a city its soource performance and efficiency are all key to determining a city's greenhouse gas emissions and are fundamental to its environmental performance

Introduction

It is widely recognised that increasing greenhouse gas emissions from human activities are a large contributor to climate change and a major threat to our future well-being and prosperity. Preventing climate change is a strategic priority for the EU.

Energy related emissions account for almost 80% of the EU's total greenhouse gas emissions. The 2020 Climate & Energy Package is a set of binding legislation to ensure the EU meets its climate and energy targets by 2020. The package sets three key targets for 2020:

1. 20% cut in greenhouse gas emissions (from 1990 levels)
2. 20% of EU energy to come from renewable sources
3. 20% improvement in energy efficiency

RENEWABLES ARE GOOD FOR EUROPE

Climate Action:
In 2012, renewables reduced CO_2 emissions by 326 Mt. equivalent to annual emissions of Spain

Jobs:
More than 1 million people work in renewables

Consumers:
There were more than 2 400 renewable energy cooperatives in Europe in 2015

Trade:
We export €35 billion in renewable technology every year

Energy security:
We have reduced our fossil fuel imports by €30 billion every year

Industry:
More than €130 billion was earned by EU renewables companies

Technology:
The price of solar panels fell by 80% in just four year

The 2030 Climate & Energy Framework, or the Clean Energy for All Europeans Package as it is also known, builds upon this and the Commission has proposed the following three key targets:

1. At least 40% cuts in greenhouse gas emissions (from 1990 levels)
2. At least 27% of EU energy to come from renewable sources
3. At least 27% improvement in energy efficiency.

Energy use in towns and cities accounts for more than half of greenhouse gas emissions caused by human activity in the EU. Local authorities have an important and influential role to play in ensuring that their actions and policies relating to energy supply, consumption and performance support a reduction in greenhouse gas emissions.

Benefits

- Enhancing energy performance in a city can have multiple benefits including lower greenhouse gas emissions as a result of increased energy efficiency and a reduction in energy consumption. Enhanced energy performance can also result in cost savings for citizens and businesses as energy consumption and associated costs are reduced.
- The energy efficiency of the built environment is an important aspect of energy performance in cities. An energy efficient environment can have a number of benefits including reduced greenhouse gas emissions, lower operating costs, reduced fuel poverty and improved health and well-being.
- Reducing energy related emissions in urban areas helps to improve air quality. This can result in health benefits for those living and working in cities and can improve their quality of life through a cleaner, more sustainable city.
- Increasing renewable energy supply from sources including wind, solar, hydro, tidal, geo-thermal and biomass can lower the greenhouse gas emissions associated with a city's energy supply and support climate and energy targets.
- By increasing energy supply from renewable sources a city reduces its dependence on imported fossil fuels and avoids energy price fluctuations. This is important for companies that consume large quantities of energy when considering where to operate. Energy

independence makes a city's energy production more sustainable and improves competitiveness. The renewable energy industry also drives technological innovation and employment across Europe.

Principles

According to a sustainability energy concept that was developed in Delft University of Technology known as the Trias Energetica concept, the most sustainable energy is saved energy. The concept sets out three main principles that should be considered in relation to energy and sustainability.

Implementation

The EU's Covenant of Mayors initiative provides cities with the guidance and tools to meet and exceed the EU objective to reduce CO_2 emissions by at least 40% by 2030 through increased energy efficiency and developing renewable energy sources. The Covenant supports local authorities to develop a Baseline Emission Inventory (BEI) and Sustainable Energy & Climate Action Plan (SECAP). The Covenant follows a three step process as follows:

1. **Signature of the Covenant of Mayors:** Adequate administrative structures should be put in place and cities should begin to develop their Baseline Emission Inventory and Sustainable Energy & Climate Action Plan.
2. **Sustainable Energy & Climate Action Plan (SECAP)** submission: During this step, the cities should begin to implement their SECAP by setting targets and introducing adaptation measures. The plan's progress should also be monitored.
3. **Regular submission of implementation reports:** Cities should submit regular reports so that the success of the SECAP can be monitored and amended as necessary.

Local authorities can show leadership and commitment to reducing greenhouse gas emissions by setting minimum energy performance requirements for new buildings that go beyond the Energy Performance Directive. In addition, refurbishments to existing municipal buildings to make them more energy efficient can significantly improve their energy performance.

Cities can further improve energy performance by developing a toolbox for citizens to undertake their own energy renovations. Possible tools could include grants or subsidies and providing technical information and advice for landowners or homeowners on setting up renewable energy cooperatives.

Challenges

Addressing energy use at a city level in order to increase renewable energy supply and improve energy performance can raise a number of challenges, including infrastructure, planning policy, funding requirements, stakeholder complexity and political commitment.

A key challenge is gaining the necessary commitment to deliver and implement a successful SECAP. Identifying and promoting the benefits and needs for a SECAP are crucial to ensuring local support and commitment.

Policies and initiatives to improve energy performance can require upfront investment before operational cost savings are realised. This can present a challenge when trying to encourage investment. It may be necessary to prepare a business case, identifying the benefits of improving energy performance and outlining the time required to achieve a return on investment (ROI).

Further issues around funding may arise when trying to improve the energy efficiency of a city's buildings. Renovations can be expensive and residents may not have the money to carry out improvement works in their homes. Several cities have developed grants, subsidies special loans and other financial mechanisms to support these renovations and improvements.

Funding

ELENA, the European Local Energy Assistance Scheme, provides grants of up to 90% of eligible costs to local and regional authorities for technical assistance relating to the development of large-scale bankable sustainable energy investments.

The European Regional Development Fund (EDRF) focuses its investments on several key priority areas and one of these areas is a low-carbon economy. The fund helps Member States, regions, local government and cities to implement much needed investments in energy efficiency in buildings, renewable energy, smart distribution electricity grids or sustainable urban transport and also in research and innovation in these areas.

There are a number of other structural funds that provide investments funds to encourage and support more energy efficient cities.

Further Information

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to sustainable energy can be found at the following links:

For more information on energy production and consumption in Europe and its environmental impact:
http://www.eea.europa.eu/themes/energy

For more information on energy performance, including the Energy Efficiency Directive, energy efficient products, buildings, financing energy efficiency, cogeneration of heat and power and heating and cooling:
https://ec.europa.eu/energy/en/topics/energy-efficiency

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Wrocław Smart Metering ..... page 126

QUESTIONS

1. **Does your city collect (or have access to) good data on energy consumption (i.e. demand for gas, electricity etc) by:**

   - Private homes / households?

   ☐ Yes ☐ No

   - Businesses/industry?

   ☐ Yes ☐ No

   - Public services (i.e. schools, hospitals, municipal buildings etc.)

   ☐ Yes ☐ No

2. **Do you collect (or have access to) good data on energy supply sources in your city? (i.e. wind, solar PV, fossil fuels, nuclear, bio-energy etc.)**

   ☐ Yes ☐ No

3. **Has your city made projections of future developments in energy supply and demand? (i.e. mid-long terms – 5-10+ years)**

   ☐ Yes ☐ No

4. **Has your city made an assessment of the potential for energy efficiency / demand reduction?**

   ☐ Yes ☐ No

5. **Has your city set specific targets for increasing energy efficiency/ reducing energy demand in:**

   - Private homes / households?

   ☐ Yes ☐ No

   - Businesses/industry?

   ☐ Yes ☐ No

   - Public services (i.e. schools, hospitals, municipal buildings etc.)

   ☐ Yes ☐ No

6. **Does your city have an strategy or plan for increasing energy efficiency / reducing energy demand in:**

   - Private homes / households?

   ☐ Yes ☐ No

   - Businesses/industry?

   ☐ Yes ☐ No

   - Public services (i.e. schools, hospitals, municipal buildings etc.)

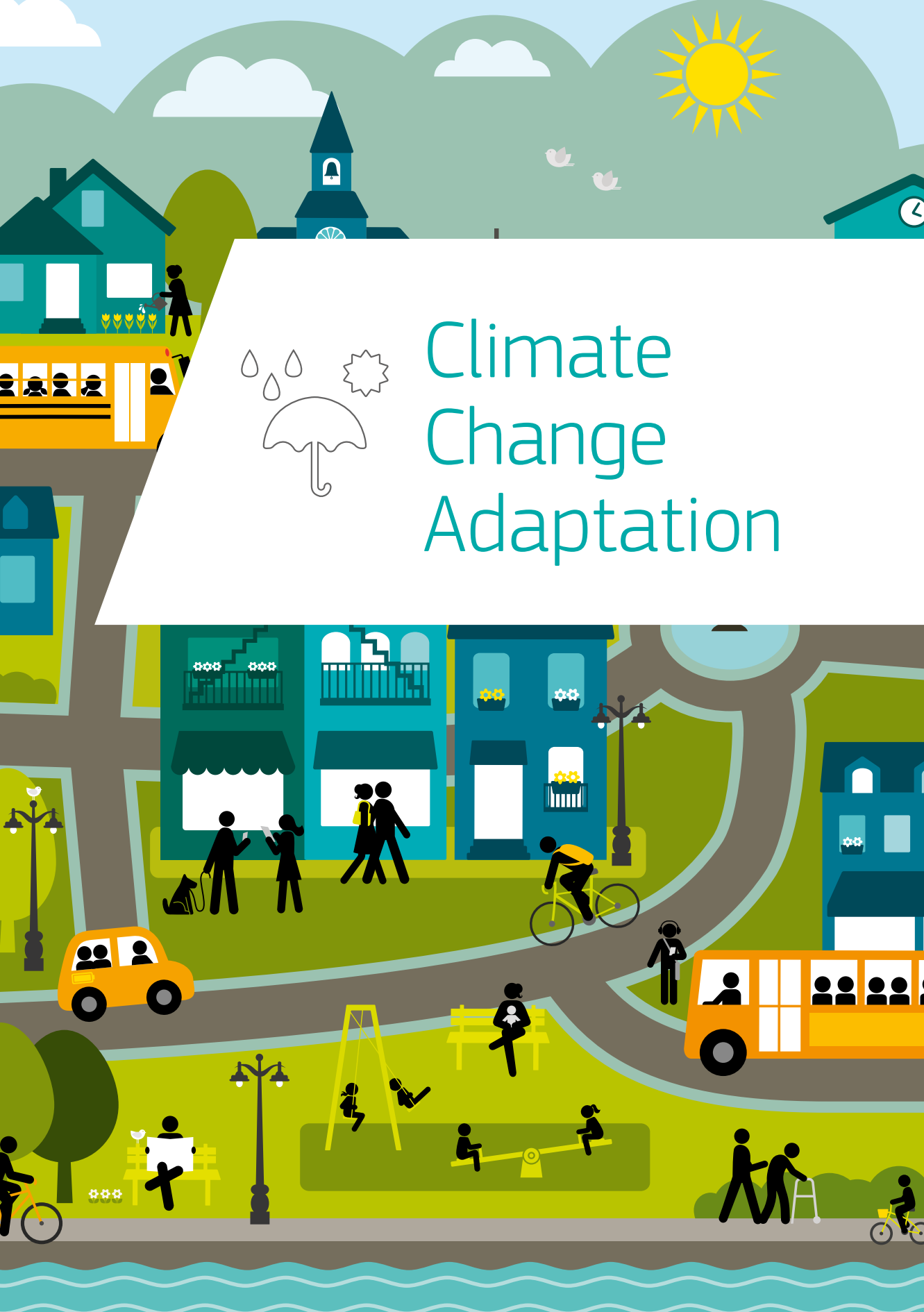
   ☐ Yes ☐ No

7. **Has your city set specific targets for increasing renewable and/or low-carbon energy supply sources?**

   ☐ Yes ☐ No

8. **Does your city have a strategy or plan for increasing renewable and/low carbon energy supply sources?**

   ☐ Yes ☐ No



Climate Change Adaptation

Climate change adaptation

Urban areas increasingly experience the impacts of climate change. The current average global temperature is 0.85o C higher than it was in the late 19th century. As a result of these changes, cities must adapt to changing pressures and extreme weather events, such as heatwaves, drought, cloudbursts and heavier, more frequent storms.

If cities do not take measures to deal with these adverse changes, they will increase the risks to the well-being and safety of their citizens and could suffer large financial losses. Adaptation measures to cope with these changes will increase cities' resilience and sustainability and contribute to citizens' safety and quality of life.

Introduction

Climate change adaptation at city level is about adapting cities to withstand the potential effects of a changing climate. It is crucial to understand what risks are faced by cities as a result of climate change and ensure that cities can adapt to deal with these.

The effects of climate change are already affecting cities and impacting on infrastructure and people. Several cities in northern Europe are already experiencing excessive rainfall and coastal cities are attempting to deal with the risk of flooding due to rising sea levels. Several countries in southern Europe are known to experience periods of drought. These droughts have already caused major forest fires.

Local governments can implement several measures to adapt cities to changing climatic conditions. However, as the impacts affect large areas, cooperation between cities, regions and countries will be necessary to implement measures that have

a significant impact. Some measures, such as the installation of flood resistant infrastructure, are achieved through physical changes while others, such as water usage restrictions, require behavioural change.

Benefits

- The main objective in adapting to climate change is to make cities resilient, or less vulnerable, to its impacts. From the many examples in recent years, we know that climate change events come at a great cost: material damage, impacts on health, and in the worst case, loss of life. To ensure losses are limited, cities can undertake several measures. Some of these involve changes to infrastructure or the urban fabric of a city. In other cases, the measures can require cooperation between multiple cities, regions or countries, for example, the restoration of a river bed to its natural course.
- Climate adaptation measures have the potential to realise other goals when carried out in synergy with other aspects, such as mitigation measures, good water management, enhancing or restoring natural ecosystems, enhancing the public realm, increasing green space and improving safety.

SUN-City Project – Heerhugowaart (NL)

Principles

There are a number of sustainability principles that can guide policy makers and practitioners relating to climate adaptation:

- Incorporate climate change adaptation into all city projects. Making smart investments that achieve two objectives at the same time is the most cost-effective way of dealing with climate change. This integrated approach helps cities to make smart investments.

- Involve all city departments and gain commitment to implement climate change adaptation measures. This should result in an integrated approach to climate adaptation. The link between urban planning and infrastructural development is key, for example the planning department can prohibit citizens from building on flood plains, thus preventing future flooding that would disrupt the city and cause damage and related financial losses.
- Involve citizens and other stakeholders in the conversation on climate change to ensure they are informed and understand the importance of adapting their city. By making citizens and stakeholders aware of the possible impacts of climate change, the city can encourage them to take action and support difficult decisions.
- Invest in low-risk adaptation measures first. A range of adaptation measures should be considered, including behavioural changes, planting drought resistant crops, using water resources more efficiently and adapting building codes to withstand climate change and extreme weather conditions.
- Invest in nature based solutions instead of grey infrastructure. Nature based solutions often offer a multitude of environmental benefits, including air quality, recreational space and water management. Nature based solutions generally allow for more flexible planning and adaptation as the impacts of climate change become clearer.

Implementation

There are a number of key steps that can be taken when implementing climate change adaptation measures in European cities:

- **Preparation**
  A first but crucial step in starting the adaptation process is to put it on the agenda of city administration and governing bodies and to ensure they are adequately informed of the issues. This is important to secure the necessary resources, such as time, people and funding. High level support will be required to establish a clearly defined process.
- **Identify risks and vulnerabilities**
  Identify the most prominent risks associated with climate change and which areas, social groups and systems are most vulnerable. By identifying the main adaptation concerns, a strategic action plan can be defined.
- **Adaptation plan**
  Develop an adaptation plan or include adaptation measures in the city's strategic planning policies to ensure an integrated approach. A broad range of adaptation measures should be considered, including behavioural, technological, regulatory, institutional or financial measures. These options should be assessed to identify what is most effective in reducing climate change risks and vulnerabilities.

- **Adaption measures**
  Implement the adaptation measures through a combination of project specific adaptations and overall systematic changes. This will ensure that the measures are adopted and implemented correctly.
- **Monitor and assess**
  It is important to ensure that the measures are being carried out within the specified time and that they are being implemented effectively enough to meet the objectives defined in the adaptation plan.

Challenges

There are a number of challenges associated with climate change adaptation:

- Political support: The effects of climate change are not always immediately visible and the most significant effects will be felt in the long term. This can make it difficult to influence short or medium term political agendas.
- Integration: Climate change impacts and measures are relevant to almost all policy areas. Therefore, it is important to have the entire city and all governing bodies aware of the importance of climate change adaptation. Effective communication and engagement will be crucial to ensure that all city officials and policy makers are informed enough to take action and integrate climate change adaptation measures into their field of expertise.
- Economic challenges: Changes in physical infrastructure often require large financial investment. Adequate funding is required to ensure that adaptation measures are implemented.
- Changing mind-sets and behaviour: City departments will need to be encouraged to include nature based solutions instead of grey infrastructure, along with other climate change adaptation measures in all projects and plans.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/ eu-regional-and-urban-development/topics/cities-and-urban-development/ funding-cities_en

Climate change adaptation in the EU is financed through a wide range of instruments which are aligned with the Europe 2020 Strategy that aims for smart, sustainable and

inclusive growth. The Multiannual Financial Framework 2014-2020 sets out that at least 20% of the European budget is dedicated to climate-related expenditure. This means that climate adaptation actions must be integrated into all major EU spending programmes, such as the European Structural and Investment Funds. A tracking system has also been put in place to ensure these objectives are met.

As part of the funding set out under the Multiannual Financial Framework 2014-2020, Horizon 2020 and the LIFE programme all provide significant support to Member States, regions and cities to invest in programmes and projects on climate change adaptation measures.

Other EU funds and international financing institutions, such as the European Investment Bank and the European Bank for Reconstruction and Development, also support adaptation measures.

Further Information

The Commission is working together with cities to ensure a good quality of life. See how the Commission helps cities to grow sustainably through sharing of knowledge, funding, and other urban policies and initiatives here:
https:// ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urbandevelopment_en

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to climate change and adaptation measures can be found at the following links:

An EU initiative providing visibility on cities' commitments and actions on climate change mitigation and adaptation, facilitating exchange of experiences and providing wide-ranging support:
http://www.covenantofmayors.eu

More in-depth information on how to tackle climate adaptation in cities:
https://climate-adapt.eea.europa.eu/knowledge/tools/urban-ast/step-0-0

The EEA offers extensive guidance on adaptation to climate change with a set of 10 leading principles, good-practice examples and background information (2010): **http://acm.eionet.europa.eu/docs/ETCACC_TP_2010_6_guiding_principles_cc_adaptation.pdf**

Read the final report on the costs of climate change in Europe and the costs and benefits of adaptation here: **http://www.climatecost.cc/images/ Policy_Brief_ClimateCost_Draft_Final_Summary_vs_4.pdf**

This webpage gives a brief overview of funding opportunities and different funding options, such as Life Climate Action, ESI Funds and Horizon 2020 (research): **https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/priority-themes/climate-adaptation-cities_en#funding-opportunities-and-advice**

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Oslo Reopening Waterways ..... page 124

QUESTIONS

1. **Has your city undertaken a climate change vulnerability study? (This study could be an integrated part of the climate adaptation plan or strategy).**

   ☐ Yes ☐ No

2. **BONUS POINTS – If you have answered YES:**

   - Does it include an analysis of the most prominent climate change risks?

   ☐ Yes ☐ No

   - Does it include an analysis of vulnerable areas and social groups and systems?

   ☐ Yes ☐ No

   - Does it include identification of the main adaptation concerns and set-up of a strategic direction?

   ☐ Yes ☐ No

3. Does your city have a system in place to collect information on extreme weather events (in order to assess trends in a systematic way)?

☐ Yes ☐ No

4. Does your city have a climate change adaptation plan

☐ Yes ☐ No

5. BONUS POINTS – If you have answered YES:

- Does your plan include long and short term objectives?

☐ Yes ☐ No

Does your plan include actions to realise those objectives?

☐ Yes ☐ No

- Does your plan include timing and budget for the implementation of these actions?

☐ Yes ☐ No

- Is your plan up to date or has it been updated in last 4 years?

☐ Yes ☐ No

Does your plan include a monitoring framework?

☐ Yes ☐ No

6. Are new developments in your city systematically adapted to possible climate change effects? (e.g. through a climate 'adaptation check' for new developments and through horizontal (across sectoral departments) and vertical (across governance levels) coordination) as well as stakeholder engagement).

☐ Yes ☐ No

7. Is your city a signatory of the Covenant of Mayors for Climate and Energy/ MayorsAdapt?

☐ Yes ☐ No

8. BONUS POINTS – If you have answered YES:

- Have you adopted and submitted your action plan within the framework of the CoM

☐ Yes ☐ No

- Have you submitted your monitoring report

☐ Yes ☐ No

Nature &
Biodiversity

Nature & Biodiversity

Urban ecosystems are key to protecting biodiversity in cities and other urban areas. Cities can play an important role in hosting rare and endangered species and habitat types. Biodiversity provides a number of important ecosystem services to urban residents, including providing recreational space, filtering air particles, cleaning water and buffering climate extremes, such as heatwaves. Nature and biodiversity, and the ecosystem services they provide, can have a positive impact on the quality and sustainability of life in cities, once they are properly managed and maintained.

Introduction

Urban biodiversity is defined by the Convention on Biological Diversity (CBD) as "*The variety and richness of living organisms (including genetic variation) and habitat diversity found in and on the edge of human settlements. This biodiversity ranges from the rural fringe to the urban core*", (Secretariat of the Convention on Biological Diversity 2012, 8). European cities provide habitats for many common and protected species. In fact, approximately 5 000 km^2 of urban areas within the EU are protected sites (Natura 2000). Yet the value of this nature and wildlife is often underestimated.

Urban expansion can result in the alteration of habitats. These altered habitats are one of the key threats to urban biodiversity and a major challenge to sustainability within cities. Urban ecosystems are defined as '*socio-ecological systems composed of green*

infrastructure and built infrastructure' (MAES 4th Technical Report on Mapping and Assessment of Urban Ecosystems, 2016). They cover constructed, industrial and other artificial spaces, including commercial and transport areas such as railway lines, urban green areas, mines and dumps. With the right planning and organisation, urban areas can retain substantial components of native biodiversity and provide opportunities for sustainability.

With more than 70% of people living in Europe's cities and towns, there are many challenges for city infrastructure, inhabitants and surrounding areas. These challenges include the availability of finite resources, the decreasing quality of urban environments and mounting pressure on biodiversity. Biodiversity provides many important ecosystem services to urban residents and helps buffer against nuisances generated by cities.

Green infrastructure, as defined by the European Union Green Infrastructure Strategy 2013 is '*a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services'. The green infrastructure concept* brings considerations for biodiversity and ecosystem services to the heart of wider spatial planning. It is key to strengthening sustainable urban development and related spatial policy.

Benefits

Urbanisation impacts biodiversity by converting agricultural, forest and other semi-natural and natural lands into urban and other artificial land development. This demand for developed land results in issues such as habitat fragmentation, soil sealing, changes in species composition, as well as water, light and noise pollution.

Enhancing both the quality and quantity of natural areas and biodiversity in cities can have substantial benefits, not only through reversing biodiversity loss, but also by improving the services that urban ecosystems provide:

- Urban green areas have an aesthetic value and provide space for recreation, social exchange, educational purposes and reconnecting people with nature.
- Urban green spaces that are rich in biodiversity help to reduce or remove different types of pollution by filtering air particles, purifying water and reducing noise. This can improve human and environmental health and well-being.
- Urban ecosystems also buffer climate extremes, such as heatwaves, which are often exacerbated by the already existing Urban Heat Island effects of artificial surfaces. Urban ecosystem services and biodiversity therefore play a supporting role in climate change mitigation and adaptation efforts.
- Integrating urban ecosystems into urban planning strategies can significantly increase the quality of life for citizens.

Principles

The following principles can guide cities to improve urban ecosystems and biodiversity:

- Limit the extension of artificial surfaces and promote the recycling or regeneration of brownfield areas that would otherwise lie vacant.
- Introduce compensation measures where artificial surfaces are being extended.
- Use green infrastructure instead of grey infrastructure to protect, conserve and enhance natural capital cities and increase ecosystem resilience.
- Increase accessibility for citizens and connectivity for species migration within cities by creating an ecological network.
- Ensure a participatory planning process is undertaken. This will help to increase acceptance and ensure transparency during the decision-making and implementation processes.

Implementation

There are a number of measures that can be implemented to enhance and promote urban nature and biodiversity, including the following:

Spatial planning regulations

Spatial planning regulations should directly incorporate either the conservation of biodiversity or the development of green initiatives. Examples include the green roof legislation in Basel, Switzerland; the green city Biotope Area Factor approach in Berlin; and a national law in France mandating green or solar roofs on new buildings.

Urban gardening & agriculture

Using urban space for gardening and agriculture is a way of creating and managing urban green spaces beyond traditional methods such as parks. It is also a way to engage urban populations in the stewardship of green space. This can also be a way to increase green infrastructure in a city where municipal budgets and capacities are constrained.

Stakeholder engagement
Involving the general public in the decision making process for green infrastructure, including implementation, maintenance and monitoring, can be key to obtaining high levels of acceptance. Effective public engagement and communication in the green infrastructure planning process can help to avoid conflicts with stakeholders, increase support and instil a sense of community ownership regarding planned measures.

Increased transparency and support
Highlighting benefits and drawbacks associated with green infrastructure will increase transparency in the spatial planning process. This will create a more informed decision making process and increase acceptance relating to green infrastructure.

Green infrastructure
The European Commission has been developing the EnRoute project to support the enhancement of urban biodiversity and deployment of green infrastructure and ecosystem services in cities. '*EnRoute*' stands for 'Enhancing Resilience of urban ecosystems through green infrastructure'. EnRoute provides scientific knowledge on how urban ecosystems can support urban planning at different stages of policy and for various spatial scales and policy-making for sustainable cities. It aims to promote the use of urban green infrastructure at local level and delivers guidance on the creation, management and governance of urban green infrastructure. Importantly, it also illustrates how collaboration across different policy levels can lead to a clear green infrastructure policy setting.

Challenges

Green infrastructure projects that aim to support urban biodiversity often face a range of challenges, including:

- **Organisational structures**: Obstacles posed by internal structures and procedures can inhibit development of urban biodiversity. Capacity and budgetary issues within organisations, such as local authorities, can also prove challenging when implementing green infrastructure initiatives.
- **Regulatory barriers**: A lack of legal protections for urban green spaces and fragmented ownership structures leads to a lack of clarity regarding responsibility for urban green infrastructure. Onerous administrative procedures can also prove to be a challenge, for example, funding applications and the high level of associated paperwork.
- **Culture and behaviour**: Customs, values, beliefs, interests and behaviours can all influence levels of acceptance when implementing green infrastructure projects. Competing interests and agendas can also have an impact on whether a project progresses or not.

- **Insufficient knowledge**: A lack of knowledge and education about green infrastructure and biodiversity is another barrier as people are unlikely to support something they know very little. For example, the effects of green infrastructure on urban biodiversity and its long term cost effectiveness, compared to seemingly cheaper alternative grey infrastructure solutions.
- **Lack of resources**: Technical, human and financial resources are all important when planning urban biodiversity. Where these resources are limited, there is a risk of informal and illegal development taking place. This can occur in areas of ecological significance, such as natural or semi-natural areas.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en

Further Information

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to urban nature and biodiversity can be found at the following links:

The EU Biodiversity Strategy to 2020:
http://ec.europa.eu/environment/nature/biodiversity/strategy/ index_en.htm

The Biodiversity Information System for Europe (BISE), Urban ecosystems and green infrastructure:
http://biodiversity.europa.eu/topics/ecosystems-and-habitats/urban

The EnRoute project:
https://oppla.eu/enroute

The MAES 4th technical report on mapping and assessment of urban ecosystems:
http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/102.pdf

The European Union Green Infrastructure Strategy:
http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

The Economics of Ecosystems and Biodiversity (TEEB) Manual for Cities Ecosystem Services in Urban Management:
http://www.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf

The FP7 project Green Surge – Green Infrastructure and Urban Biodiversity for Sustainable Urban Development and the Green Economy:
http://greensurge.eu/

Naumann, Sandra, McKenna Davis, Timo Kaphengst, Mav Pieterse, and Matt Rayment. 2011. "*Design, Implementation and Cost Elements of Green Infrastructure Projects.*" Final report to the European Commission, DG Environment. Ecologic Institute and GHK.
http://www.ecologic.eu/sites/files/project/2014/documents/design-implementation-cost-elements-of-green-infrastructure-projects-2011-naumann_0

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Strasbourg's Project Sustainability Evaluation Tool page 128

QUESTIONS

1. **Does your city have an understanding of the nature and biodiversity in the city? (i.e. a map or detailed study, looking at, for example: rare and endangered species, indicator species, protected and non-protected areas, protected habitats and species, common species.)**

   ☐ Yes ☐ No

2. **Does your city have any specific and measurable objectives related to protecting biodiversity in the city?**

   ☐ Yes ☐ No

3. **Does your city have a specific nature and biodiversity policy, strategy or action plan?**

   ☐ Yes ☐ No

4. **BONUS POINTS – If you have answered YES:**

   - Are roles and responsibilities defined for city actors with the plan?

   ☐ Yes ☐ No

   - Has the plan been updated in the last two years?

   ☐ Yes ☐ No

   - Is a specific budget set aside for the protection of nature and biodiversity within the plan?

   ☐ Yes ☐ No

   - Does the plan include the concept of 'corridors' or connected spaces for wildlife across the city?

   ☐ Yes ☐ No

   - Does the plan include medium/long term targets for nature and biodiversity in the city?

   ☐ Yes ☐ No

   - Do you have a system in place to systematically monitor the progress of your plan?

   ☐ Yes ☐ No

5. **Has the city defined objectives and actions aimed at increasing Green Infrastructure? (this might be part of the biodiversity policy, strategy or action plan as referred to above)?**

   ☐ Yes ☐ No

6. **Does your city officially recognise the concept of «ecosystem services», acknowledging the importance of urban ecosystems (such as parks, water bodies) for delivering societal benefits (such as air purification, water regulation, cultural values, ...)?**

   ☐ Yes ☐ No

7. **Does your city have policies aimed at raising awareness amongst citizens and city visitors about the benefits nature and biodiversity in the city?**

   ☐ Yes ☐ No

8. **Does your city actively promote any of the following 'nature based solutions' (NBS): (e.g. via legal obligations, or economic such as taxes and subsidies, public-private partnerships with business sector etc)**

   - Green roofs, green walls?

   ☐ Yes ☐ No

   - SUDS (Sustainable Drainage Systems)?

   ☐ Yes ☐ No

   - Natural flood protection measures?

   ☐ Yes ☐ No

   - Natural waste water treatment solutions?

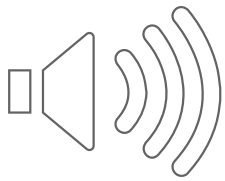
   ☐ Yes ☐ No

   - Protection of watersheds to safeguard infiltration areas for the city's drinking water

   ☐ Yes ☐ No

   - Other measures?

   ☐ Yes ☐ No



Noise

Noise

Noise pollution poses an environmental risk to human health. Therefore, the reduction of noise in urban areas, through a range of integrated measures, plays an important role in improving the quality of life within Europe's cities. Road traffic is the greatest contributor to urban noise pollution.

Introduction

Noise relates to sounds, especially those that are loud or unpleasant or that cause disturbance. Environmental noise is defined as unwanted or harmful outdoor sounds created by human activities, including noise emitted from road, rail or air traffic and from industrial activity. It is different from noise caused by domestic activities, such as a neighbour mowing the lawn, computers or telephones in an office and music inside vehicles.

Noise in the European Union is regulated by the Environmental Noise Directive and other legislation that sets maximum noise levels for cars, buses, trains, airplanes etc., and a range of activities, including construction work.

Benefits

A number of health impacts, both direct and indirect, have been linked to exposure to high levels of noise. Reducing noise pollution is therefore an important element in improving the quality of life for people living in a city.

- People exposed to elevated levels of noise can experience stress reactions, interrupted sleeping patterns and other biological or biophysical impacts. In turn, these impacts may lead to more serious health problems, such as stroke and ischemic heart disease, that can result in a heart attack. Reducing the levels of noise can reduce these adverse health impacts.
- Reducing noise pollution and protecting quiet areas in cities also has an economic benefit. It can reduce external costs like medical expenses for noise related health issues. It can also reduce the cost of lost productivity in the workplace due to absenteeism resulting from the effects of noise pollution.

Principles

The following principles can help municipalities to lower environmental noise levels within their city:

Noise reduction at source: The most cost-effective method of reducing noise is at source and can be achieved through regulation at EU level. Long-term measures can be incorporated into national and international policies. For example, noise levels from vehicles, aircrafts, trains etc., are regulated as part of the EU internal market. Low noise road surfaces have been used in a number of cases and this has resulted in significant noise reduction.

Exposure reduction: Measures to reduce people's exposure to environmental noise can be implemented on a local level. Some of these local measures include insulating buildings or constructing noise barriers.

Land use planning: Encouraging and ensuring appropriate land use and urban planning can reduce levels of environmental noise and any associated impacts. An example of this would be building certain transport infrastructure, such as a new airport or runway, a suitable distance from residential areas.

Awareness building: Promoting noise reduction initiatives and the benefits of reduced environmental noise can raise awareness and encourage citizens, organisations and local authorities to make decisions that result in reduced environmental noise.

Traffic management: Implementing integrated traffic planning and management measures can have a direct impact on environmental noise by limiting or controlling the volumes of traffic within an urban area. Care must be taken, however, to ensure that any measures implemented do not just divert the issues to another area.

Implementation

Best practice implementation strategies for reducing environmental noise in urban areas can include the following:-

Noise mapping
This allows local authorities to locate areas that are most impacted by noise pollution and identify the sources of environmental noise.

Noise reduction action plans
Developing and implementing long-term noise reduction action plans enables cities to reduce environmental noise through a range of integrated measures in a cost-effective manner.

Stakeholder engagement and awareness building
Building awareness of the issues and impacts associated with noise pollution and educating stakeholders on the sources and impacts of environmental noise can prompt debates to identify policies and find clever solutions to help reduce noise in urban areas.

Establishing quiet areas
Increasing the availability of quiet areas within a city provides residents with a calm place away from environmental noise and the stresses and strains it can bring. A quiet area can include parks, commercial areas and pedestrian only areas.

Integration of noise management with air quality and urban planning
Integrating noise management with related topics such as air quality, transport planning, urban planning and green area planning ensures efficient use of resources and an integrated approach to reducing urban environmental noise pollution.

Challenges

Most of the noise in a city is the result of the demands and development of modern society including increased mobility and productivity. This contributes to increased environmental noise pollution in urban areas.

The major issue with the effectiveness of the previously mentioned implementation measures is that given the various different factors that determine the level of environmental noise, one single measure alone is often ineffective and inefficient. Noise reduction measures need to combine local, national and international measures and be implemented in tandem with other policies, such as mobility and land use, in order to ensure an effective and efficient approach to reducing noise pollution.

Awareness is another challenge which the successful implementation of noise reduction measures can face. Policy makers and public authorities can sometimes overlook the issues and the potential benefits to noise reduction. Citizens and commuters may not be fully aware that they play a significant role in the level of environmental pollution within a city. Changing human behaviour can prove difficult without proper engagement and awareness.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information: **https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-andurban-development/funding-cities_en**

The EU offers a variety of funding opportunities to address excessive noise and environmental noise pollution. Some of the funding programmes available include:

- The European Regional Development Fund
- The Cohesion Fund
- Connecting Europe Facility for Transport
- The EU Research and InnovationProgramme Horizon 2020
- LIFE Plus

Further Information

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to environmental noise can be found at the following links:

General overview on noise (EEA):
https://www.eea.europa.eu/airs/2017/environment-and-health/environmental-noise

Overview of noise at EC:
http://ec.europa.eu/environment/noise/europe_en.htm

Noise sources:
http://ec.europa.eu/environment/noise/sources_en.htm

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QUESTIONS

1. **Does your city collect data on the 'quality of its acoustic environment' (i.e. the levels of noise across the city at different times of day)?**

   ☐ Yes ☐ No

2. **Do you have a graphic representation of the sound level distribution existing in your city (i.e. a noise map) available for different times of day and different days of the week?**

   ☐ Yes ☐ No

3. **Does your city have a website / city magazine or other well established information source where citizens can easily find information on noise in the city?**

   ☐ Yes ☐ No

4. **Does your city have a policy in place to protect more sensitive areas from noise (e.g. hospitals/schools, residential, parks)?**

   ☐ Yes ☐ No

5. **Does your city have an official up-to-date action plan to reduce noise levels?**

   ☐ Yes ☐ No

6. **BONUS POINTS – If you have answered YES, Does your action plan include:**

   - The setting long and short term objectives with regards to reduce noise levels?

   ☐ Yes ☐ No

   - Defined actions to reduce noise levels, including a time-frame and budget to realise the targets?

   ☐ Yes ☐ No

   - The establishment of quiet areas in the city?

   ☐ Yes ☐ No

Governance

Governance

Governance plays a key role in determining the environmental performance of a city. environmental governance is a complex and wide ranging issue that is relevant to a diverse range of stakeholders and policy areas. City governments and authorities have a central role in establishing effective environmental governance.

Introduction

The governance of environmental issues and sustainability is inter-linked with many other themes such as energy, water, waste and mobility, along with urban planning and infrastructure policies. Urban areas are the source of many environmental challenges but they also provide an opportunity to address and resolve many of these issues. There are a range of European environmental action plans and environmental management systems in place to support European cities and communities in becoming more sustainable. The below diagram highlights the operating principals of an environmental management system.

Source : http://ec.europa.eu/environment/emas/join_emas/ow_does_it_work_step0_en.htm

Benefits

- By taking an overarching approach to environmental governance, a city can achieve improved environmental outcomes. This means that the city delivers an integrated approach to governance by addressing a wide range of interconnected issues. This allows for greater opportunity to balance different interests and objectives and benefit from increased efficiency and cost-effectiveness across a range of issues and policy areas.
- In addition, effective environmental governance can result in enhanced environmental awareness and participation amongst citizens, local government, employees and stakeholders. It can also improve the reputation of a city and its local government, leading to increased competitiveness.
- The European Commission is promoting the European Green Capital Award (EGCA) and the European Green Leaf Award (EGLA) as a way to address environmental challenges through inspiring local governments to improve the environment, economy and quality of life in cities.

Principles

The Council of Europe's Strategy on Innovation and Good Governance identifies twelve principles for good governance at a local level. These principles focus on general governance but also provide a useful basis for good environmental governance. These principals are as follows: 1. Fair conduct of elections, representation and participation

2. Responsiveness
3. Efficiency and effectiveness
4. Openness and transparency
5. Rule of law
6. Ethical conduct
7. Competence and capacity
8. Innovation and openness to change
9. Sustainability and long-term orientation
10. Sound financial management
11. Human rights, cultural diversity and social cohesion
12. Accountability

Implementation

There are a number of implementation strategies that can be utilised in order to ensure effective governance.

Integrated management
Effective governance of environmental issues requires an integrated approach. Integrated environmental management addresses interlinked issues such as urban management and governance, spatial planning, economic well-being and competiveness, social inclusion and environmental stewardship. An Integrated Environmental Management System (IEMS) aims to improve the environmental performance of an urban area and helps to avoid conflicts between the competing demands of various policy areas and initiatives.

EU Eco-Management and Audit Scheme
The EU Eco-Management and Audit Scheme (EMAS) is the European benchmark for environmental management systems. It is a voluntary system and its objective is to improve the environmental performance of organisations by having them commit to evaluating and reducing their environmental impact and continuously improving their environmental performance.

Green Public Procurement
Public authorities in cities and other urban areas can demonstrate their willingness to lead behavioural change and make sustainable choices by using environmental criteria when purchasing goods and services. This is known as 'Green Public Procurement (GPP)' or green purchasing. Governing bodies possess the ability to have a positive impact on the environment through GPP and have the power to influence the market by providing industries with policies and incentives to develop green technologies and products.

To be effective, GPP requires the inclusion of clear and verifiable environmental criteria for products and services in the public procurement process. The European Commission has a set of guidance documents, frameworks and action plans to implement green procurement in European cities.

Challenges

The most common challenge likely to be encountered when establishing an IEMS is finding support for an integrated management process. A successful IEMS requires high level support and resources to implement the strategic programmes. Some of the challenges associated with establishing an IEMS are outlined below:

- Baseline review: A sufficiently detailed IEMS is necessary to integrate environmental considerations into other policies and to recognise important

regulatory requirements. • Target setting: Defining objectives and selecting targets when preparing the strategic programme and action plans can be difficult and requires specific knowledge and expertise from a range of disciplines.

- Political commitment: Significant deliberation during the approval process is necessary but can result in a loss of momentum and delays.
- Cross-sectoral cooperation and ongoing engagement: Engagement with all relevant stakeholders is essential to the success of an IEMS, in particular for setting targets, implementing measures and evaluating its impact.
- Implementation and monitoring: Insufficient resources and unclear lines of responsibility for implementing specific actions can present obstacles to the successful implementation of the plan.
- Reporting & evaluation: If results and successes are not adequately promoted and communicated, the ongoing support and participation from stakeholders can be impacted.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en

Further Information

The Commission is working together with cities to ensure a good quality of life. See how the Commission helps cities to grow sustainably through sharing of knowledge, funding, and other urban policies and initiatives here: https:// ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urbandevelopment_en

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https://webgate.ec.europa.eu/ greencitytool/home/

Further information relating to sustainable governance measures can be found at the following links:

Further information on the European Green Capital Award:
http://ec.europa.eu/environment/europeangreencapital/about-the-award/policy-guidance/index.html#

Guidance to assist municipal authorities in establishing Integrated Environmental Management Systems can be found at:
http://www.ccre.org/docs/guide_environment_mangement.pdf

Read more about European environmental management systems (EMAS) here:
http://ec.europa.eu/environment/emas/index_en.htm

The Urban Development Network is made up of more than 500 cities/ urban areas across the EU responsible for implementing integrated actions based on Sustainable Urban Development strategies financed by ERDF in the 2014-2020 period:
http://ec.europa.eu/regional_policy/en/policy/themes/ urban-development/network/

More background information on governance models can be found here:
http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/ citiesoftomorrow/citiesoftomorrow_governance.pdf

For more information on the local governance agenda and initiatives related to policy making for sustainability:
http://www.sustainablecities.eu/ transformative-actions-database/

ICLEI promote a number of resources and initiatives relating to a cyclical, integrated management and governance system:
http://www.iclei-europe.org/topics/urban-governance-participation-social-innovation/

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Bologna Local Urban Environment Adaptation Plan (BLUEAP) .....page 114

Industrial Symbiosis .....page 120

Strasbourg's Project Sustainability Evaluation Tool .....page 128

QUESTIONS

1. **Does your city have an integrated environmental policy framework, vision or management plan?**

   ☐ Yes ☐ No

2. **BONUS POINTS – If you have answered YES, does it include:**

   - Short and long term actions to achieve a more integrated management of environmental policy?

   ☐ Yes ☐ No

   - Links to other policy documents (e.g. urban planning, infrastructure)?

   ☐ Yes ☐ No

   - Agreed actions to be executed by or for other policy fields?

   ☐ Yes ☐ No

   - A dedicated budget for the implementation of the environmental vision?

   ☐ Yes ☐ No

3. **Is your city's environmental vision reflected in different strategies and action plans?**

   ☐ Yes ☐ No

4. **BONUS POINTS – If you have answered YES:**

   - Have city departments, other than the environmental department, adopted your city's environmental vision or elements of it?

   ☐ Yes ☐ No

   - Does your city have an administrative committee or team, which is devoted to the integration of environmental or sustainability strategies?

   ☐ Yes ☐ No

5. **Which of the following innovative tools or methods are used in the environmental department?**

   - Citizen participation in environmental enforcement and/or policy making?

   ☐ Yes ☐ No

- Using apps, smart city initiatives and citizen science applications?

☐ Yes ☐ No

- Awareness raising campaigns on environmental issues?

☐ Yes ☐ No

- Setting up co-creation processes and developing projects together with groups of citizens or external stakeholders, for example?

☐ Yes ☐ No

- Other innovative measures?

☐ Yes ☐ No

6. Is the city leading by example in (integrated) environmental behaviour by:

- Using Green Public Procurement guidelines for purchasing and contracting external services and goods?

☐ Yes ☐ No

- Using an environmental management system to track progress, monitor and set targets?

☐ Yes ☐ No

- Cooperate with other authorities and organisations on environmental topics?

☐ Yes ☐ No

- Enable employees to develop their skills on environmental topics and sustainable city development?

☐ Yes ☐ No

- Another exemplary practices?

☐ Yes ☐ No

Water

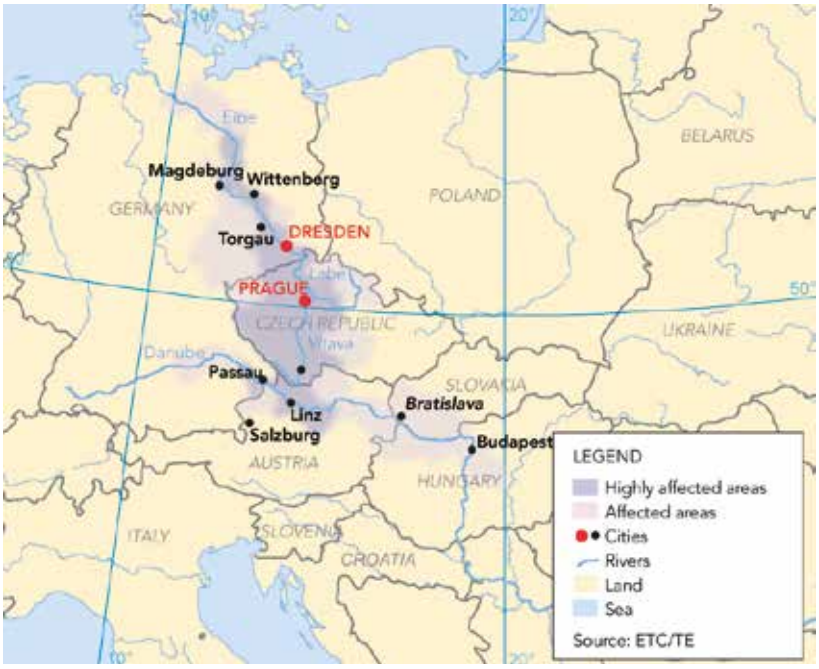
Water

Cities are a major consumer of water and a significant generator of waste water. In addition, many urban areas have an important relationship with water due to the risk of flooding and its associated impacts. Addressing drinking water supply and consumption, wastewater management, water quality and flooding are central to sustainable water management in our cities.

Source: © Alexander Goranov, Environment & Me /EEAhttp://www.eea.europa.eu/highlights/world-water-day-is-europe

©iStockphogo/bubutu-

The below map highlights flooding in central Europe in 2002 where Austria, the Czech Republic and Germany were most impacted.



Source: http://www.eea.europa.eu/data-and-maps/figures/areas-affected-by-2002-flooding

Introduction

Clean water is vital to our cities, not only for human consumption and domestic use, but also to produce many goods and services that contribute to a successful and sustainable economy. Water resources in Europe are under increasing pressure and improving the way water is supplied, consumed and managed in cities is a vital component of sustainable development.

There are significant opportunities to improve the efficiency of water consumption through policies and measures promoting sustainable water use. Addressing leakage in water infrastructure can also present an opportunity to improve the efficiency of water supply throughout Europe.

Significant volumes of wastewater are generated in cities due to high concentrations of people and industry. Adequate treatment of wastewater is required to minimise negative impacts on the wider environment, once wastewater has been discharged back into rivers, lakes and seas.

Climate change and urbanisation have increased the risk of flooding in many cities. Flooding results in significant social and economic damage while flood risk can negatively impact on the wellbeing of communities and deter investment in urban areas.

Benefits

The effective management of water and wastewater and its associated infrastructure will bring many short and long term benefits:

- Water is a precious resource that we all depend on to sustain life. Managing our water supply in a sustainable way will help to ensure the quality and availability of a clean, safe supply into the future which will benefit public health and well-being
- Sustainable water management also reduces the negative impacts of overabstraction on the wider environment and limits impacts on local ecosystems.
- Increasing water efficiency in urban areas promotes enhanced resource efficiency, in terms of both the water and energy needed to process and supply drinking water and treat wastewater.
- Improving wastewater treatment can reduce pollution and have a positive impact on the quality of lakes, rivers and local biodiversity.
- The development and implementation of a Flood Risk Management Plan can reduce flood related risks in a city and, in turn, reduce social and economic risks and improve a city's resilience.

Principles

Understanding and identifying the interdependence between water infrastructure, ecological systems and the built environment is a key principle for sustainable water management and ensuring a safe and secure supply for cities and urban areas. Plans and policies that simultaneously address and integrate these topics are likely to deliver more sustainable outcomes.

The following principles can be applied to flood risk management:

- **Prevention**: Avoid new development in areas prone to present or future flooding.
- **Protection**: Take measures to reduce the likelihood of floods and reduce the impacts of flooding in specific locations.
- **Preparedness**: Inform local communities about flood risks and provide advice on how to react in the event of a flood.
- **Emergency response**: Develop emergency response plans in case of a flood.

Implementation

Best practice strategies that are commonly used to promote sustainable water management include:

- **Improve water efficiency in the built environment**
- Support sustainable water use in cities and urban areas through water efficient fixtures and fittings, rainwater harvesting and grey water recycling to reduce consumption and contribute to sustainable water use.

- **Establish a Flood Risk Management Plan**

The overall objectives of a flood risk management plan include:

- Reducing the adverse impact of floods and likelihood of floods
- Promoting sustainable flood risk management measures;
- Seeking opportunities to work with natural processes; and
- Informing the public and competent authorities about flood risks and how to deal with them.

The key outputs from a flood risk management plan should be:

- Insight into and understanding the size, nature and distribution of current and future flood risks; • Understanding flooding processes and their sensitivity to change; and
- A list of cost-effective flood risk management measures to be implemented.

- **Developing flood risk maps**

Long term flood risk management policies and a prioritised set of further actions or studies for river basins should be developed alongside flood risk maps, where appropriate.

Challenges

By its nature, all water network infrastructure extends across large areas in a city and upgrading this infrastructure is often a complex task that can result in significant impacts on local communities and businesses. This can present challenges to city governments, local authorities and utilities in terms of financing and management.

A public perception that water is an abundant, low value resource can hinder the promotion of efficient consumption and lead to high levels of waste. Influencing public behaviour towards improved efficiency and sustainable use can present challenges and requires effective communication and engagement.

Understanding and managing flood risk can be a complex task that requires a technical understanding of natural systems and river basin management. It should also be integrated with climate change mitigation and adaptation measures.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development_en

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https://webgate.ec.europa.eu/ greencitytool/home/

Further information relating to sustainable water use can be found at the following links:

For an overview of the value of water and EU policies relating to water:
http://www.eea.europa.eu/themes/water/intro

For further information on European water resources:
http://www.eea.europa.eu/themes/water/water-resources

Further information on how water resources are directly impacted by climate change:
http://climate-adapt.eea.europa.eu/water-management

Flood risk management – Flood prevention, protection and mitigation:
http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004DC0472&from=EN

Learn more about the role of natural processes in sustainable flood risk management:
http://ec.europa.eu/environment/water/flood_risk/better_options.htm

Read about the Urban Waste Water Directive:
http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html

Read about the EU Water Framework Directive:
http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm

The Water Information System for Europe – or more commonly known as WISE – is a gateway to information on European water issues:
http://water.europa.eu/

The European Water Partnership is committed to the Water Vision for Europe by initiating, supporting and enhancing initiatives and projects:
http://www.ewp.eu/about-ewp/who-we-are/

WE@EU is based on the ambition to create an open European platform for EU excellence in water efficiency in urban water management:
http://www.weateu.eu/

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Oslo Climate Budget ..... page 122

Sustainable Food Production and Management ..... page 130

Industrial Symbiosis ..... page 120

Oslo Reopening Waterways ..... page 124

Wastewater Management ..... page 134

QUESTIONS

1. **Does your city collect (or have access to) good data on drinking water consumption by:**

   - Private homes / households?

   ☐ Yes ☐ No

   - Businesses/industry?

   ☐ Yes ☐ No

   - Public services (i.e. schools, hospitals, municipal buildings etc.)

   ☐ Yes ☐ No

2. **Does your city set specific targets for reducing drinking water consumption for:**

   - Private homes / households?

   ☐ Yes ☐ No

   - Businesses/industry?

   ☐ Yes ☐ No

   - Public services (i.e. schools, hospitals, municipal buildings etc.)

   ☐ Yes ☐ No

3. **Has your city taken on one or more of the following measures to save water:**

   - Adjust urban parks and green to cope with less water?

   ☐ Yes ☐ No

   - Inform citizens on sustainable gardening practices?

   ☐ Yes ☐ No

   - Install water metering in households and link with water consumption pricing schemes?

   ☐ Yes ☐ No

   - Establish or enhance grey water recycling projects?

   ☐ Yes ☐ No

   - Inform on and promote the use of rainwater in residential buildings for e.g. toilets, washing machines, etc. (building requirement, permitting, etc.)?

   ☐ Yes ☐ No

- Project to diminish losses through the supply system (detecting and solving leaks)?

☐ Yes ☐ No

- Other innovative measures?

☐ Yes ☐ No

4. Does your city have a water management plan? (This plan could be set up for your city only or include several municipalities)

☐ Yes ☐ No

5. BONUS POINTS – If you have answered YES:

- Has the plan been updated in the last two years?

☐ Yes ☐ No

- Does the plan contain long and short term objectives concerning the water supply?

☐ Yes ☐ No

- Does it contain specific actions to save water?

☐ Yes ☐ No

- Does it consist of a specific budget allocated to the actions?

☐ Yes ☐ No

- Are there actions to reduce losses in water networks?

☐ Yes ☐ No

- Are there actions that involve citizens?

☐ Yes ☐ No

6. Does your city have a waste water management plan or strategy? (This plan could be set up for your city only or include several municipalities)

☐ Yes ☐ No

7. BONUS POINTS - If you have answered YES:

- Does the plan long and short term objectives on waste water management?

☐ Yes ☐ No

- Are there actions to improve the quality of surface waters in your city area and beyond?

☐ Yes ☐ No

- Does it contain actions to prevent ground water pollution?

☐ Yes ☐ No

- Do the actions include citizen participation?

☐ Yes ☐ No

8. Is your city reusing waste water or sewage sludge?

☐ Yes ☐ No

9. Does your city set targets for the reuse of its (treated) waste water?

☐ Yes ☐ No

10. Does your city set targets for the reuse of the sludge from waste water plants?

☐ Yes ☐ No

11. Does your city have a plan or project for nutrient recovery from waste water?

☐ Yes ☐ No

12. Does your city have a flood protection management plan? (This plan could be set up for your city only or include several municipalities)

☐ Yes ☐ No

13. BONUS POINTS - If you have answered YES, does it include:

- targets and actions to reduce the likelihood of floods occurring?

☐ Yes ☐ No

- Inform, promote and realise green roof projects or (semi) permeable surfaces for instance for driveways?

☐ Yes ☐ No

- Improving green-blue networks to e.g. increase infiltration capacity?

☐ Yes ☐ No

- Inform citizens on the importance of behavioral change? (awareness raising campaigns on flood prevention, for instance the importance of using permeable paving or no paving in a garden, and on what to do when a flood occurs)

☐ Yes ☐ No

- Other innovative measures?

☐ Yes ☐ No

Climate Change Mitigation

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Climate Change Mitigation

The effects of climate change resulting from increased greenhouse gas emissions are already being felt across the globe and have the potential to significantly impact a city's way of life. A rapid and dramatic reduction in greenhouse gases entering the atmosphere is necessary in order to limit and prevent the impacts of climate change.

The image above shows the Freiburg economic region in Germany that maintains an innovative business development cluster with a special focus on the environmental and renewable energy sectors.

Introduction

Climate change mitigation refers to specific actions that reduce greenhouse gas emissions in the atmosphere or enhance greenhouse gas sinks for storing the gases. Most of these actions focus on CO_2 as this greenhouse gas is one of the most commonly produced by human activity and is responsible for over 64% of man-made global warming. Other greenhouse gases, such as methane, nitrous dioxide and fluorinated gases, are emitted in smaller quantities, but have a much stronger warming capacity.

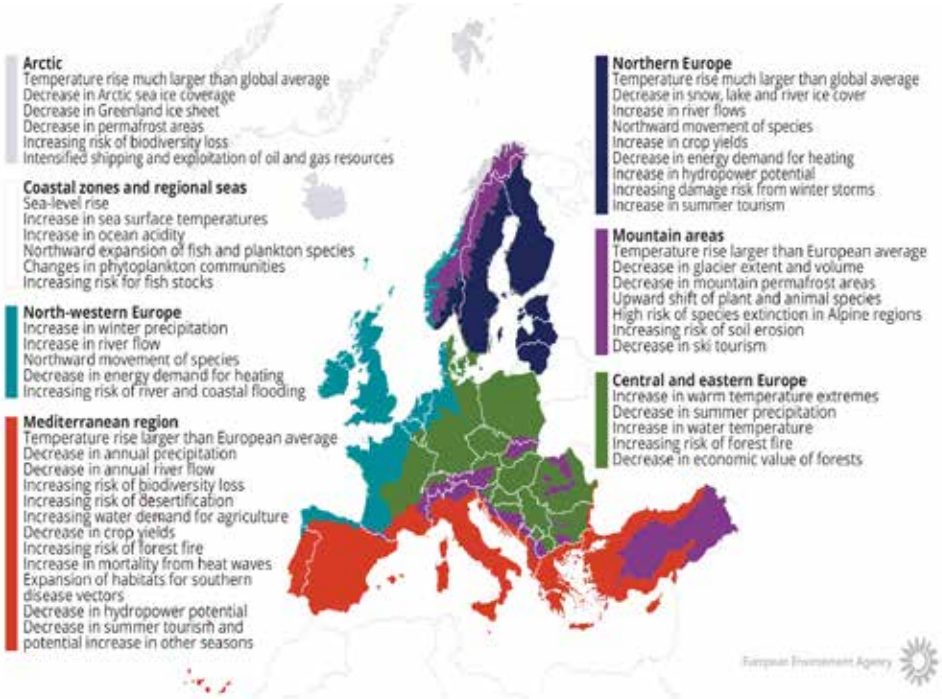
The most notable impacts of climate in change in Europe are as follows:

- A rise in temperature causing glaciers to melt more rapidly with an increased risk of erosion, mud slides, flooding and possible water shortages in the future.
- A rise in sea levels causing increased coastal erosion and flood risks.
- More extreme weather events such as heat waves, heavy rainfall and increased risk of drought.

Cities play a critical role in achieving significant greenhouse gas reductions. Urban areas account for 60-80% of global energy consumption and around the same share of CO_2 emissions. The main areas that should be considered when looking to reduce greenhouse gas emissions within a city are:

- Buildings – heating, cooling, material use, recycling
- Power generation – fossil fuels versus renewable energy, smart grids
- Transport – fuel efficiency, public transport, renewable energy
- Industry – EU Emissions Trading System (ETS), energy consumption, technology
- Agriculture – livestock, land use, use of fertiliser

The below image highlights the impacts that have been experienced by the various regions around Europe as a result of climate change.



Benefits

Climate change affects the day to day functioning of a city through extreme weather conditions. Drought can impact the availability and quality of drinking water and green infrastructure, flooding can impact traffic, and heat waves can impact public health. Without addressing the causes of climate change, any measures taken to enhance green infrastructure, flood protection, etc., will only have a limited effect.

Climate change mitigation measures can result in a number of cross-functional benefits when correctly implemented. Some of these benefits include the following:

- Secure supply of energy and other resources.
- Improved health for citizens as a result of better air quality and improved access to urban green areas.
- Reduced costs due to reduced energy demand and a reduced need to invest in adaptation measures.
- New jobs and technologies.
- Reduced urban migration by minimising or preventing impacts from climate change such as drought, conflicts, etc., which can result in migration flows.

Studies show that the EU's greenhouse gas emission reduction targets are feasible and affordable, once implemented correctly. The costs of climate change to the economy and to society will be much higher than the costs of implementing climate change mitigation measures.

Climate change mitigation measures provide an opportunity for implementation alongside other environmental actions, such as climate change adaptation, public transport, biodiversity and ecosystem restoration and enhancement.

Principles

There are three main principles associated with climate change mitigation. These are as follows:

1. **Monitoring**: It is important to set targets and monitor progress in order to know how a city is performing. This principle helps a city identify where it can have the most significant impact on greenhouse gas emissions and provides the knowledge and understanding required to achieve targets.
2. **Stakeholder engagement**: Involving citizens and stakeholders and keeping them aware of mitigation measures and their importance can contribute towards effective emissions reduction and ensure the whole city plays their part.
3. **Potential**: The potential to reduce greenhouse gases and improve energy performance should be considered in all city projects.

Implementation

The EU has a set of binding targets to reduce emissions by at least 40 % by 2030. Due to the scale of the issue, climate mitigation actions require behavioural change. Climate adaptation and mitigation are very closely related and therefore offer many different opportunities for synergetic implementation.

There are a number of different implementation measures that contribute to the reduction of greenhouse gases and these include:

Avoid emissions
Avoid greenhouse gas emissions by building passive houses and retrofitting existing buildings to prevent or reduce active heating and cooling; replacing fossil fuels with renewable energy such as solar, wind and hydro; preventing carbon sinks by preserving peatlands and preventing deforestation; and raising citizens' awareness on how they can contribute through changed behaviour and attitudes.

Greenhouse gas sinks
Enhance greenhouse gas sinks by encouraging urban greenery and nature based solutions such as green roofs and facades, and by increasing the soil's capacity to store carbon.

Sustainable Energy Action Plan
The EU Covenant of Mayors offers cities a defined approach to identifying actions and monitoring processes in its Sustainable Energy Action Plan (SEAP) guidelines. These guidelines are also applicable to implementing climate change mitigation measures as they are closely linked with sustainable energy.

Challenges

Climate change and the implementation of climate change mitigation measures can face a number of challenges:

- **Political support**: Climate change is a long-term process which means it can be difficult to influence short or middle-term political agendas.
- **Integration**: The impact of climate change and mitigation measures are relevant to almost all policy fields. It is therefore important to ensure awareness of the importance of mitigation. Communication and engagement is vital to ensure that city officials and representatives and informed enough to take action and integrate climate change mitigation measures into their field of expertise.
- **Social challenges**: Behavioural change can have a significant impact on energy consumption and consequently, on the greenhouse gas emissions of a city. Effective communications and awareness campaigns can engage citizens and encourage them to adapt a lower energy consumption lifestyle.

- **Economic challenges**: Although renewable energies are becoming increasingly competitive, energy from traditional non-renewable resources is still cheaper than energy from renewable resources. This can make it difficult to convince businesses and citizens to switch to non-renewable sources. Policy incentives may be required in order to encourage organisations and individuals to switch to renewable energy.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en

The majority of funding for climate change mitigation comes from European Structural and Investment Funds (ESIF). There are five European Structural and Investment Funds. These are jointly managed by the European Commission and its member states to invest in job creation and a healthy, sustainable European economy and environment. The ESIF focus on five main areas, each with an interest in climate change mitigation:

- Research and innovation;
- Digital technologies;
- Support low-carbon economies;
- Sustainable management of natural resources; and
- Small businesses.

Further Information

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to climate change mitigation can be found at the following links:

Get inspired by the actions and strategies other cities and municipalities in Europe are implementing:
http://www.covenantofmayors.eu

Read about the Horizon 2020 proposals on climate action here:
https://ec.europa.eu/programmes/horizon2020/en/h2020-section/ climate-action-environment-resource-efficiency-and-raw-materials
and click on 'Related Horizon 2020 calls' (on the right side of the page)

Read about the expected impacts from climate change in your region by following this link:
http://www.eea.europa.eu/soer-2015/europe/climate- change-impacts-and-adaptation and go to 'countries and regions' (on the right side of the page)

Do you want to know more about greenhouse gas emission statistics in Europe? Click here:
http://ec.europa.eu/eurostat/statistics-explained/ index.php/Greenhouse_gas_emission_statistics

Find out more about the EU climate action for the different sectors through this webpage:
http://ec.europa.eu/clima/policies/lowcarbon/index_en.htm

Find climate change data for both cities and companies:
https://data.cdp.net/browse?tags=climate+change

QUESTIONS

1. **Does your city collect (or have access to) good data on its CO_2 emission equivalents covering at least the last 2 years?**

   ☐ Yes ☐ No

2. **Does your city have a systematic monitoring program for CO_2 emission equivalents to keep your data regularly updated?**

   ☐ Yes ☐ No

3. **BONUS POINTS – If you have answered YES:**

   - Is the data publicly available via the internet?

   ☐ Yes ☐ No

4. **Does your city have a climate change mitigation plan or strategy?**

   ☐ Yes ☐ No

5. **BONUS POINTS – If you have answered YES:**

   - Does it include short and long term objectives?

   ☐ Yes ☐ No

   - Does it include an action plan with timing and measures to reach the reduction target ?

   ☐ Yes ☐ No

   - Is it actively linked with other policy fields, strategies, plans or projects, such as energy, urban planning, transport, etc.?

   ☐ Yes ☐ No

6. **Does your city have a reduction target for CO_2 emission equivalents?**

   ☐ Yes ☐ No

7. **Is your city a signatory of the Covenant of Mayors?**

   ☐ Yes ☐ No

8. **BONUS POINTS – If you have answered YES:**

   - Have you adopted and submitted your action plan within the framework of the Covenant of Mayors?

   ☐ Yes ☐ No

- Have you submitted your monitoring report?

☐ Yes ☐ No

9. Do you involve stakeholders and citizens in any climate change mitigation actions undertaken by your city?

☐ Yes ☐ No

10. Has your city taken one or more of the following measures to reduce its CO_2 emission equivalents:

- District heating and/ or cooling, CHP (combined heat and power) project or passive cooling projects?

☐ Yes ☐ No

- Promotion of energy saving renovations (residential buildings)

☐ Yes ☐ No

- Developing carbon capture and storage (CCS) technologies?

☐ Yes ☐ No

- Other measures not listed above?

☐ Yes ☐ No

Green Growth & Innovation

Green Growth & Innovation

Green growth and innovation are key to Europe's future. As centres of talent, business and creativity, European cities have an opportunity to be at the forefront of this growth. Innovation and green technologies such as renewable energy, resource efficiency and smart city solutions are expected to create employment and drive economic growth for years to come. Our cities can benefit from an improved economy, increased competiveness, job creation and improved sustainability and environmental performance.

Environment ©iStocphoto/ simon2579

Introduction

The term 'green growth' has a number of definitions but can include renewable energy technology, water and wastewater management, sustainable design, construction and transport, pollution control, land remediation, environmental auditing and consultancy, and organic food production.

'Green economy' refers to an economy where all production and consumption choices are made with the wellbeing of society and environmental health in mind.

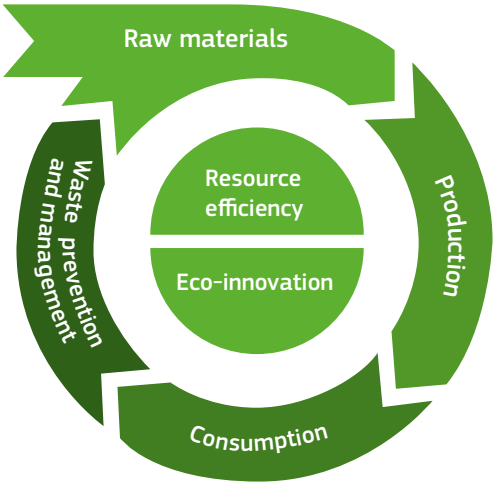
Europe's environmental sector grew by 50% between 2000 and 2011, with more than three million people already working for eco-industries in the EU. The global market for eco-industries was estimated to be € 1.15 trillion in 2010 with a broad consensus that this will double by 2020.

Benefits

Green growth and innovation are associated with driving jobs and economic growth through the delivery of technologies, solutions and services that benefit the environment. It represents an opportunity for the EU to take a leading role in overcoming global environmental challenges, while encouraging a more competitive economy.

The benefits of green growth and technology include:

- Building a more competitive low carbon economy that makes efficient, sustainable use of resources.
- Protecting the environment, reducing emissions and preventing biodiversity loss.
- Capitalising on Europe's leadership in developing new green technologies and production methods.
- Introducing smart electricity grids.
- Harnessing EU-scale networks to give businesses an additional competitive advantage.
- Improving the business environment, particularly for SMEs.



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Principles

There are a number of key principals to encourage and implement green growth and innovation:

- **Focus on the long-term**: Encouraging the growth of a new sector in a city's economy may take time and requires leadership and commitment at city government level.

- **Shift towards a circular economy**: Resource efficiency needs to be improved across the economy and requires a new mindset from both producers and consumers in order to turn waste into a resource.
- **Focus on ecosystem resilience and people's well-being**: A sustainable economic model that can function within ecosystem boundaries is crucial for transitioning to a green economy. It is also important to have stakeholder support.

Implementation

According to the EU's 7th Eco-Innovation Action Plan, there are four key pillars for the transition to a green economy:

Implementation
Environmental regulations that enhance resource efficiency should be implemented by local governments. Examples of such regulations include; encouraging companies to invest in eco-innovation, phasing out harmful subsidies, shifting taxation from labour to pollution and systematically applying the 'polluter pays' principle.

Integration
Environmental issues should be integrated into key economic policies to ensure resource efficiency and effective resource management.

Information
Expanding the information base and educating residents within a city or defined area can support integration and implementation of green growth and innovation.

Investment
Incentives for promoting green growth and innovative thinking in small enterprises and start-ups should be encouraged. New investment in water, energy and transport infrastructure should encourage a transition to more sustainable models.

Bristol, the European Green Capital 2015 has outlined how to grow the green economy in a city as part of the 'Bristol Method'. The following document describes how Bristol City Council is supporting the growth of the local green economy and outlines a number of case studies:
https://www.bristol2015.co.uk/media/filer_public/f3/f4/f3f4618deb1f-4af5-9b99-11f5951be757/24_bristol_method_how_to_grow_the_green_economy_in_a_city.pdf

Challenges

One of the key challenges facing green growth and innovation is identifying and implementing the correct blend of policies, partnerships and incentives to successfully support and realise a sustainable and innovative economy. The pursuit of green growth opportunities amongst cities is likely to become increasingly competitive. It is important that the correct policies, processes and partnership incentives are in place in order to attract talent and businesses.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urbandevelopment/funding-cities_en

Further Information

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to green growth and innovation can be found at the following links:

For more information on how to realise a green and circular economy, follow this link:
http://www.eea.europa.eu/signals/signals-2014/articles/the-economyresource-efficient-green

Read how the EU is supporting innovation and helping citizens and governments to green their economies:
http://ec.europa.eu/environment/basics/green-economy/innovation/index_en.htm

Discover more about the Eco-Innovation Action Plan:
https://ec.europa.eu/environment/ecoap/about-action-plan/objectivesmethodology

Read an overview on delivering a green economy:
http://www.eea.europa.eu/themes/economy

Access reports and studies on green jobs and social impacts here:
http://ec.europa.eu/environment/enveco/jobs/

Read more about the European Commission priority for sustainable growth – for a resource efficient, greener and more competitive economy:
http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/sustainable-growth/index_en.htm

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Wrocław Smart Metering ..... page 126

Strasbourg's Project Sustainability Evaluation Tool ..... page 128

QUESTIONS

1. **Has your city taken initiatives to encourage the development and adoption of environmentally-friendly technologies?**

   ☐ Yes ☐ No

2. **Has your city taken initiatives to promote the creative 'green industry' (e.g. jobs in energy efficiency, circular economy, promoting nature and biodiversity in cities etc.)?**

   ☐ Yes ☐ No

3. **Has your city defined and carried out projects or actions to increase green skills or jobs and promoting the circular economy with:**

   - Citizens?

   ☐ Yes ☐ No

   - Industry?

   ☐ Yes ☐ No

   - Its own employees, integrating green economy thinking in the city's system and management?

   ☐ Yes ☐ No

4. **Has your city defined other, specific stakeholders and taken actions to promote green skills or jobs?**

   ☐ Yes ☐ No

5. **Does your city have an action plan aimed a supporting eco-innovation, the circular economy and/or green growth?**

   ☐ Yes ☐ No

6. BONUS POINTS – If you have answered YES, does your plan include:

- Targets on 'smart' developments for eco-innovation or circular economy, i.e. innovations that address material use & improve resource efficiency?

☐ Yes ☐ No

- Programmes or actions for training of unemployed citizens?

☐ Yes ☐ No

- Dedicated budgets for future plans and strategies to promote and encourage eco-innovation and green jobs?

☐ Yes ☐ No

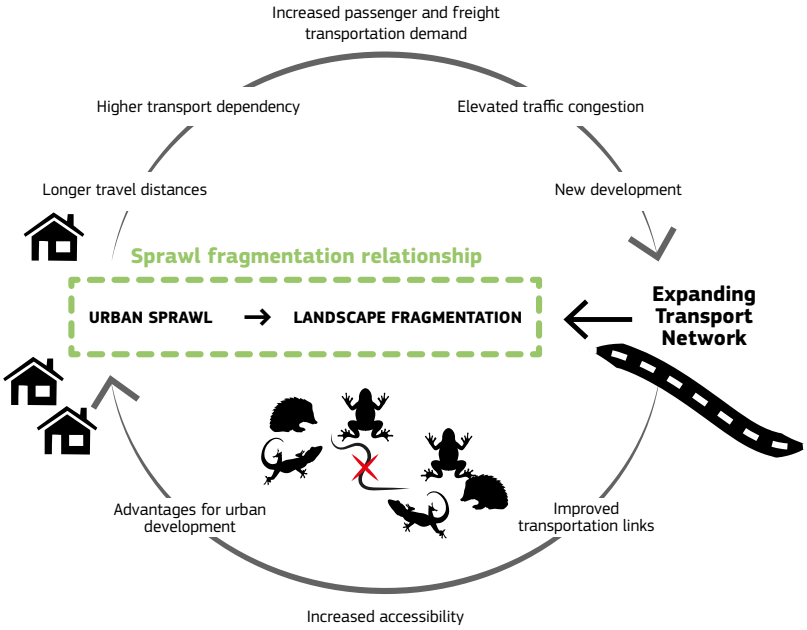
7. Does your city monitor green growth and / or eco-innovation?

☐ Yes ☐ No

Land Use

Land Use

Land use is defined as the utilisation and functions of land, including its allocation, future development and ongoing management. Therefore, land use plays an important role in environmental management, including the water cycle and availability and distribution of green space. Land use also has a socio-economic aspect when it comes to the availability of public services, density of buildings in urban areas and the distribution of industrial areas.



The expansion of road networks and urbanisationcan result in a lock-in effect. That leads to the development of built-up areas not served efficiently by public transport and, therefore, where people depend more and more on cars.

Source: 'Urban sprawl in Europe' EEA report n°11/2016

Introduction

Cities are shaped by the way people live. Economic activities, planning traditions and geographic settings along with people's behaviours dictate the distribution of various uses, such as residential, commercial, industrial, hospitals, schools, etc. Therefore, land use is strongly linked to quality of life and provides opportunities for socio economic development.

Some land use changes are almost irreversible, or prove too costly to reverse.

Therefore, land use needs careful planning. Management of land use in the context of sustainable cities should consider a number of elements:

- The extent and form of urban development, which can lead to urban sprawl in some cases.
- Achieving the correct population density within the city and within any built up area is key to optimising resources and ensuring a liveable city.
- Mixed land use can make land more efficient and facilitate a sense of community, while reducing the distance citizens need to travel to avail of services, such as work or shopping. This in turn encourages more pedestrians and cyclists.
- Managing derelict, or brownfield, land requires specific protocols depending on its previous use, especially where contaminated land is an issue.

Benefits

Good strategic planning, reflected in the land use of an area, can provide several benefits:

- **Health and well-being:** The availability and accessibility of urban green areas are key contributors to the physical and mental health of citizens. Green urban areas also play an important role in improving air quality and reducing the heat island effect where an urban or metropolitan area is significantly warmer than its surrounding rural areas due to human activities. Green urban areas also provide aesthetic and recreational values for people, contributing to a city's quality of life.
- **Economic development**: Different types of land use are crucial for economic development. Therefore, land use should be considered on a local level and also in a regional context. For example, walk-to-work neighbourhood centres facilitate the development of locally owned businesses while larger scale commercial activities or industries requiring greater space should be considered in a regional context.
- **Reduction of CO_2 emissions**: The distribution of land use and density is strongly linked with urban mobility and the demand for transport. Public transport is more expensive and less efficient in low density peri-urban areas at the outskirts of cities. Carefully planned cities and urban areas can facilitate more sustainable transport, including public transport and foot / cycle paths.
- **Sustainable water management**: Land use and the degree of soil sealing, or imperviousness, largely determines the degree of water infiltration and the type and level of contaminants entering the water cycle. By reducing the level of soil sealing and planning strategic areas on flood plains to act as buffer zones, land use can facilitate flood prevention and increase water quality.

- **Biodiversity**: The distribution and connection of green urban areas, including green infrastructure, is important for sustainability and biodiversity in cities.

Principles

Sustainable land use should be compact, integrated and connected and the following principals can guide cities towards this:

- Efficient utilisation of land to ensure its best and most appropriate use. Soil suitability, previous use, location, etc., should all be considered in land use planning to ensure maximum profit while reducing any negative impacts on the environment.
- Promote the use of brownfield sites and land reuse to maintain green areas. Land reuse includes reclaiming derelict land.
- Increase population and building density, while keeping them within healthy limits.
- Consider future needs when planning transport and public services.
- Increase accessibility to green areas.
- Ensure an integrated approach to planning is taking place with other departments, such as transport planning.

Implementation

Regulation

Land use regulation is a primary function of local government. Planning departments oversee much of the regulation relating to land use as they are responsible for issues such as housing, transport, land zoning and economic development. Integrating these various components will lead to strategic planning and sustainable land use.

Land Use Change
The evolution of land use should be monitored to ensure that the planning process is flexible enough to adapt to changes and robust enough to identify issues that may arise.

Awareness
Relevant organisations should be identified in advance of any land use planning. These organisations include businesses, NGOs, research bodies etc.

Planning
Local planning should be coordinated with regional planning, particularly in relation to the containment of new urban development on the outskirts of cities and metropolitan areas.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en

At least 5% of The European Regional Development Fund (ERDF) resources are set aside for investment in integrated sustainable urban development at national level and in innovative actions for sustainable urban development.

Further Information

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to sustainable land use measures can be found at the following links: • Briefing on urban systems developed by the European Environment Agency:
http://www.eea.europa.eu/soer-2015/europe/urban-systems

Tool for cities to assess their environmental performance:
http://ec.europa.eu/environment/urban/tool.htm

LUMASEC Results (Land Use Management for Sustainable Cities) including issues in integrated urban development:
http://urbact.eu/lumasec

News and examples related to integrated urban development within URBACT (network of cities). On the left side of the screen there is a tag cloud with relevant references to land use: Abandoned Spaces, City Planning, Housing, Urban Mobility, urban Renewal, Urban Sprawl, Urban-Rural:
http://urbact.eu/integrated-urban-development

Soil sealing. Description of the issue and recommendations/practices to reduce the degree of sealing:
http://ec.europa.eu/environment/soil/sealing_guidelines.htm

Reports on resource-efficient cities (EEA):
http://www.eea.europa.eu/highlights/resource-efficient-cities-vital-step

DG for regional and urban Policy:
http://ec.europa.eu/regional_policy/en/policy/themes/urban-development/

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Quiet Areas ..... page 118

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QUESTIONS

1. **Does your city have a detailed map of land-use types for the city and surrounding area?**

   ☐ Yes ☐ No

2. **Does your city measure and monitor changes of total area of green open spaces in the city over time?**

   ☐ Yes ☐ No

3. **Do you measure and monitor levels of urban sprawl (the spread of built up area) in your city and the surrounding area?**

   ☐ Yes ☐ No

4. **Does your city monitor user satisfaction with the available green urban spaces?**

   ☐ Yes ☐ No

5. **Does your city have a spatial planning policy or strategy specifically aimed at preserving and adapting open spaces to improve quality of life of citizens?**

   ☐ Yes ☐ No

6. **BONUS POINTS – If you have answered YES:**

   - Does this include specific and measurable objectives and associated actions?

   ☐ Yes ☐ No

   - Do the defined actions include a budget for implementation?

   ☐ Yes ☐ No

   - Are roles and responsibilities defined?

   ☐ Yes ☐ No

   - Is there a time-frame for implementation?

   ☐ Yes ☐ No

   - Is the strategy regularly updated?

   ☐ Yes ☐ No

- Is the strategy publicly available via the internet?

☐ Yes ☐ No

7. Has your city a specific policy with measures aimed at:

- Restricting or minimizing urban sprawl?

☐ Yes ☐ No

- Optimizing population density both in the total area of the city and inside the built-up area?

☐ Yes ☐ No

- Converting derelict land (brownfield sites) for use as public green space?

☐ Yes ☐ No

- Increasing access to green urban areas (e.g increasing connections between the green areas)?

☐ Yes ☐ No

- Promotion of the city's green spaces for citizens and visitors?

☐ Yes ☐ No

Waste

Waste

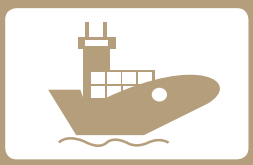
Waste is one of the most pressing environmental, social and economic issues in modern society. Increasing consumption and a developing global economy are resulting in more waste being generated. As a result greater efforts are required to reduce and prevent waste. While waste was viewed as disposable in the past, today it is increasingly recognised as a valuable resource. The waste management process has thus shifted away from disposal towards recycling and recovery.

Introduction

Municipal solid waste consists of everyday items that are discarded by members of the public, including from our homes, schools, businesses and streets. This waste is similar in nature and composition and is collected by, or on behalf of, municipal authorities and disposed of through the local or regional waste management systems.

In 2016, each person in Europe generated an average of 480 kg of municipal waste during the year. The quantity of waste generated varied considerably by country, ranging from 747 kg per capita in Denmark to 261 kg per capita in Romania. These variations reflect differences in consumption patterns and economic wealth and also how municipal waste is collected and managed. Wealthier countries usually generate more municipal waste per capita with less wealthy countries generating lower volumes of waste.

11.5 tonnes of materials per person were extracted int the EU in 2014 (direct material consumption).



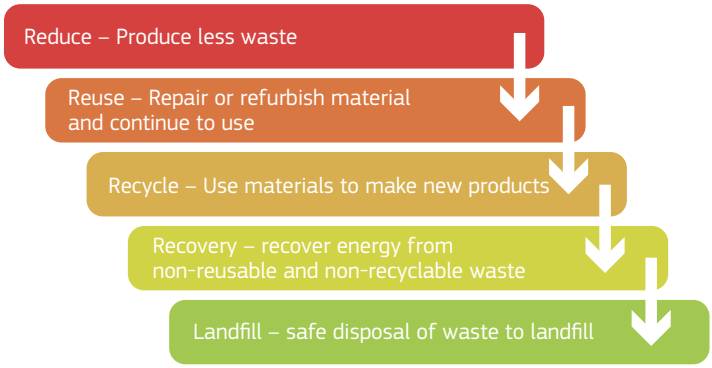
3 tonnes of materials per person were imported to the EU in 2014 (direct flows).

0.3 tonnes of materials per person were incinerated in the EU in 2012.

2.2 tonnes of waste per person were sent to landfill in the EU in 2012.

Data: Eurostat, 2015, 'Marerial flow accounts' and 'Treatment of waste'. ec.europa.eu/eurostat.

Most municipal solid waste can be reused, repaired, recycled or used as fuel to produce energy. There is also potential for reducing or eliminating waste by changing consumer behaviour. Recycling performance is improving throughout Europe. This is mainly due to an increase in separated waste collection and improved recycling facilities for glass, paper, cardboard, metals, plastics and textiles. However, the separate collection and treatment of bio-waste materials, such as food waste and biodegradable garden or park waste, remains low at EU level.



Landfill and incineration without energy recovery are the least desirable options for waste management as they have a detrimental environmental impact and lead to a loss of precious resources. The following hierarchy ranks the different waste treatment options according to how sustainable they are.

Benefits

As most municipal waste can be reused or recycled, there is huge potential to maximise the use of waste resources. There are a number of benefits to reducing waste and implementing the effective management of waste:

- **Supporting a circular economy and creating jobs**: Services that are established to reuse, repair, refurbish, recycle and replace waste products create job opportunities and reduce pressure on the environment. At a local level, labour intensive activities such as preparing and sorting products and materials for reuse or recycling can provide low-skilled jobs. Developing a circular economy requires a range of skills from research positions to industrial jobs for re-manufacturing products or materials.

- **Reducing environmental impacts**: Poorly managed waste has a detrimental impact on human health, the environment and on the economy.
- **Reducing the use of natural resources**: Europe's current pattern of consumption is leading to the scarcity and depletion of natural resources. On a planet with finite resources, the challenge is to deliver greater value and more services with fewer inputs. The reduce-reuse-recycle model for waste management protects our natural resources and decreases Europe's reliance on imported raw materials.
- **Reducing greenhouse gas emissions**: Efficient waste management and a focus on reuse and recycling results in lower greenhouse gas emissions (due to fewer emissions from landfills and incinerators) and reduced emissions from the extraction and processing of raw materials.
- **Supporting grassroots initiatives**: Many grassroots initiatives are emerging in relation to the sharing, repairing and maintenance of 'waste' products. Municipalities are encouraged to support grassroots initiatives that increase the longevity of products, promote the value of product repair over replacement and educate citizens on responsible consumption and waste management, including food waste.
- **Energy production**: When waste materials cannot be reused or recycled, they can be transformed into energy and used to generate district heating and / or power.
- **Cost-effectiveness**: Individuals, businesses and municipalities can save money by reducing and preventing waste. Waste that is avoided or never created has no management or handling costs. The lower the volumes of waste created, the lower the costs to consumers.

Principles

There are four main guiding principles that municipalities and local authorities can follow to reduce waste:

Reduce – reducing the amount of waste generated means reducing the impacts on the environment and the cost of waste management. The concept is basic; if we create less waste, we consume fewer resources and we don't have to spend money to collect, recycle or dispose of our waste. Waste reduction and prevention are closely linked to improvements in manufacturing processes and to changing consumer behaviour.

RECYCLE SIGN

GARBAGE DUMP

TRASH CAN

RECYCLING GLASS

RECYCLING PLANT

RECYCLING FOOD

RECYCLING TRUCK

RECYCLING PLASTI C

Reuse – a large amount of municipal waste consists of materials or products that can be reused without any structural changes. Reusing a product or material that can be repaired or refurbished is an efficient way to use our resources.

Recycle – municipal waste is a source of secondary raw materials and can therefore create business opportunities. The recycling process is energy intensive and requires significant manufacturing manipulation to change the product, usually producing a new product of lesser quality. To maximise high quality recycling, it is essential to develop separate waste collection systems, such as paper and cardboard, metal, glass, plastic, multilayer packaging, bio- waste, batteries, wood, textiles, tyres, etc.

Energy Recovery – energy from waste products or materials can be captured either directly, by using them as a combustion fuel, or indirectly by processing them into another type of fuel, for example, through gasification processes and biogas production from food waste, compost, landfill gas, etc.

Implementation

Municipalities and local authorities can take action to encourage waste reduction, reuse and recycling by implementing the following actions:

Waste reduction

- Work with individual businesses, including retailers and take-away restaurants, to eliminate or reduce the amount of packaging used. This can be achieved through promoting bulk sales and using reusable containers, for example.
- Develop and promote incentives for citizens and businesses to generate less waste and implement separate waste collections. These could be enforced through waste charges such as 'pay as you throw' charges and taxation etc.
- Work with canteens, restaurants and households to prevent food waste though reduced portion sizes, promoting local and seasonal foods without packaging, promoting the use of 'doggy bags' for leftovers and establishing or promoting farmer's food markets.
- Develop awareness campaigns to encourage consumers to demand goods that produce less waste in order to drive the creation of a more resource- efficient market. An example of this includes educating households on waste reduction.

NO LITTERING

RECYCLING PAPER

GARBAGE BAG

RUBBISH TANK

RECYCLE BIN

WHEELIE BIN

WASTE BARREL

REUSE

NO LITTERING

RECYCLING PAPER

GARBAGE BAG

RUBBISH TANK

RECYCLE BIN

WHEELIE BIN

WASTE BARREL

REUSE

- Install public water fountains in busy areas to avoid excessive use of plastic bottles.
- Implement public procurement policies to encourage eco-friendly products that minimise packaging, contain recycled materials, avoid hazardous substances and can be recycled later on.

Reuse and recycling

- Organise efficient separate waste collection systems within cities that require waste separation into waste streams such as food waste, garden waste, plastic, paper and cardboard, metal, glass, etc.
- Develop and promote second-hand markets and food banks.
- Encourage home and on-site composting.
- Support grassroots initiatives that enable peer-to-peer selling, sharing, borrowing, swapping and reuse of second hand goods, along with repair services to prolong the life span of a product or material. For example, repairing an old bicycle instead of buying a new one, or establishing a bike sharing scheme.
- Provide information on local recycling and reuse initiatives to stimulate demand.

Challenges

There are a number of challenges that municipalities face when trying to implement more effective waste management systems.

- Waste management needs to be an integrated system with support from local government, public administration, local businesses, residents and visitors. This requires collaboration to ensure that all parties involved are working towards the same outcome.
- Adequate waste management infrastructure can be expensive to introduce, requires buy-in from all associated parties and long-term planning to ensure that choices relating to infrastructure are future proof.
- Changing consumer behaviour can be difficult but it is vital to deliver effective waste management.

Funding

The EU and the Commission provide support through a wide range of funding programmes, covering funding opportunities as well as advice on how to access funding and put it to use. See here for more information:
https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_

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https://webgate.ec.europa.eu/greencitytool/home/

Further information relating to waste can be found at the following links:

European Commission Website:
http://ec.europa.eu/environment/waste/

A study on collection schemes in the 28 capitals of EU:
http://ec.europa.eu/environment/waste/studies/index.htm#assessment

EEA, 2013, Managing municipal solid waste, EEA Report N° 2/2013, European Environment Agency:
http://www.eea.europa.eu/publications/managing-municipal-solid-waste

EEA, 2015, SOER, Waste – municipal solid waste generation and management, European Environment Agency:
http://www.eea.europa.eu/soer-2015/countries-comparison/waste

Network for recycling and sustainable resource management:
http://www.acrplus.org/index.php/en/

Zero waste Europe:
https://zerowasteeurope.eu/

EEA, 2015, Resource-efficient cities: good practices, EEA Report 24/2015, European Environment Agency:
http://www.eea.europa.eu/publications/

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QUESTIONS

1. **Does your city systematically collect data on the generation, collection and treatment of waste from:**

   - Private homes / households

   ☐ Yes ☐ No

   - Businesses/industry

   ☐ Yes ☐ No

   - Public services (i.e. schools, hospitals, municipal buildings etc.)

   ☐ Yes ☐ No

2. **Has your city made projections of future levels of waste generation?**

   ☐ Yes ☐ No

3. **Does your city set recycling targets for household or municipal wastes**

   ☐ Yes ☐ No

4. **Do you have a policy relating to the management of biodegradable municipal waste**

   ☐ Yes ☐ No

5. **Has your city estimated the financial costs / investment needed to maintain and develop waste management in the city in the future? (including planned new installations, closure of old installations).**

☐ Yes ☐ No

6. **Does your city have a published, up-to-date management plan for municipal waste**

☐ Yes ☐ No

7. **Which of the following fractions are collected and/or sorted separately after kerbside collection in your city:**

- plastics

☐ Yes ☐ No

- glass

☐ Yes ☐ No

- cardboard and paper

☐ Yes ☐ No

- metal

☐ Yes ☐ No

- food waste

☐ Yes ☐ No

- green waste

☐ Yes ☐ No

- waste electrical and electronic equipment

☐ Yes ☐ No

- hazardous waste

☐ Yes ☐ No

- other fractions

☐ Yes ☐ No

8. Which of the following fractions can be disposed of separately or sorted at publicly accessible waste disposal sites (i.e. by citizens, companies etc):

- plastics

☐ Yes ☐ No

- glass

☐ Yes ☐ No

- cardboard and paper

☐ Yes ☐ No

- metal

☐ Yes ☐ No

- food waste

☐ Yes ☐ No

- green waste

☐ Yes ☐ No

- waste electrical and electronic equipment

☐ Yes ☐ No

- hazardous waste

☐ Yes ☐ No

- other fractions

☐ Yes ☐ No

9. Does your city (or region) have a waste prevention programme (separately or as part of a waste management plan) relating to municipal waste?

☐ Yes ☐ No

10. BONUS POINTS – If you have answered YES – does your programme include:

- A description and evaluation of the existing waste prevention measures?

☐ Yes ☐ No

- An overview of planned prevention measures?

☐ Yes ☐ No

- Short and long term waste prevention objectives with appropriate specific qualitative or quantitative benchmarks?

☐ Yes ☐ No

- A monitoring/assessment programme?

☐ Yes ☐ No

11. Does your city have a prevention plan for litter in the public spaces

☐ Yes ☐ No

12. BONUS POINTS – If you have answered YES – does your programme include:

- Measures to fight street littering?

☐ Yes ☐ No

- Measures to fight street littering?

☐ Yes ☐ No

- Measures aimed at reducing the use of unnecessary packaging?

☐ Yes ☐ No

- A ban on free plastic carrier bags?

☐ Yes ☐ No

- Other litter prevention measures not listed above?

☐ Yes ☐ No

13. Has your city implemented one or more of the following measures:

- 'Circular economy' business models, aimed at encouraging the reuse, repair and/or recycling of products (e.g. setting up repair cafes, bicycle repair cooperatives, product leasing schemes, product char or exchange schemes etc)?

☐ Yes ☐ No

- A food waste prevention programme?

☐ Yes ☐ No

- Promotion of the use of recycled and recyclable, renewable and sustainable materials (e.g. FSC wood, hedges instead of fences ...)?

☐ Yes ☐ No

- Support for industrial symbiosis between local business?

☐ Yes ☐ No

- Support for more sustainable buildings (either new builds or refurbishments – using recycled materials or innovative designs that will increase the life-time of buildings and/or allow them to be more easily recycled in the future)?

☐ Yes ☐ No

- Other innovative measures promoting the circular economy concept?

☐ Yes ☐ No

Best practices

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Bologna Local Urban Environment Adaptation Plan (BLUEAP)

This good practice is relevant to EGCA Indicators: *2: Climate Change: Adaptation, 4: Sustainable Land Use, 10: Green Growth and Eco-innovation, 12: Governance*

Introduction

The Bologna Local Urban Environment Adaptation Plan for a Resilient City (BLUEAP) is Bologna's strategy to address the **challenges of climate change** in its city. BLUEAP requires the involvement of both public and private stakeholders, and was co-founded by the EU under the LIFE+ initiative.

Bologna has been adversely affected by the impacts of climate change, specifically **heatwaves**, **drought** and **flooding**. Under the BLUEAP initiative, strategies have been developed to tackle these:

Heat Waves
- Increase urban greening to protect and enhance urban green areas and urban agriculture
- Increase insulation and greening of public/private buildings
- Reduce vulnerability of population exposed to health risks linked to temperature increase

Drought
- Eliminate polluted and contaminating water sources
- Reduce the use of natural resources
- Protect agricultural production
- Regulation of Reno River water flow

Flooding
- Improve city's hydrogeological response to flooding
- Reduce pollution from acid or polluting rain
- Build resilience to extreme weather events to protect inhabitants and buildings

The BLUEAP project has been made successful through the **identification of vulnerabilities** relating to climate change, **building of resilient communities** and **raising awareness** amongst its stakeholders. Furthermore, with other cities in mind, BLUEAP was developed as a template. The City of Bologna has designed the guidelines for the adaptation plan, so that they can be adopted by similarly sized cities and the benefits realised beyond the city itself.

Objectives

BLUEAP aims to provide the City of Bologna with a **responsive** and **anticipatory** strategy to **adapt** and **future proof** the city against the challenges of climate change. The main goals of the BLUEAP project are to:

- Learn from and **disseminate** the best EU experiences in **adaptation planning** at city level;
- Develop a comprehensive, **scalable information system** about climate change impact **risks** and **vulnerability** in the city;
- Increase the **awareness** of Bologna's inhabitants and decision-makers to the impacts of climate change;
- Increase **participation in environmental actions** amongst the residents, government and businesses of Bologna; and
- Develop **solutions** to enable the city to cope with the effects of climate change and implement these as **pilot actions** throughout the city.

Bologna at a Glance

Statistics sourced from EGCA 2019 Application.

- **Gross Domestic Product**: €37,285/capita
- **Population**: 386,633
- **% Green Areas in Overall City**: 9%
- **Koppen Climate Classification**: Cfa (Humid Subtropical Climate)
- **% Inhabitants Living within 300 m of Green Area**: 97%
- **Annual CO_2 Emissions**: 5.18 tCO_2 per capita

Budget for BLUEAP

- The total budget for BLUEAP was €986,049, with €493,024 coming from EU contributions

Want to know more?

For further information about **Bologna's BLUEAP project** please see:

- BLUEAP Overview
- Bologana's Local Adaptation Plan
- GAIA Project
- LIFE GAIA
- Pilot Actions Report
- Best Practices report (Italian)
- PlayBlueAp website
- PlayBlueAp twitter account

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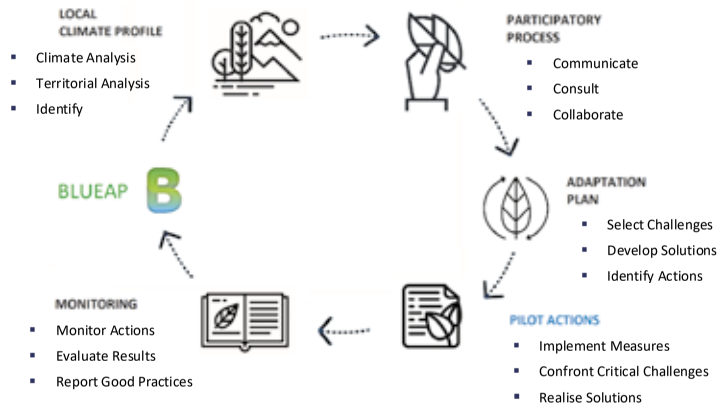
Methodology

BLUEAP established **a local climate change adaptation plan** for the city, aiming to **prevent and repsond** to climate change impacts at local levels e.g. heat waves, drought and flooding. BLUEAP's project team used **model forecasting** for climate, meteorological and hydrogeological risks, and developed **bespoke climate adaptation measures**.

The project was implemented with **awareness campaigning** and **participatory processes** at its core. This successful combination of targeted stakeholders, technology and engagement allowed for the creation of **risk maps** and regional **climate change modelling** scaled from the national level.



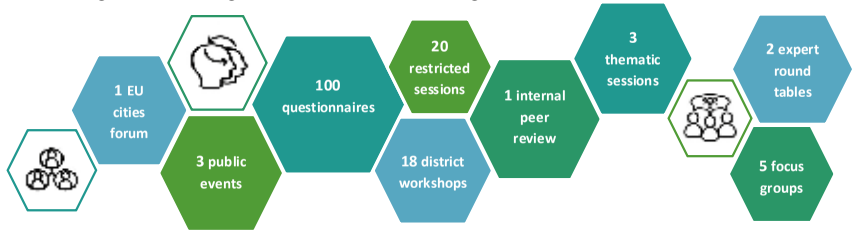
Local Climate Profile

Development of the Local Climate Profile (LCP) was the first step in BLUEAP. The LCP comprises two main components:

- The first focuses on **climate analysis** observed on a regional scale, on which **future climate scenarios** are constructed. The climate variables analysed are minimum temperature, maximum temperature, amount of precipitation, medium and extreme fields;
- The second analyses the territory of Bologna by identifying the **main vulnerabilities** that emerge in relation to the climate projections at regional level. Ongoing **trends** are observed and validated against other European areas with respect to both temperature and rainfall.

Participatory Processes

Stakeholder engagement and participatory planning were integral to the success of the BLUEAP project. A widespread campaign of district workshops, public events, peer reviews, thematic sessions, engagement with European partners, expert round tables, surveys and focus groups collectively worked to ensure that BLUEAP **comprehensively identified** the challenges to climate change, and addressed the needs of Bologna's citizens.



Adaptation Plan

The Adaptation Plan outlines strategies capable of **combatting the critical conditions** highlighted in the LCP. It sets out a series of **actions and good practices** for the management of green spaces, and the conservation of designated zones of environmental importance within the city.

The Adaptation Plan was developed from existing actions and good practices which have already been successfully implemented at national and international level. The plan also focuses on **water management**, specifically, **reducing consumption** and **managing intense weather events** which may affect the cities available water resources.

Pilot Actions

As part of the project, the City of Bologna developed pilot actions to trial and test the Adaptation Plan. These pilot actions are **exploratory studies** which examine the performance of concepts on a small scale, and assess their **efficiency** before implementation at city-wide scale. A snapshot of these actions are described below:

Amendment of Municipal Codes and Regulation

- The amendment of the **Municipal Building Code** was a key pillar of the BLUEAP initiative. This amendment **decreased the maximum daily water consumption** from 150 litres per capita per day to 140 litres per capita per day and **increased the provision for rainwater harvesting** in new buildings.
- The amendment to the **Municipality Public and Private Green Regulation** saw the introduction of a **new annex on plant species with high environmental efficiency**. With regard to water management it also made provision for **conveyance channels**, **infiltration trenches** and **retention areas** in the public works guidelines.

Risk Diagrams

- The city developed **risk diagrams** in order to adapt to the increased risk of flooding and drought posed by climate change. These enable the City of Bologna to **identify areas which are most vulnerable** to extreme weather conditions and make the necessary improvements to ensure that they can cope with and appropriately react to environmental pressures.

Rainwater Harvesting

- In order to reduce water demand, the Deparment of Agriculture worked with the BLUEAP team to study the collection of water with **rooftop harvesting** systems and how the water could be used to irrigate an experimental orchard.
- The project's sustainability campaign implemented **Sustainable Urban Drainage Systems** (SUDS) techniques to improve **rainwater harvesting in impermeable areas**. This opened up an opportunity for knowledge sharing and awareness campaigning amongst companies and citizens on the economic, social and environmental risks of climate change.
- Together with other pilot actions, the initiatives of BLUEAP **minimised water losses** in the distribution network and aided civil and agricultural **water consumption reductions** through the increased use of rainwater sources.

Monitoring

Monitoring is fundamental to the success of the BLUEAP project, as it provides invaluable **data** and **metrics** regarding the effectiveness and results of the changes and improvements by BLUEAP to date. The monitoring carried out was based on two main instruments; the monitoring protocol on **climate change impact risk and vulnerability**, based on the provisions of the LCP and the monitoring protocol of **adaptive interventions** in Bologna.

The monitoring protocols allow the continual improvement of BLUEAP and enable it to **adapt to new challenges**. They contribute to the development of **good practices and key learnings** and ensure that BLUEAP continues to grow from strength to strength in a way which is tailored to the needs of Bologna and its inhabitants.

Key Benefits

The benefits of BLUEAP have a broad reach, from local innovations to international teachings. Primarily, the project has allowed the city to develop an **improved response** to the challenges of climate change. Key outputs of the BLUEAP project include:

- Development of the **Local Adaptation Strategy to Climate Change** and a **Local Climate Profile** which identifies the cities vulnerabilities relating to the effects of climate change;
- Development of a stakeholder engagement outcomes report featuring **10 pilot stakeholder engagement actions**;
- **Information sharing** and increased awareness amongst citizens, businesses, stakeholders and local authorities of risks associated with climate change;
- Reduction in water consumption, with increased use of **rainwater harvesting** resulting in reduced cost and pressure associated with water supply for residential and commercial purposes;
- Development of **13 good practices** for green and blue areas; and
- Provision of **guidance** to similarly sized cities who want to develop their own climate change adaptation strategy.

Commendable Innovations

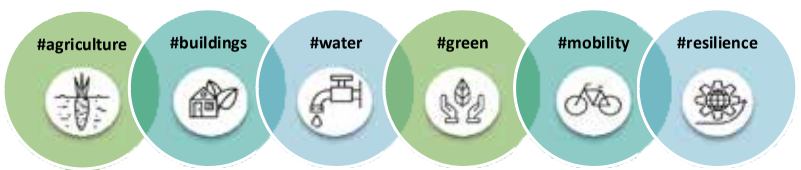
GAIA - Tree Planting for Urban Resilience

In 2016, under the Green Area Inner-city Agreement (GAIA) initiative, Bologna developed a model to **reduce greenhouse gas emissions (GHG) at local level**. This was achieved through the creation of a **public private partnership** (PPP) to plant trees throughout the municipal area. The initiative forms part of Bologna's climate strategy by incentivising the increased planting of trees which cool the city by evaporation and transpiration during heat events. The initiative operates under a GHG compensation scheme and EU LIFE+ funding which finances tree planting and green spaces adaptation measures.

The tree planting scheme under the GAIA initiative allows **businesses** to **offset their greenhouse gas emissions** by purchasing plants and maintaining trees across the city. Participants use a website to calculate the quantity of CO_2 produced by their business and select a **purchase plan to neutralise their carbon footprint** and provide for planting. Initiatives such as the tree planting financing scheme under the GAIA programme allow local businesses to take **ownership of their carbon footprint** and make a real difference to counteracting the impacts of climate change. There are three levels of purchase plan available to businesses:

Citizen Participation - @PlayBlueAp

PlayBlueAp, developed under the BLUEAP initiative, is an online application which aims to **engage citizens** in climate change challenges addressed by the BLUEAP project. The app aims to **spread scientific knowledge** acquired by the BLUEAP project and give Bologna's citizens access to understanding their impact on climate change. The app is a social game where **citizens share their environmentally friendly actions** and gain online rankings. The app is linked to twitter which acts as the platform for users to report their action under one (or more) of six themes:



The development of PlayBlueAp app has allowed Bologna's citizens to **locate and report damage** to the city associated with climate phenomena such as heavy rains or heat waves. It empowers citizens to make their own suggestions as to how the government should prepare for possible future climate events. The app gives the public a chance to **ask** questions, **connect** with likeminded individuals, **learn** about other projects, **report** their actions, and be inspired to respond to and **take responsibility** for their environment.

Ghent BWK Biological Scorecard

This good practice is relevant to European Green Capital Award Indicators:
4: Sustainable Land Use, 5: Nature and Biodiversity

Introduction

The City of Ghent has developed a database known as the 'De Biologische Waarderingskaart' (BWK); this is a **Biological Scorecard** of the city's natural capital. This database provides area specific qualitative descriptions of the status of nature in Ghent and plays an important role in the monitoring of vegetation and nature. It details all types of vegetation present in Ghent, and has an automatic scoring system. The database is an important tool used to facilitate **city planning**, **inform and educate** the general public, and fulfil **environmental policy** requirements. It allows changes over time to be documented and highlights the current status of nature in the city.

Objectives

In cities, nature and biodiversity is very important. It is therefore necessary to monitor, care for and preserve nature whilst also encouraging and further developing it in cities. The BWK scorecard in Ghent supports the city in its journey to **achieve and maintain nature and biodiversity goals** including the increase of forest cover in the territory, protection of forests and maintaining the current level of nature in the city. The aim of the BWK is to highlight the evolution of vegetation and forest in the city and territory of Ghent and **facilitate analysis** of the changes occurring in vegetation and what may have caused them. The BWK also helps the city to **meet policy requirements** such as the Flemish Nature and Forest Decrees. These decrees are related to the Flemish region and their policies provide obligations and conditions regarding land use, planning and nature conservation.

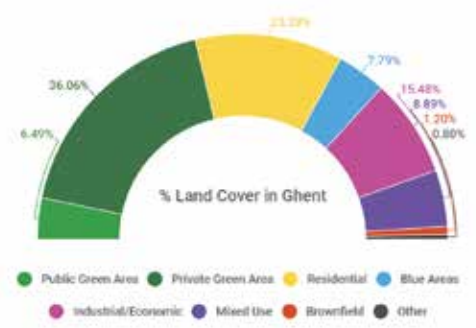


Figure 1: Land Cover Breakdown, Ghent. *Source: City of Ghent, 2015.*

Ghent at a Glance

Statistics sourced from EGCA 2019 Application

- **Gross Domestic Product:** €41,223/capita
- **Population:** 256,235
- **Population Density:** 1,622 inhabitants/km^2
- **Area:** 157.96 km^2
- **% People Living within 300 m of Green Areas in City:** 81.9%
- **Area of Designated Sites of Local Biodiversity Importance:** 2,311 ha
- **Area of Designated Sites of National Biodiversity Importance:** 70 ha
- **Area of Natura 2000 sites in/within 10 km of the city:** 244 ha

Want to know more?

For Further information on **Ghent's BWK Biological Scorecard Database** please see:

- The Ghent BWK Scorecard Database (Dutch)
- Nature in Ghent Information Page (Dutch)

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Policy Context

The Flemish Nature Decree provides a policy of **conservation and protection of nature and the environment** and aims to maintain the level and quality of nature in the city. Under this decree, there is also a **duty of care** that must be adhered to. Citizens must do what is necessary to protect nature from damage or restore it. This decree encourages **social support** by encouraging **education and awareness** for citizens regarding nature and environment. This decree outlines certain vegetation and plants that are not to be changed without the submission and approval of a licence application.

The Flemish Forest Decree aims to **regulate, manage, protect, and restore forests**, forest lands and their natural environment. It promotes sustainable forest management and provides a legal basis for forest protection. It also prohibits unlicensed tree felling. Deforestation can only occur under certain conditions and planning permits are required.

In order to **meet requirements and achieve goals** in line with environmental law and policy, it is important that a city can identify and understand the situation regarding the status of nature and forest in its territory.

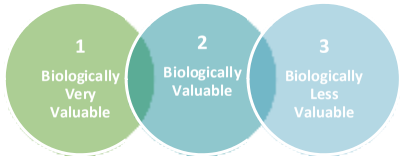
Methodology

The BWK was first developed in 1999 when the City of Ghent commissioned a full inventory of the nature and vegetation in its territory. During this inventory, teams visited as many land parcels as possible of both public and private lands. Aerial photography analysis was used to supplement and support the inventory.

Data and information was collated and developed into the BWK for the entire territory of Ghent. This database takes the form of a topographical map made up of plotted polygons containing one or more mapping units describing and breaking down the land type vegetation and nature in a particular plot. The database can be viewed in map or aerial form. Plot colour varies depending on the land type and levels of vegetation in the area, such as; forests, marshes, parks, fields, urban areas, waters, grasslands and thickets. Types of vegetation and land in each plot are described using letters, for example *'sf: moist willow structure on food rich soil'* or *'kp: park (public or private)'*; these can be used individually or combined depending on the combination of vegetation and land in the particular parcel of land. The scorecard also outlines the biological rating identifying the level of **biological value** in a specific area. Levels of biological value in Ghent are identified under the categories of *Biologically Very Valuable*, *Biologically Valuable*, and *Biologically Less Valuable*.

Figure 2: Subset of a Ghent BWK Biological Scorecard Map. *Source: City of Ghent, 2017.*

Ten years later in 2009, this process was once again carried out and the new data gathered provided an updated picture of the state of nature in the city. This process took place in two phases. Firstly, the BWK from 1999 was compared with topographical maps and aerial views taken in 2008. The second phase of the 2009 update involved comparing the historical and updated data set and detecting differences between them. If changes appeared in a plot, such as with the vegetation types or if land parcel boundaries no longer matched, then a plot was re-checked. The vegetation and nature in that area was then updated to its current state in the database.



Following the 2009 inventory, it was decided that the BWK will be **updated every five years**, the following and most recent update took place in 2014. By updating the BWK more frequently, a more up to date and comprehensive picture of nature in all areas of Ghent can be obtained, along with how it is changing over time.

In the 2014 update, it was identified that 2,911 hectares or 19% of Ghent's territory was nature. In 1999, this was 2,865 hectares or 18.7%. Latest data shows that the greatest increases in the surface area of nature are primarily attributable to the increase in forest. Compared with 1999, 71 hectares of new forest have been planted.

Key Benefits

Updates to the BWK allow the city to **compare differences between years**, allowing them to **track changes over time**, painting a picture of the types and evolution of nature in the city along with its most current situation. The BWK and its analysis allow the City of Ghent to highlight and monitor the evolution of biologically valuable and very valuable types of vegetation and forest in the city and territory.

Policy

- Allows the city to **meet environmental policy requirements** and achieve environmental goals.
- Data collected can inform **environmental, planning and construction policy**.

Planning

- Useful tool for city departments and services relating to **planning of forests and nature**.
- Provides useful data to the parks service and department of **urban planning** and **spatial planning**.
- Data collected can inform **construction planning**.

Awareness and Understanding

- **Raises awareness of nature amongst citizens** and allows them to keep up to date with it's status.
- Comparing a **snapshot view** of the city's nature to **historical data** allows for increased understanding of its status.

Future Planning

It is important to regularly monitor nature in the city and keep the database updated. This will take place every five years, with previous versions providing a source of reference for new inventories so that the change and development of nature in the city and its surrounding areas can be observed. It is vital to take nature into consideration when planning for the future and the BWK can be used to inform future building and development and city and regional plans as it shows where vegetation and land are not to be disturbed and where protection and conservation is required.

Quiet Areas

This good practice is relevant to European Green Capital Award indicators:
4: Sustainable Land Use, 5: Nature and Biodiversity, 6: Air Quality, 7: Noise

Introduction & Objective

Noise pollution is a growing environmental concern caused by a variety of sources. The effects of noise pollution have been found to adversely impact the **well-being** of exposed human populations, the **health** and distribution of **wildlife** and the abilities of our children to **learn** at school (EEA, 2016).

Under the EU **Environmental Noise Directive** (END) 2002/49/EC, 'Quiet Areas' (urban or in open country) must be **protected against noise**. Quiet areas are not areas of complete silence but are ones that are undisturbed by unwanted or harmful outdoor sound created by human activities (i.e. environmental noise). Article 3 of END defines a quiet area in an agglomeration as:

'an area, delimited by the competent authority, for instance which is not exposed to a value of L_{den} or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source.'

and defines a quiet area in open country as:

'an area, delimited by the competent authority, that is undisturbed by noise from traffic, industry or recreational activities.'

The idea of quietness is both complex and subjective. Its concept encompasses many factors including sound pressure levels, human perception, visual interactions, recreational value, the balance between wanted and unwanted sound, the appropriateness of sound to a given area, and human expectation.

Quiet areas in the urban context may include parks, areas within building blocks, courtyards, unused land or protected areas. These must be protected against noise and, in accordance with END 2002/49/EC, they must be formally **identified**, **classified** and **protected** by the responsible authority.

Examples of good practices undertaken by EGCA 2019 Applicants in relation to quiet areas are below, and disussed herein:

Mapping of Quiet Areas	Monitoring and Public Engagement	Acoustic Mitigation	Inventory of Quiet Areas
Lahti Lisbon	Oslo Tallinn	Florence	Ghent

Cities at a Glance

Statistics sourced from EGCA 2019 Applications.

Gross Domestic Product (€/capita):

Florence: €26,251	Lisbon: €22,800
Ghent: €41,221	Oslo: €83,746
Lahti: €29,913	Tallinn: €25,131

Population:

Florence: 377,587	Lisbon: 547,733
Ghent: 256,235	Oslo: 658,390
Lahti: 119,263	Tallinn: 443,268

Population Density (inhabitants/km^2):

Florence: 3,678	Lisbon: 5,090
Ghent: 1,622	Oslo: 1,450
Lahti: 230.5	Tallinn: 2,759

Population living within 300 m of quiet areas:

Lahti: 41.4%	Oslo: 35%
Lisbon: 13%	Tallinn: 66%

Population living within 300 m of green urban areas of any size in inner city:

Florence: 95.84%	Lisbon: 77%
Ghent: 80%	Oslo: 98.2%
Lahti: 99%	Tallinn: 79.9%

Useful References

- Good Practice Guide on Quiet Areas (EEA, 2016)
- Mapping Europe's Quiet Areas (EEA, 2014)
- Towards a Comprehensive Noise strategy (EU Parliament, 2012)

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Challenges

The main challenges faced when tackling noise pollution and creating quiet areas are very closely linked and primarily derive from **city urban geography** and **transportation**. Noise pollution and **exposure from traffic is recognised as one of the biggest challenges** that cities will face in adherence to the Noise Directive (END 2002/49/EC) and implementing quiet areas within cities (European Parliament, 2012).

Congestion and overcrowding of the streets with vehicles can have **adverse impacts on the environment** and take away valuable space from citizens. This can be **more pronounced in older cities** that developed during **heavily industrial times** when due cognisance was not given to noise pollution or environmental sustainability. As a result, older cities are often densely built with limited open spaces that are free from urban noise.

Good Practices

Lahti, Finland - Mapping

Lahti is small and green, but the city centre is densely built. In 1868, Lahti had only 18 houses, but the construction of a railway line and a canal changed everything. These transport routes spurred the development of Lahti, and the population grew exponentially until around 1975, however it has grown very little since. The current urban structure is largely inherited from the 1950s-1970s.

Figure 1: Lahti's Quiet Areas Map (left), Lakes serve as Quiet Areas in Lahti (right). *Source: City of Lahti, 2017.*

In order to develop an understanding of Lahti's city and its structure, quiet areas were mapped in 2010 (and subsequently updated in 2016) through the **'Lahti Master Plan'**. This information provides a valuable resource for **future planning and development** of the city. It highlighted that Lahti has many quiet areas of **high recreational value** near natural forests and lakes. Although the largest areas are located further from the city centre, smaller areas are also accessible in the city centre.

In addition to the mapped quiet areas, lakes serve as quiet areas. During summer, these are accessible by boat. During winter these are more easily accessible for fishing, skiing, and skating by traversing the ice when safe to do so.

Lisbon, Portugal - Mapping

Figure 2: Examples of Lisbon's Quiet Areas. *Source: City of Lisbon, 2017.*

Lisbon's Noise Action Plan comprises a set of priority measures, which aim to **protect the health and well-being of citizens** by **reducing sound levels** of environmental noise and **preserving quiet areas**.

The **mapping** of environmental noise in the city of Lisbon, paired with subsequent **analysis** and **evaluation** makes it possible to identify two types of 'noise' situations requiring intervention: areas that have environmental noise levels above the regulatory values requiring **remediation**, and the potential quiet areas that present L_{den} values and L_n, less than 55 and 45 dB (A) respectively, which should be **maintained** and **preserved**.

Despite covering a considerable urban area with many sources of noise, due to its long history of urban design, Lisbon is well known for its peaceful, romantic squares, small lanes, gardens, corners, and variety of spaces that allow for quiet reflection. Lisbon's focus on **reducing traffic** on the main streets is ongoing, and has yielded great results to date, bringing a sense of calm to the entire city.

Mapping quiet areas has allowed Lisbon to preserve existing environments, introduce noise reduction measures and implement a **strategic noise plan** going forward to ensure the continued noise management as the city continues to flourish and develop.

Oslo, Norway - Monitoring and Public Engagement

The forests of Oslo, as well as the islands in the Oslo Fjord, provide vast, continuous open quiet areas for recreational use. For years, the forests have been protected from development. An extensive network of quiet areas, including eight main waterways connects the forests and the fjords.

Oslo utilises Yardstick's Parkcheck Survey to monitor park activity through **public engagement.** Results from 2012 showed 'partial satisfaction' with noise levels among respondents, with more concern expressed at the noise in parks than at beaches. In Oslo's 2011 survey 90% of respondents named trekking and the experience of nature, silence and calm as their main reasons for visiting forests.

Information about noise is **easily accessible** and **well organised** on the municipality's website. It is easy to submit noise complaints, and these are managed by local health authorities engaging with owners **to solve or reduce noise problems**. Statistics on noise are available in both graphs and tables, and are easily accessible on the website which encourages Oslo's citizens to engage with the concept of noise management in their city.

The process of monitoring and public engagement has resulted in **quiet areas receiving legal protection from noise** in the 2015 Municipal Master Plan, which secures quiet areas as a priority for Oslo's future development.

Figure 3: Examples of Information Material related to Quiet Areas. *Source: City of Oslo, 2017.*

Tallinn, Estonia - Monitoring and Public Engagement

Tallinn's main environmental noise stems from a large volume of traffic. This is amplified by high levels of commuting due to urban sprawl. Tallinn **monitors compliance** with environmental noise requirements when planning new noise-sensitive projects and it is mandatory to carry out a noise survey during the planning stage for new sites that could potentially cause a noise disturbance.

Figure 4: Noise Monitoring Point installed on the Main Street in Tallinn. *Source: City of Tallinn, 2017.*

Tallinn's **residents contributed** to tackling noise by contributing to **public hearings** of the noise reduction action plan, and the **public discussions** held for all projects, plans and environmental impact assessments undertaken in the City. The noise maps and noise reduction action plans are available on Tallinn's website.

Information about the harmfulness of noise and how to prevent excessive noise is distributed to citizens through **awareness campaigns**, Such as 'Environmentally Friendly Mobility Month', with the objective of promoting sustainable urban mobility.

Tallinn **displays a noise map** prominently on a public environmental information screen in the Freedom Square in the City Centre. In response to the complaints of residents, the City has commissioned several noise level measurements in problematic areas and, dependent on results, **action has been taken** to solve the issues, **or citizens have been advised** on how to improve the situation.

Florence, Italy - Acoustic Mitigation

The City of Florence recognises primary and secondary schools as quiet areas. With aid from European projects HUSH (Harmonisation of Urban noise reduction Strategies of Homogeneous action plans) and QUADMAP (Quiet Areas Definition and Management in Action Plans) and regional funding, noise mitigation was implemented in school buildings exposed to noise pollution. These mitigation measures aimed to **improve the quality** of community spaces and resulted in the **reclamation of space** to be used for educational games, amphitheatres and open-air lessons.

The HUSH project, financed by LIFE+ funding, **piloted a project in acoustic mitigation** at the Don Minzoni School in Florence. All **teachers, students, parents and staff were involved** with the project planning and approval phases of the pilot scheme, allowing participatory assessment of the process. This model was then replicated for 10 other schools, allowing noise mitigation interventions to be carried out within the gardens.

Pilot actions were outlined for each of the schools and the following measures were implemented at a selection of sample schools:

- Anti-noise walls, with the internal side constructed from a material that allowed children to draw on it, similar to a chalkboard. This also improved security for the children in the school, a bonus point;
- Landscaping, with increased green plant life added on the school grounds; and
- Safe areas, dedicated to teaching outside but within the school perimeter.

Figure 5: Noise Reduction Barriers in Schools. *Source: City of Florence, 2017.*

Ghent, Belgium - Inventory of Quiet Areas

Ghent has a considerable amount of parks and green areas totalling a surface area of 8.35 km^2. In Ghent, 71% of the people live within walking distance (300 m) from these green spaces. These spaces have a good acoustic environment and offer quiet space for Ghent's inhabitants. The city has an array of other quiet areas such as quays, cemeteries, and courtyards.

Figure 6: Map of Parks and Green Areas in Ghent. *Source: City of Ghent, 2017.*

Two **exploratory studies** on the acoustic environment in 9 different quiet areas in September 2016 and May 2017, revealed that there is an excellent acoustic climate, with L95 values of 30.9 to 44.4 dB(A) and L50 values of 35.1 to 47.4 dB(A). These exploratory studies were the starting point for the current comprehensive **inventory** (2017-2018) of the quiet areas in Ghent.

From June to October 2017, citizens and frequent visitors of Ghent were encouraged to fill out an **online questionnaire** on quiet areas which were supplemented by **field interviews** and **GIS analysis**. The resulting inventory of quiet areas will be used to **devise a strategy to maintain and reinforce the existing quiet areas**, as well as to create new ones with results expected to be published in 2018.

Key Benefits of Quiet Areas

Quiet areas have been identified to have positive impacts for **human health**, **biodiversity** and **economics** (EEA, 2016). The creation and preservation of quiet urban areas results in **less traffic related noise** exposure for the citizens. This will **reduce the loss of DALYs** (Disability Adjusted Life-Year) caused by heart disease, cognitive impairment, sleep disturbance, tinnitus and annoyance. Other transportation related benefits include the preservation of communities, overall reduction of noise, improvement of mobility and improvement of health and safety for citizens.

Mapping of quiet areas proves beneficial to performing a range of activities at local and national level, including: **green infrastructure planning**, maintenance work of forest and parks and designing new nature recreational services or routes.

The inclusion of citizens through **monitoring** and **public engagement** raises awareness of the challenges associated with noise and helps create solutions that benefit communities and the environment.

Community Preservation	Protection of neighbourhoods from unwanted noise and cross-over traffic.
Safe Mobility	Improving road safety for all users, especially for pedestrians and cyclists, by reducing the occurrence and severity of accidents.
Health and Wellbeing	Reduction of noise improves human health by limiting exposure to harmful noise pollution.
Recreational Space	Creation and conservation of quiet spaces for recreational use.

Industrial Symbiosis

This good practice is relevant to European Green Capital Award indicators:
3: Sustainable Urban Mobility, 8: Waste, 9: Water, 10: Green Growth and Eco-innovation, 11: Energy Performance, 12: Governance

What is Industrial Symbiosis?

Industrial symbiosis is the process by which wastes or **by-products** of an industry or industrial process become the **raw materials** for another. Application of this concept allows materials to be used in a more **sustainable** way and contributes to the creation of a circular economy.

The transition to such an economy is the goal of the **European Commission's Circular Economy Action Plan** as it will result in the increase of Europe's **economic competitiveness**, **sustainability**, **resource efficiency** and **resource security**. It also contributes to the reduction of greenhouse gas (GHG) emissions.

Industrial symbiosis creates an **interconnected network** which strives to mimic the functioning of **ecological systems**, within which energy and materials cycle continually with **no waste** products produced. This process serves to reduce the **environmental footprint** of the industries involved. Virgin raw materials are required to a lesser degree, and the need for landfill waste disposal is reduced. It also allows value to be created from materials that would otherwise be discarded and so the materials remain **economically valuable** for longer than in traditional industrial systems.

Examples of industrial symbiosis are wide ranging and include the use of waste heat from one industry to warm greenhouses for food production, the recovery of car tyre shavings for use in construction materials, and the use of sludge from fish farms as agricultural fertiliser.

Industrial symbiosis has been applied for waste management and valorisation in **Lahti**, Finland, and **Pécs**, Hungary.

Kujala Waste Centre, Lahti, Finland

Aims and Methodology

Päijät-Häme Waste Management Ltd (PHJ) has employed the principles of industrial symbiosis in the city of Lahti to **optimise waste processing**, **treatment**, and **recycling**. Their **Kujala Waste Centre** project has **co-located various waste related businesses on a single site** extending over 70 hectares to allow the outputs from one to be easily transferred to another for reuse or further processing.

The original site which oversaw the intake and sorting of waste was completed in 2001. Since then, further businesses have been added and the site now contains **20 interconnected operational units** to store, handle, recover, transfer and dispose of waste.

Cities at a Glance

Statistics sourced from EGCA 2019 Applications.

Gross Domestic Product: €/capita:
Lahti: €29,913 Pécs: €6,843

Population:
Lahti: 119,263 Pécs: 156,049

Municipal waste generated (kg/capita):
Lahti: 486 Pécs: 452

Proportion of waste sent to landfill:
Lahti: 7% Pécs: 29%

Percentage of organic waste collected separately:
Lahti: 16% Pécs: 37%

Percentage of recycled household waste:
Lahti: 38% Pécs: 27%

Want to know more?

For further information on **Lahti and Pécs' projects** please see:

- Mecsek-Dráva Waste Management Project - Non Technical Summary
- PHJ - Industrial Symbiosis at Kujala Waste Centre

Useful References

- EU Circular Economy Package
- EU Cohesion Fund

Find out more about the **European Green Capital Award**, and its sister competition, the **European Green Leaf Award** on our website:

ec.europa.eu/europeangreencapital/

Implementation of Industrial Symbiosis at Kujala

Waste is sorted and as much of the material as possible is recycled. The majority of recyclable waste is refined and used in the production of new material which can be **utilised in industry**. Organic material is used for **biogas generation** and in the composting plant. Raw biogas is produced from bio-waste, garden waste, and waste water sludge. This is then **upgraded** at the facility **to produce high quality biogas which is transferred** to the **natural gas network**. The remaining material is composted for use in agriculture and growing media.

Gas produced from waste which is deposited in landfill is reclaimed and most is pumped to a **heating station** where it is used to generate steam used in soft drinks manufacture. Remaining landfill gas is used to **generate energy** at the Kujala site. Leachate from the landfills and dirty water from other waste management processes and facilities is treated at Lahti Aqua Ltd´s Ali-Juhakkala waste water treatment facility.

Contaminated soil is stabilised and compacted into a non-toxic form at the Kujala site. It is utilised in embankments or as preliminary landfill cover.

Key Statistics: Kujala Waste Centre

- **Amount invested:** €28 million
- **Population served:** 119,263
- **Number of employees:** 45
- **Waste processed per year:** 200,000 tonnes
- **Proportion of waste recovered:** 90%
- **Proportion of waste sent to landfill:** 3%

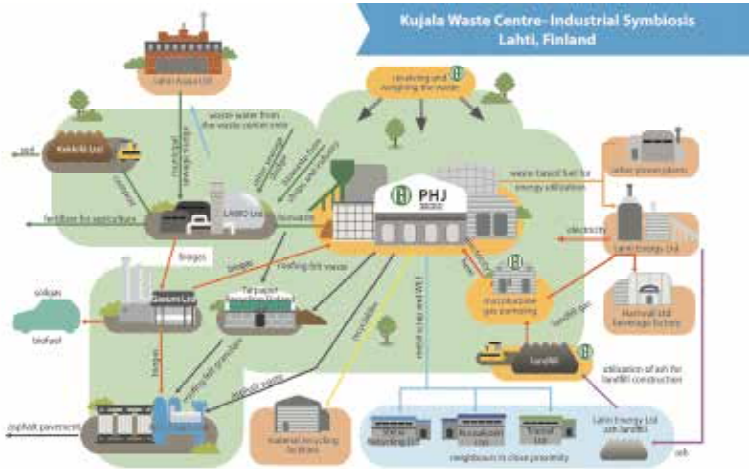

Figure 1: Kujala Waste Centre Flow-Chart. Designed by Anna Polkutie, Esa Ekholm and Hanna Bergman, supported by Lahti region Development (LADEC). *Source: City of Lahti, 2017.*

Future Plans

PHJ's 2020 strategy indicates that the primary goal is to increase the value added so that waste can be turned into **saleable products** and materials. PHJ has set a goal of achieving a **50% recycling rate** of all municipal waste. PHJ also aims to increase the amount of bio-waste which is collected separately from general waste in a **cost effective** way.

In collaboration with the City of Lahti, PHJ is investigating sustainable solutions to optimise the potential of surplus land and brownfield sites. PHJ is also working towards powering the operations of the Kujala Waste Centre with on-site **renewable energy** generation. This goal has led to the installation of solar panels onto roofs in Kujala. The next planned step is to utilise the closed landfill surface as a solar park.

Pécs-Kökény Waste Management Centre, Pécs, Hungary

2002
- Mecsek-Dráva Programme adopted by the Hungarian Government.

2003
- Mecsek-Dráva Local Government (MDLG) Cooperation Agreement finalised.
- Preparatory & feasibility studies.
- MDLG Association established.

2004
- Mecsek-Dráva Project Organisation (PIU) formed.
- Tender completed.
- Government financing secured.

2005
- Design and scope of the project agreed upon.
- Mecsek-Dráva Great Project Fund contract signed.

2006
- Public procurement procedures for design and environmental review initiated.

2007
- Project split into two parts (development and landfill reclamation) due to a change in tender structure.

2008
- Official support decision made.
- Grant agreement signed.

2009
- Proposal accepted by EU.
- Began process of aquisition of relevant real estate, conclusion of service contracts, preparation of public service works contracts.

2012
- Construction of the Pécs-Kökény Waste Management Centre began.

2014
- Construction of the Pécs-Kökény Waste Management Centre completed.

Aims and Methodology

The Pécs-Kökény Waste Management Centre was developed as part of Hungary's Mecsek-Dráva Waste Management Project. This project was developed to solve the waste challenges of **313 municipalities** and is supported by the **European Union**. The project required close cooperation across municipalities and a dynamic project team which included input from planning and waste management experts.

The project collaborated with the **EU Technical Assistance Programme** and secured funding from the **EU Cohesion Fund**. It also utilised municipal funds and ensured state backing. The key objectives of the project are to achieve compliance with the **Waste Framework Directive** (2008/98/EC), and the **Landfill Directive** (1999/31/EC), improve **resource efficiency** with regard to mixed residual waste and minimise diversion of waste to landfill, promote waste to energy conversion of non-recyclable material and minimise operational cost of waste management and therefore reduce public waste tariffs.

Key Statistics: Pécs-Kökény Waste Management Centre
- **Waste processed per year:** 100,000 tonnes
- **Population served:** 426,022
- **Amount invested:** €25 million
- **Net operating cost:** €2.8 million, €28/tonne of waste processed
- **Source of net operating costs financing:** Waste management fees paid by users, and income from sales of raw materials

Implementation of Industrial Symbiosis at Pécs-Kökény

Recyclable materials are reclaimed and used to generate raw **materials for re-sale**. Passing through a mechanical-biological treatment plant, material suitable for **fuel generation** is separated and utilised as energy. Organic matter within the waste is also removed and is transferred to a **composting** facility to create a useful product.

Future Plans

Pécs has plans to extend the present manually operated sorting system in the materials recovery facility, and install a pre-sorting machine line to automatically pre-sort the waste. This will **improve efficiency** and will restrict hand sorting to fine sorting.

At the mechanical treatment facility, optical sorting machines will be installed at the end of the process line to improve the **quality** of the combustible waste fraction. This will reduce the **chloride** content of the end product as PVC plastic can be sorted out.

Further separation of **bio-stabilised** waste will be carried out to remove the 20-80 mm fraction which can be recovered for **energy generation**. To reduce waste sent to landfill, the amount entering landfill will be restricted to that which is below 20 mm fraction.

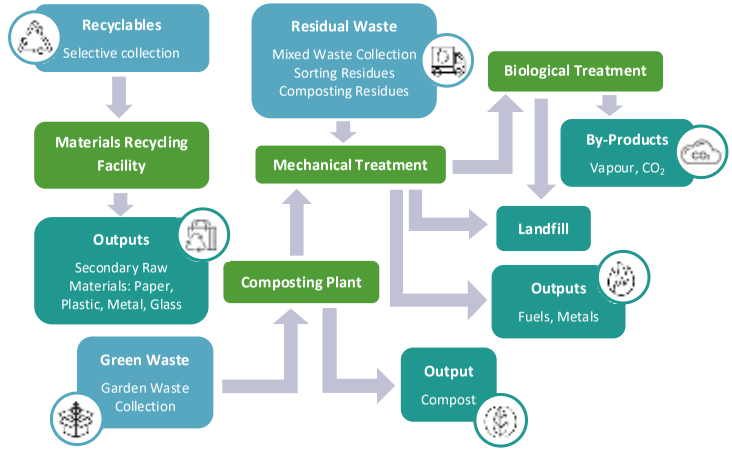

Figure 2: Pécs-Kökény Waste Centre Flow-Chart. *Information supplied by the City of Pécs, 2017.*

Challenges and Learnings

Challenges in implementing industrial symbiosis include managing **close cooperation** between governing bodies, stakeholders and the general public, and achieving **public acceptance**. Presenting plans and illustrating the social, environmental and economic **benefits** of a scheme clearly can help to overcome this issue. Good **waste management strategies** may take time and persistence to develop, and there is a need for good **waste sorting** efficiency at household and consumer level to ensure **cost efficiency**.

For the Kujala Waste Centre, obtaining environmental and construction **permits,** and reducing the volume of waste produced in the region were key challenges. Obtaining **data** on the sources and processing of industrial, agricultural and construction wastes was also challenging. Guidance, support and **regulatory compliance and enforcement** can help to overcome these barriers. The Pécs-Kökény Waste Management Centre found that the **selection of technically and economically appropriate technologies** required **strong guidance and management** from planning through to construction. The City of Pécs recommends that professional events and exhibitions are held **to inform the project** and **source expertise**. Engaging in **knowledge transfer** and participatory **stakeholder engagement** are recognised as key processes which cities should prioritise if they adopt industrial symbiosis.

Key Benefits

Some key benefits of industrial symbiosis are outlined below:

Impact Reduction	•Reduction of **environmental impact** of waste through recovery, reuse and recycling. •**Biostabilisation** reduces the environmental impacts and risks associated with wastes that are sent to landfill.
Economic Value	•Creation of **economic value** from waste material.
Climate and Air	•Reduction of **GHG emissions** from waste transport and raw material extraction. •Reduction of reliance on **fossil fuels** and decrease of emissions of **NO_x, SO_2, CO_2**.
Knowledge and Skills	•Extension of knowledge and practical know-how of how waste management can be transformed into a **sustainable and growth oriented** business.

Oslo Climate Budget

This good practice is relevant to European Green Capital Award Indicators:
2: Climate Change: Adaptation, 4: Sustainable Land Use, 5: Nature and Biodiversity, 9: Water

Introduction and Objective

Oslo's **Climate Budget** is a key **governance tool** for reaching the targets adopted in Oslo's **Climate and Energy Strategy**. It budgets the city's CO_2 emissions in a similar manner to the city's finances. It was first adopted by the City Council in June 2016 and was introduced as an integral component of the overall city budget. It is now in its second generation.

The Climate Budget is the blueprint Oslo uses to achieve its ambitious emission targets. It outlines **the measures** Oslo will implement to reduce CO_2 emissions, when these will be implemented, the expected emission reductions and the **lines of responsibility**. It aims to reduce CO_2 emissions by 36% compared to 1990 levels by 2020, 50% by 2022 and by 95% in 2030. **Carbon neutrality** (net GHG emissions to zero) is targeted for 2050.

Climate Budget: 1st Generation

The first generation of Oslo's Climate Budget initiative included **42 measures** which were planned across the energy and built environment, resources and transport sectors.`

The CO_2 reductions for each sector to achieve the total cumulative reduction by 2020 were broken down into individual targets for **Energy/Buildings** (7 measures), **Resources** (4 measures), and **Transport** (31 measures).

Climate Budget: 2nd Generation

The Oslo City Government launched the **second generation** of its Climate Budget in September 2017 as part of the City's financial budget. Revision of the original budget followed the postponement of the development of a carbon capture and storage facility at Klemetsrud, which was an integral component to achieve carbon budget targets.

The second generation of the Climate Budget includes **36 measures** which aim to reach the targets set out in Oslo's Climate and Energy Strategy. This governance document emphasises that the city needs to strengthen the strategic climate work by **integrating climate budgets in the regular budgetary process**.

Oslo at a Glance

Statistics sourced from EGCA 2019 Application.

- **Gross Domestic Product**: €83,746/capita
- **Population**: 658,390
- **CO_2 Emissions per Capita**: 2.3 t/capita
- **CO_2 Emissions from Transport**: 1.4 t/capita
- **Total City CO_2 Emissions**: 1,436,000 t/annum
- **Proportion of Low Emission Buses**: 90%
- **% Electric Vehicles in the Municipal Fleet**: 48%
- **Energy Use**: 23,872 kWh/capita

Want to know more?

For further information about **Oslo's Climate Budget** please see:

- Oslo's Climate Budget Information (Norwegian)
- Oslo City's offical webpage on the budget (English)

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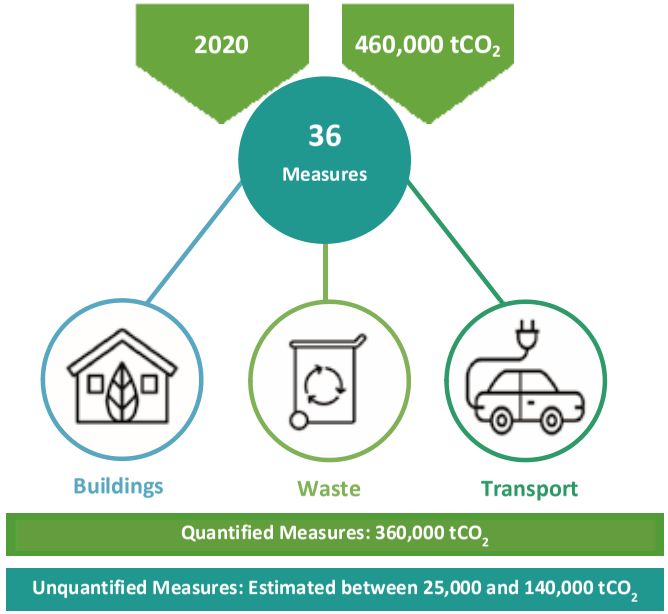
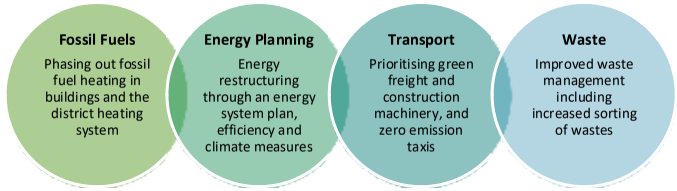
Strategy Overview

The **36 measures** within the Climate Budget have been developed to tackle GHG emissions from waste, buildings, and transport sectors. As set out in the second generation budget, these measures will achieve an overall **reduction in CO_2 emissions of 460,000 tonnes** by 2020 against 2015 levels. Individual quantified measures will contribute approximately 360,000 tonnes of GHG savings. Measures requiring more investigation have the potential to reduce CO_2 by 25,000 tonnes to 140,000 tonnes.



The measure with the largest mitigation potential in the transport sector is the charging plan for the Oslo **toll ring** that will apply lower toll charges to **zero and low emission vehicles** than to standard vehicles. It has been estimated that this measure will reduce CO_2 emissions by 93,000 tonnes in 2020. The toll ring revenue is also the most important **financing source** in public transport and bicycle infrastructure.

A **ban on fossil heating fuels** will come into effect in 2020 for the building sector. Along with accompanying support schemes, this measure is expected to reduce emissions of CO_2 by 121,000 tonnes by 2020. Some initiatives laid out in the Climate Budget to achieve the targets are:



Methodology

Oslo's Climate and Energy Strategy acts as the foundation for the Climate Budget and mandates that Oslo will strengthen its strategic climate work by integrating climate budgets within the municipal budget process. The successful development of the Climate Budget relies on:

Governance and Commitment

- The **Department of Finance** and the **City Council for Environment and Transport** are responsible for the Climate Budget. The City Council has overall responsibility for monitoring and implementing the climate measures and associated initiatives.

Communication and Collaboration

- The Climate Budget emphasises that **communication**, **involvement** and **active engagement** of the population are essential for achieving the ambitious goals of reducing emissions by 36% by 2020, 50% by 2022 and 95% by 2030.
- The **Business for Climate Network** was established to encourage communication between business communities, NGOs and citizens to address the areas where businesses presented obstacles to the city trying to meet its emission reduction targets.
- The Budget requires **cross-sectoral commitment** from various private and public organisations across the city in order to achieve its objectives.
- **City agencies** were involved in the design of the second generation Climate Budget to a greater degree than the first. They were invited to suggest measures according to the standard budget process.

Targeted Measures

- Reduction targets have been linked to **specific measures** to ensure goal attainment. Several measures still require further assessment and design to quantify their effects.
- The specific measures, responsible agency, associated funding body and CO_2 reduction per area are detailed alongside each measure.
- All businesses responsible for implementing climate measures will have **prioritised emissions reduction goals** and must **report their progress** figures three times a year.

Regulatory Enforcement

- **Regulatory enforcement** is a vital aspect to the success of the Climate Budget. Through the management of laws and regulations regarding environmental and climate requirements, Oslo will regulate taxi hovering and introduce **low emission zones**. There are also plans to introduce traffic regulation, conversion of car parks for emission free vehicles and environmental differentiation of toll rates.

Transparency

- The second generation of the Climate Budget is more **transparent** than the first, and the uncertainties attributed to them are more visible. This enables the budget to be more easily understood by stakeholders or interested parties and **fosters trust** in the overall process.

Reporting

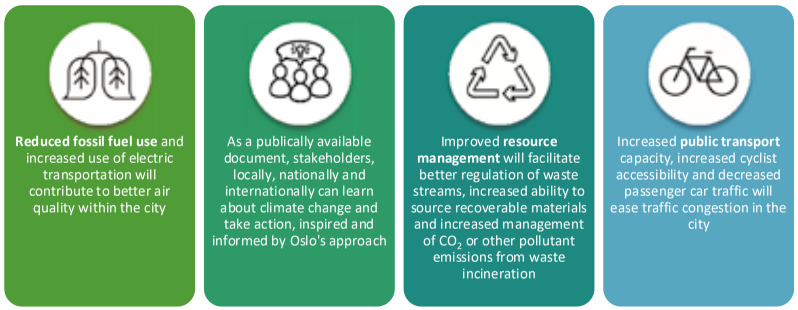
- A '**Climate Barometer**' indicating the progress of the Budget measures is published every quarter.
- The measures in the Climate Budget are reported together with the **budget report** in the Oslo Municipality.
- **Emissions statistics** are recorded by Statistic Norway. Work carried out to achieve the aims of the Climate Budget is based on these statistics, with supplementary data from other sources.

Key Benefits

Oslo is a city rich in resources, in a country with abundant access to **renewable energy**. The Climate Budget capitalises on this unique situation and offers significant benefits to the **social**, **environmental** and **economic** aspects of the City of Oslo. Furthermore, its annual review provides an opportunity to make continual improvements and allow the city to respond to emerging challenges.

The development of the Climate Budget places Oslo as **a leader at the forefront of climate change mitigation** and has significant potential to serve as a tool to be adopted and adapted by other cities because the **core concepts**, **objectives and results are formulaic and transferable**.

The Climate Budget makes the city better for its inhabitants and **sets the groundwork** for other cities who wish to adopt a similar strategy to tackle the challenges of climate change. Further benefits of the climate budget include:



Looking Forward

Recommendations

The Climate Budget is one of the first city climate budgets in the world. It is a **governance** tool that clearly outlines the measures that the city of Oslo will implement, who is responsible for them, the timeline for their implementation and the expected **emission reductions**.

The variety of measures proposed in the Climate Budget range in complexity and cost. The city emphasises the need for **transparency** of the methodology behind the development and implementation of climate budgets. They also indicate the need for effective communication between various stakeholder groups. Oslo's Climate Budget can act as a **tool for other cities** who want to introduce measures to tackle climate change. Therefore cities have the opportunity to adopt or adapt measures from the Climate Budget that are appropriate for their energy, buildings, resources and transport infrastructure.

Future Planning

The overall success of the Climate Budget is dependent upon reaching the **ambitious emission targets**. Oslo will continue to **collaborate** across departments and agencies, with citizens, businesses and other stakeholders to develop into a leading environmental city. The Oslo Agency for Climate will coordinate and facilitate the climate work in Oslo.

The Climate Budget as a **governance tool** will be **strengthened** in 2018. There will be closer links between measures in the Climate Budget and the instructions given to agencies for their annual work plan and reporting routines. This gives an **improved level of control** over the progress of the municipality's climate work. Staff resources will be expanded to facilitate development and strengthen these links.

Oslo Reopening Waterways

This good practice is relevant to European Green Capital Award indicators: *2: Climate Change: Adaptation, 4: Sustainable Land Use, 5: Nature and Biodiversity, 9: Water*

Introduction and Objective

The City of Oslo is defined by its **urban waterways** which have shaped the development of the city throughout history. Oslo **has ten main waterways** in the built up zone of the city, equating to 354 km of rivers and streams. These waterways provide **vital ecosystem services**, including **recreational** opportunities, **wildlife habitat** and act as the city's arteries for **flood control**. Up until the 1980s, the waterways were considered problematic due to leakages from the sewage system, heavy pollution from emissions and spills, and as obstacles for efficient urban development. Hence large sections of waterways were put in pipes or culverts.

In recent years, extreme weather events, increased rainfall and storm surges resulting from **climate change** have made Oslo more vulnerable to the **risk of flooding**. The capacity of culverted rivers to manage water is limited by their design. During peak times, increased rainfall can overburden the water infrastructure and cause flood events. Oslo decided to **reopen its waterways as an integral part of its climate change adaptation plan** to make the city resilient to flood risk. The reopened waterways also serve to contribute to increased **biodiversity**, improve **water quality** and benefit **public health**.

In 2016, the City's **investment budget allocated €11.7 million** for reopening projects. In the past decade, a total of **2,810 metres of waterways were reopened**. This includes 1,080 metres between 2015 and 2016. The City of Oslo is actively working to reopen closed rivers and streams with tributaries wherever it is possible and expedient with long-term plans to opening up **30 stretches of waterways** including an additional eight kilometres of waterways in the coming 10 years.

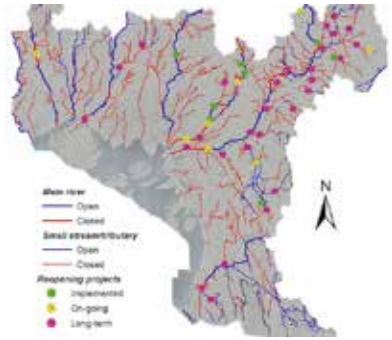


Figure 1: Oslo Plan for Reopening Waterways. *Source: European Green Capital Award 2019, City of Oslo Application (2017)*

Oslo at a Glance

Statistics sourced from Oslo's EGCA 2019 Application

- **Gross Domestic Product:** €83,746/capita
- **Population:** 658,390
- **% Blue Areas in Overall City:** 6%
- **Köppen Climate Classification:** Dfb (Warm Summer Continental Climate)
- **Annual Rainfall:** 763 mm (10/16 - 09/17)

Want to know more?

For further information about **Oslo's Reopening Waterways Project** please see:

- Principles for reopening of streams and rivers in Oslo (Norwegian)
- Reopening Waterways (English)
- Climate Change Adaptation Strategy 2014-2030 (Short version)
- Action Plan for Storm Water Management (English) (Short version)
- Storm Water Management Strategy 2013-2030 (Norwegian)
- The 2015 Municipal Master Plan: Oslo towards 2030 'Smart, Resilient and Green' (Norwegian)

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ec.europa.eu/europeangreencapital/

Methodology

In the late 1990s, the trend of closing streams and rivers was reversed. Inspired by international trends, efforts of NGOs, grass roots organisations and individual engagement, Oslo started its work to reopen its waterways. Today, **Oslo has an explicit goal to reopen rivers and streams** enshrined in local policy. This goal is assessed in all development projects in proximity to closed waterways. The success of the reopening waterways project has been heavily dependent on **planning** bespoke policies, **monitoring** of water quality and **collaboration** between the city's stakeholders.

Planning

- The **City Investment Budget** (2016) set aside €11.7 million for reopening projects throughout Oslo.
- In 2016, municipal agencies developed a management document outlining **principles for reopening projects** and a list of prioritised projects.
- The **Oslo Action Plan for Stormwater Management** (2016) highlighted the need to utilise open waterways in a three step strategy for managing stormwater and extreme weather events.
- The **Municipal Master Plan** (2015) made provision for setting construction zones 20 m away from main waterways and 12 m away from tributaries to mitigate construction related pollution.
- The Municipal Master Plan (2015) also set out specific measures for maintaining blue-green infrastructure. The **blue-green factor (BGF)** is a tool that uses zoning proposals to ensure sufficient vegetation in new development areas to support storm water management and flood control measures. Guidelines are being developed to aid planners in understanding aggregate effects of nature-based flood control.

Monitoring

- For over 10 years Oslo has been **monitoring bacteriological, chemical and ecological parameters** of the waterways, including assessment of the bottom dwellers and fish in order to assess the conditions of the ecosystems.
- Each year the city monitors two rivers. Monitoring results are published annually and uploaded to the city's statistics webpages ensuring that **Oslo's citizens are kept informed** on the quality of water in their urban environment.

Collaboration

- Storm water managment requires **cooperation** between city agencies, other public agencies, the private sector and Non-Government Organisations (NGO).
- The **Oslo River Forum** (Elveforum) is an NGO that works with the city agencies to protect and rehabilitate the waterways in Oslo. Elveforum serves to preserve important **cultural heritage and environmental** aspects of Oslo's waterways.
- The forum actively **engages with stakeholders and disseminates project information** via a regularly updated website: http://www.osloelveforum.no

Key Benefits

The extensive reopening of waterways has made a major contribution to the protection of Oslo's environment and cultural heritage. It is a fundamental element of **Oslo's climate adaptation strategy** which has provided multiple benefits for the City's citizens by **minimising flood risk and developing blue-green infrastructure**.

Oslo has strived to develop a **sustainable solution** to adapt to the impacts of climate change and specifically, the **risk of flooding** caused by increased rainfall and storm surges. Storm water is ideally handled in open flood ways and existing rivers and streams. Therefore the **reopened waterways provide ideal conditions to minimise and prevent costly damages caused by flooding**.

In all reopening projects, the City of Oslo endeavours to make the aquatic habitat and surrounding environment as natural as possible. Only **native vegetation** has been planted in water networks and adjacent land including, amongst others, marsh marigold, purple loosestrife, yellow iris, bulrush, reed canary grass and common alder. Emphasis is also placed on creating natural bottom substrates for invertebrates and fish. The **restoration of Oslo's aquatic and terrestrial ecology with native species** continues to be a positive development for the preservation and management of local biodiversity. The project is **recovering migration paths** for fish which has enabled breeding and population growth of migratory fish in the region.

Flood Alleviation	Sustainable solutions for storm water management to minimise and prevent costly flooding damages
Biodiversity	Creation of aquatic and terrestrial habitats for flora and fauna including natural bottom substrates for fish
Recreation	Spaces for community recreation and leisure including parks, hiking trails, walkways and playgrounds
Water Quality	Natural cleaning by dense vegetation sedimentation basins, shallow areas and rapids to improve water quality

Several of the projects are planned and developed as **natural cleaning systems**, with sedimentation basins, water rapids and shallow waters with dense vegetation for uptake of excess nutrients from the water. The use of these natural systems to control pollution offers a **sustainable solution for water management** and **improves the water quality** for the city's citizens and wildlife.

Reopened waterways with associated park areas, playgrounds and trails are **high value amenities** for Oslo's citizens. The projects serve as learning arenas for children, schools and educational institutions. Reopening waterways has made a positive contribution to **education and knowledge** sharing by recovering lost biodiversity, creating access to indigenous habitat for residents and raising awareness about local flora and fauna.

Challenges

Reopening waterways can be **costly** and often **challenging** in dense urban areas due to existing buildings and infrastructure, both above and below ground. For these reasons, **close cooperation** across several city agencies, private companies and NGOs is required for **planning, budgeting and implementation** of projects. Three examples of successful projects are the Hølaløkka Waterpark, Alna River Redevelopment, and Teglverksdammen.

Hølaløkka Waterpark

Photo: I. H. Kjerkreit, 2007

- Early redevelopment project undertaken between 2003 and 2004.
- Known as 'a showcase for physical, ecological and aesthetic waterway rehabilitation in an urban area' , (Holtan Hartwig et al p. 94).
- Reopening and environmental enhancement of c. 300 m of a closed section of the River Alna.
- Development of a new nature and environmental park for recreational use.
- Construction of a wetland to treat polluted storm water from traffic and industrial areas.

Alna River Redevelopment

Source: Municipality of Oslo Application for Candidacy to the Landscape Award of the Council of Europe 2016/17

- Plans for the river were explored in Oslo's 'Alna Report of Ideas, A Walk with Water' (2002).
- The Municipal Sector Plan for the Alna Environmental Park (2003-2007) enshrined the committment to the river's improvement in the city's land-use plans.
- Development of green structures, improvement of biodiversity and preservation of cultural heritage by reopening waterways.
- Natural soils and plant life were utilised to improve the water quality by filtering pollution and creating habitats.
- Development of hiking trails and river walkways to areas which were previously inaccessible or difficult to access.
- New access point to the Alna includes a tunnel under a train track called the Haugen Gate.
- The Leir Waterfall, which was previously covered by a concrete dam, was reopened as part of the Alna River Redevelopment.

Teglverksdammen

Source: City of Oslo, EGCA 2019 Application

- Oslo's flagship reopening waterways project cost approximately €10 million and was completed in August 2015.
- Reopening of approximately 650 m of the Hovinbekken stream.
- Development of a natural cleaning system to filter incoming waters.
- Designed as a natural filtration system consisting of several sedimentation basins, streams with rapids, a small lake and high-density native vegetation.
- Development of a clean habitat to native species, rejuvinated biodiversity and creation of a popular recreation zone.

Wrocław Smart Metering

This good practice is relevant to European Green Capitcal Award Indicators:
10: Green Growth and Eco-innovation, 11: Energy Performance

Introduction and Objective

The City of Wrocław has introduced **smart metering** in their city. The technology used, AMIplus, is a smart metering system that allows automatic processing, transmission and management of measurement data. It facilitates two-way communication between the electricity meters and the distributor, while giving consumers/customers access to current information on electricity consumption.

The project is led by TAURON Dystrybucja, the electricity supplier and distributor operating in the city. Installation of the AMI device is the first step to optimise electricity distribution and improve the efficiency of the processes related to the management of metering data in Wrocław.

Smart meters are being used as part of the smart electricity metering system in Wrocław. Implementing smart electricity metering solutions in the city allows the electricity providers/power plants to:

- **Automatically obtain information** on electricity consumption from specific locations;
- **Increase efficiency** with regard to management of measurement data;
- **Identify and improve** power network safety;
- **Strengthen** customer service as it allows for the identification and verification of issues more rapidly;
- **Operate faster** and **more efficiently** in the event of a network failure and shorten the duration of power outages;
- **Facilitate** the procedure of changing electricity supplier; and
- **Tailor offers and services** to meet the individual needs of consumers.

With these changes in the electricity metering system, the power plants have access to measurement data with a high degree of precision, allowing them to effectively monitor the status of the network and to optimise the costs related to electricity supply.

Economic Data

The project was carried out on the basis of the procedure for the award of a public contract under the restricted tendering procedure according to the provisions of the Act of 29 January 2004 Public Procurement Law. The project budget is close to PLN 157 million (over €36 million, September 2017 conversion rate).

Wrocław at a Glance

Statistics sourced from City of Wrocław's EGCA 2019 Application.

- **Gross Domestic Product:** €18,300/capita
- **Population:** 609,857
- **Koppen Climate Classification:** Cfb (Marine West Coast Climate)
- **Energy Consumption:** 2,073,972 MWh
- **Energy Use/Capita:** 3,280 kWh/capita

Want to know more?

For further information on **Wrocław's Smart Metering Project** please see:

- TAURON AMIplus: http://amiplus.tauron-dystrybucja.pl/Strony/start.aspx
- Smart Metering Deployment in the EU: http://ses.jrc.ec.europa.eu/smart-metering-deployment-european-union

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Policy Context at European Level

Roll out of smart meters in Wrocław meets the requirements of **Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity**. The Directive outlines that where roll out of smart meters has been assessed positively, and wherever it is cost-effective to do so, **at least 80% of consumer's meters are to be replaced with smart metering systems by 2020**.

The **principles of this Directive** are aimed at achieving a competitive, secure and environmentally sustainable market in electricity, while considering, amongst others, the following:

Methodology

The **smart meter**, also called **AMI or remote reading meter**, is the key element of the overall smart metering system. The installation of the meter is free of charge and does not involve additional fees or a change of contract by energy consumers. The exchange of meters is carried out by TAURON Dystrybucja personnel and installation takes about 15 minutes, during which time the power supply needs to be switched off.

Where meters are mounted inside a home, the presence of the homeowner is **required**. In cases where meters are located outside buildings or apartment stairwells for example, the presence of residents is not required. **The device measures the electricity consumption and automatically transmits the encrypted data to the power plant**. The roll out of smart metering in Wrocław took place over a three phase timeline.

To date the AMIplus Smart City Wrocław project, has replaced **330,000 meters** with smart meters, and **progress made on the exchange is currently at 96%**.

Phase 1:
February - March 2015

Phase 2:
April - August 2015

Phase 3:
September 2015 - January 2017

Challenges

The **main challenge** in the roll out of the smart meters was the **planning and scheduling** of the project. The correct scheduling of meter deliveries was critical to the management of possible risks associated with the roll out. It is essential that the deliveries accurately match the roll out schedule so that they are ready and available for installation. Based on experience in Tauron strongly recommended meters delivery at least 4-6 weeks ahead of scheduled installation work.

Future plans

Following on from roll out of the meters, the AMIplus project has prepared personal resources and built the competence to carry out work related to the **maintenance of the network**.

They are also preparing to **optimise the customer service process** as a result of the smart meter functionality. Further to the initial project, the HAN TAURON AMIplus service has been launched to complement the service. This enables customers to turn on the AMI meter communication interface from their smartphone and share data on their current electricity consumption.

Key Benefits

There are multiple benefits to be seen from the installation of smart meters in the city. They allow for **faster problem resolution for consumers**, for example, in the event of a power outage the **system sends information directly to the electricity provider**. As a result the provider can troubleshoot and resolve issues faster.

They also allow for **remote meter reading** to take place. Due to this innovation there is no need for meter readings to be taken on site. The smart metering system also offers **better security and protection against fraud**.

The smart meter display allows the user to separately **analyse the amount of electricity consumed**. It can provide detailed information about the consumption of electricity with an accuracy of 15 minutes to one hour.

Through the TAURON AMIplus website or by using an app called 'eLicznik' **users can monitor and track their electricity consumption**. These platforms allow users to view their daily, monthly and annual usage and set electricity usage limits and goals and receive email alerts regarding these measurements. They can also check the status of their energy meter and compare their consumption over different periods and how it compares to the statistical average.

The service also **allows users to pay as they use** by providing them with the opportunity to pay for the amount of electric energy used in a given month without estimating future electric energy consumption.

Carbon Savings
Using less resources, example: reducing the need for personnel to visit on site to take meter readings, less use of vehicles etc.

Energy Efficiency
Contributes to conservation and efficiency which has a positive effect on carbon footprint.

Energy Savings
Supports behavioural change when it comes to energy consumption and reduced overall energy demand.

Sustainable Technologies
Adaptable to renewable energy technologies as part of a smart grid such as wind or solar.

Learnings and Recommendations for other Cities

Wrocław has identified the following key learnings and recommendations following the roll out of smart metering in their city:

- The **planning process** of the overall project and meter delivery schedule is critical for a smooth roll out of the meter installation;
- **Providing information to customers** about the new smart meter system and the functionality offered is a key activity in the roll out of the project;
- Making the meter interface **user friendly and easy to use** and providing a dedicated website and app to customer's **builds confidence in the new technology** whilst also **raising awareness of energy consumption**;
- **Staff and field workers** need to be **well qualified and trained**; mistakes can be costly and have a direct impact on customers;
- **Cooperation** between both parties to the contract is important for delivering the project on time;
- The **value of meter interoperability** and the fact the system is successfully utilising meters from multiple vendors within one system was a significant achievement;
- It is **important to identify new sources of interference** which may become more common in the future, for example LED lights.

Strasbourg's Project Sustainability Evaluation Tool

This good practice is relevant to European Green Captial Award Indicators:
3: Sustainable Urban Mobility, 4: Sustainable Land Use, 5: Nature and Biodiversity, 10: Green Growth and Eco-innovation, 12: Governance

Introduction and Objective

According to the European Innovation Partnership on Smart Cities and Communities (EIP-SCC), an initiative of the European Commission, **78% of European citizens live in cities**, and 85% of the EU's GDP is generated in cities. The EIP acknowledges that **smart cities are integral to delivering sustainable solutions to the key challenges facing European economies and citizens**. Upgrading key technologies, infrastructures and services with smart solutions across the **ICT**, **buildings**, **transport** and **energy** sectors provides an intelligent approach to growing the competitiveness and accelerating the sustainability of Europe's cities while improving the quality of life for their citizens. Strasbourg's Project Sustainability Evaluation Tool (PSET) is a front-running innovation in the transition towards smarter cities.

PSET is an **interactive tool** developed by the City and Eurometropolis of Strasbourg to **assess the sustainability of its projects over their project lifetime**. The tool is an integral measure of the city's 'ÉcoCité – City of Tomorrow' policy and was developed in collaboration with an independent specialist advisor in the field of **low carbon strategy** and **climate change adaptation**. The tool offers a new approach to analysing the needs of the city and an innovative mechanism to review the practices of the city within the framework of sustainability.

The overall objective of the tool is to assess the actual sustainability of projects and implement increased sustainability measures across them. It achieves this by cross-tabulating sustainability indicators and criteria throughout the project life-cycle across six major policies: **mobility, nature and biodiversity, environment, urban planning, governance** and **cross-functionality**. The latter policy allows the city to gain a transverse view of the interactions between each policy.

Financial Overview

The project required circa **€77,500** investment which included advisory services from an external specialist and the Eurometropolis of Strasbourg. **ÉcoCité co-funded** the project providing circa €27,000 of the total cost.

Strasbourg at a Glance

Statistics Sourced from City of Strasbourg's EGCA 2019 Application

- **Gross Domestic Product**: €40,000/capita
- **Population**: 275,718
- **Energy Use**: 22,356 kWh/capita/year
- **CO_2 Emissions**: 3.75 tCO_2/capita/year
- **Sustainable Committments**:
  Climate Plan 2009 (baseline 1990):
  By 2020 Strasbourg aims to reduce:
  - GHGs by 30%
  - Energy Consumption by 30%

  COP21-2015 (baseline 1990):
  - Reduce GHGs by 75% by 2050

Want to know more?

For further information relating to **the Project Sustainability Evaluation Tool**, please see:

- Strasbourg Eco-2030 Plan
- Planning and Sustainable Development Plan (PADD)
- Local Intercommunal Urban Planning Plan (PLUi)
- Strasbourg Energy Transition Guide
- Eco-Cities (ÉcoCités)
- EIP EU Smart Cities
- Factor 4 Initiative

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Methodology

Strasbourg's Project Sustainability Evaluation Tool has been developed to **assess the actual sustainability** of projects and **implement increased sustainability measures** across them. It is a multifaceted tool with multiple applications for the city of Strasbourg in the development of their projects. Some of the applications of the tool are to:

- Assess the **carbon footprint** and its contribution to France's **Factor 4** objective to improve energy efficiency in buildings and France's COP 21 commitment to cut GHG emissions by 75% by 2050 (compared to 1990 levels);
- Identify and forecast the number of households likely to be in a situation of **fuel poverty**;
- Develop and prioritise **sustainable mobility plans** by identifying access to main employment hubs with respect to different modes of transport such as car, bicycle and public transport;
- Analyse effectiveness of **pedestrian mobility planning** such as ease of access to basic amenities, neighbourhood facilities, shops and services;
- **Define** and **review** the actual contribution of the measures to achieving **sustainability** in the city's projects; and
- Make continual improvements by **measuring** and **evaluating** the governance aims against project outcomes.

The three pillars of success for PSET are that it:

- Uses established, well-understood software which is **accessible** to users and requires little training to use;
- Promotes **collaborative input** to ensure that all risks and opportunities are identified; and
- Priotises an **integrated approach** to ensure that the project takes a holistic overview of sustainability and due cognisance of all stakeholders. In addition, this makes sure that the knowledge gained from PSET is shared across other programmes and projects that can benefit from it.

Accessible Systems

- PSET consists of a suite of Excel files tailored to each individual city project and managed by a specified municipal project manager. The primary component is an Excel data-board describing the project with tabs under **six policy themes: mobility, nature and biodiversity, environment, urban planning, governance and cross-functionality**. Each tab contains a suite of questions and indicators relating to each theme. These serve to define the strategy and cost required to achieve the target objectives and ambitions set out for the project.
- After inputting data, the excel table automatically produces diagrams, descriptive datasets and graphs using pre-formatted equations. As such, all project results appear in **a systematic, consistent and easily understood** format. These useful information outputs allow the project manager and stakeholders to critically **analyse the performance**, **identify project successes** and **target opportunities for improvement**. Utilising a familiar, accessible suite of software ensures that little training is required and that a broad range of stakeholders can easily engage with PSET.

Collaborative Input

- While PSET is the overall responsibility of each designated project manager from the local municipality, it requires **input from all project stakeholders** including the developer, planner, designer and construction teams. Cooperative design ensures that the city implements suitable and resilient solutions which are cognisant of the dynamic nature of projects.
- The tool has been developed to be utilised during **all phases of the project lifetime** including the operational phases of projects. As such, the city is able to gain an overview of each project as it develops, monitoring progress and re-evaluating the project sustainability goals as it transitions from planning through to construction and use.

Integrated Approach

- The Project Sustainability Evaluation Tool takes a holistic approach to assessing the sustainability of its projects by considering each theme in context of the others. This is facilitated through the '**cross functionality**' tab which enables the user to **assess the interactions** between themes and consider additional cross-sectoral indicators, for example carbon footprint or energy efficiency, which requires input from a number of the tabs.
- An innovative aspect of the tool is that it supplies essential data to the **geographical information system** (GIS). Providing an interface between the tool and GIS enables it to generate **new spatial intelligence** as part of the overall approach.

Project Implementation

To date, the Project Sustainability Evaluation Tool has been tested on three developments with substantially different urban characteristics; in the **city centre**, in **suburbs close to the city centre** and in more **outlying suburbs**:

- The Danube eco-district, which is part of the larger urban project of the Deux-Rives;
- The Eco-district of Rives du Bohrie in Ostwald; and
- The Portes du Kochersberg project in Vendenheim.

A Snapshot of PSET in Use

An example of the PSET's functionality and output, generated for the Danube eco-district development in Strasbourg, is illustrated in Figure 1 below. This diagram charts **energy efficiency** and identifies trends of **CO_2 emissions** associated with dwellings within the Danube eco-district development. The carbon footprint estimate is based upon data from a number of different sectors including **construction activities**, **energy** and **transport**, enabling a more **robust assessment** of average footprint per inhabitant of the building shown in the example below.

Following collation of the relevant information, the building energy consumption data was entered into PSET and it **automatically calculated** if existing buildings follow the global objective defined for energy consumption. Data is **collected continuously**, allowing **frequent review** and **close monitoring** of the sustainability goals as the project develops.

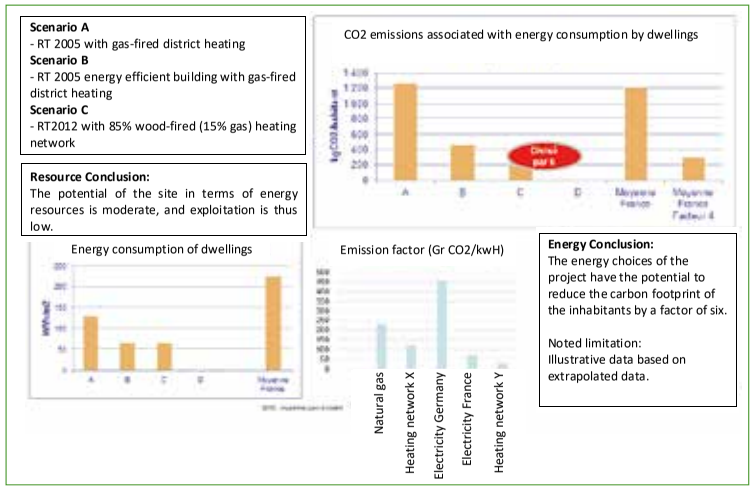

Figure 1: CO_2 emission trends and energy efficiency of dwellings in the Danube eco-district project. *Source: City of Strasbourg*

Another example of the output of PSET is presented in Figure 2. In this project, the tool was used to analyse tram-station accessibility with respect to the proximity of stations next to an urban project.

Future Implementation

In addition to the projects outlined above, PSET is currently used in the Vergers Saint-Michel project in Reichstett and is planned for further use in the Deux-Rives development in Strasbourg.

Given the success of the output, the city intends to **implement PSET on future developments** and ensure that sustainability is assessed in all city projects moving forward.

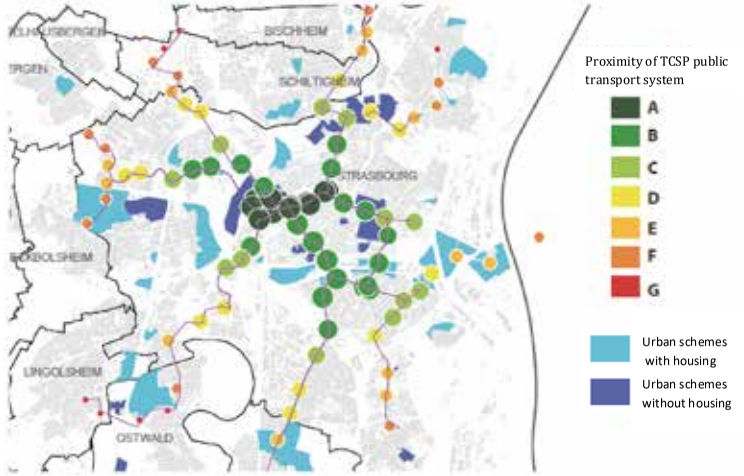

Figure 2: Analysis of tram-station accessibility regarding proximity of stations to urban projects. *Source: City of Strasbourg*

Key Benefits

The Project Sustainability Evaluation Tool brings a spectrum of benefits to the City of Strasbourg, project stakeholders and the city's inhabitants by providing **continual improvements in sustainability** across its projects. The holistic and integrated approach of PSET enables the city to have an overarching view of the performance, risks and opportunities of Strasbourg's projects. This, in turn, facilitates knowledge sharing from one project to the next.

As PSET is intended to be utilised throughout the entire project lifecycle, it provides **benefits from project inception to beyond project completion**. The tool acts as a guidance mechanism for the municipality and project stakeholders to **set sustainability goals** for their project and **monitor the progress** of these as the project develops. Further benefits of Strasbourg's Project Sustainability Evaluation Tool are provided below:

- Improves **accessibility to information** about city projects and provides the local authority with an overview of city projects and their contribution to public policy objectives.
- Allows stakeholders to **assess different project scenarios**, the impacts of change on the quality of the project and enables the project stakeholders to **make informed decisions** to **achieve sustainable solutions** to project needs.
- **Enables participatory planning and engagement** amongst project stakeholders in the planning and development of sustainable projects.
- Provides a **smart solution for asset management** and **development** by capturing data, monitoring progress and identifing key learnings which can be applied across other city projects.
- Results in the **implementation of sustainable projects** which in turn creates **economic, social and environmental benefits** for Strasbourg's industry, citizens and biodiversity.

Sustainable Food Production and Management

This good practice is relevant to European Green Capital Award indicators:
4: Sustainable Land Use, 8: Waste, 9: Water, 10: Green Growth and Eco-innovation, 11: Energy Performance

Why Sustainable Food?

Both globally and in Europe, food production commonly exceeds environmental limits for **biodiversity**, **nitrogen** and **phosphorus** loss, **greenhouse gas** emissions and **water** extraction. Other associated issues include **food security**, the degradation of **soil** resources and **land use change**.

The development of a **sustainable food** production and management system has been identified as a goal to address these issues in the **Europe 2020 Strategy** and the **Roadmap to a Resource Efficient Europe**. Developing such a system will also contribute to a more **competitive**, **low-carbon economy** and increase the **resilience** of the EU food system. This is particularly important in light of increasing **resource scarcity** and economic **instability**. EU funding is available to support such initiatives and further information can be found at: **http://ec.europa.eu/environment/funding/intro_en.htm**

Among other goals, **sustainable food** initiatives aim to increase **resource efficiency** and consumer **health**, decrease food **wastage, give value** to food waste, achieve **environmental protection**, generate **renewable energy**, and create **closed loop** food systems.

Sustainable food initiatives have been developed in **Lisbon**, **Portugal** and **Ghent**, **Belgium**. Both cities have implemented a variety of measures which are governed and influenced by a central **food policy**.

Lisbon: Food Waste Management

Introduction and Objectives

Since 2010, the City of Lisbon has embraced a strong commitment to **food waste prevention** in order to decrease its associated footprint on natural resources. This is aligned with the **Food and Agriculture Organisation of the United Nations** (FAO) and leveraged by the **FAO Office in Lisbon** which was established in October 2009.

As part of their commitment, the City has implemented a series of initiatives that focus on measures to collect and reduce food waste and are also supporting local initiatives or citizens' movements. One such movement is the **ReFood Movement**, a project born in Lisbon in 2011, has grown in to a highly successful food waste prevention initiative currently operating on a large scale in Portugal.

Cities at a Glance

Statistics sourced from EGCA 2019 Applications

Lisbon

- **Gross Domestic Product:** €22,800/capita
- **Population:** 547,733
- **% Organic Waste Collected Separately:** 9.2%
- **Total Water Usage:** 169 litres/capita/day

Ghent

- **Gross Domestic Product:** €41,223/capita
- **Population:** 256,235
- **% Organic Waste Collected Separately:** 12.8%
- **Total Water Usage:** 151 litres/capita/day

Want to know more?

For further information on **Lisbon and Ghent's projects** please see:

- ReFood Website (Portuguese & English)
- FORCE Project (English)
- Gent en Garde (English)
- The Old Docklands Project (Dutch)
- Urban Smart farm (English)
- Donderdag Veggiedag (Thursday Veggieday) (English)

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It is a **humanitarian project** that collects donated surplus food from restaurants and businesses and delivers it to people in need at a local level. The emphasis of this project is on **volunteerism**; and as such it is not financed by the municipal budget.

In January 2015, the Municipality approved the **Municipal Plan Against Food Wastage**, where members of the City Council, national authorities, parishes and NGOs, including the ReFood Movement, took part in **Lisbon's Municipal Commissariat Against Food Wastage**. The primary objective of this is to implement a series of **interconnected measures** for the collection and **reduction of food waste** by working with **stakeholders** in the city to implement **specific actions**. By doing so they aim to optimise the collection of food surpluses in Lisbon and to widen the reach and level of distribution of food to **people in need**.

Methodology

Lisbon's Municipal Commissariat against Food Wastage was first **established in 2014**, it developed the following steps, outlined in Figure 1 to achieve the City's goals in relation to food waste prevention.

Planning & Implementation	Preparation and implementation of the Municipal Plan Against Food Wastage
Increasing Awareness	Increase awareness within the different stakeholder groups to combat food wastage
Recruiting & Manangement	The management of a volunteer network ensuring the entire city's coverage
Support	Support organisations to comply with the appropriate quality, hygiene, and safety requirements for food distribution logistics
Engaging with EU Projects	Lisbon has committed to tackling the issue of food waste through the FORCE Project: Cities Cooperating for a Circular Economy (a Horizon 2020 project)
Continued Development	A Cooperation Agreement has been signed between Lisbon and the Portuguese Association of Distribution Companies (APED) to facilitate the collection and distribution of surplus food

Figure 1: Lisbon's Food Waste Prevention Methodology.

Key Benefits

Overall, the ReFood project is contributing to the **Circular Economy** through its **resource efficient activity** and promotion of **food waste prevention** and a more **sustainable** future whilst tackling food poverty by helping communities and those in need. In 2015, the network collected and delivered meals to **families in need**. The municipality is a key stakeholder, belonging to an extensive **network** of **food donors** and **citizen volunteers**, **beneficiaries**, **pioneers** and **logistic partners**.

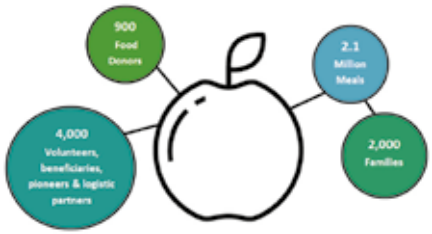


Figure 2: The key benefits realised through Lisbon's ReFood network.

Recommendations

The ReFood Movement is a **transferable model** that can be **adapted** by other municipalities and cities. This project is a good example of the potential for and success of working together through volunteerism and humanitarian support to decrease the food wastage footprint and to help the people in need.

Future Plans

Lisbon is continuing its commitment and work to tackle the issue of food waste through the Horizon 2020 **FORCE Project: Cities Cooperating for a Circular Economy**. As part of this Lisbon will be responsible for developing an **Online Network Tool** application that will manage information related to surplus food. This application will gather information about surplus food products and meals; food donors; producers of organic and garden waste; and information about the beneficiaries. It will bring together information about parish councils, charity institutions and NGOs involved in this network.

The key objective of this tool is **to close the food and bio-waste loop** to allow for more efficient management of these waste streams. The application will facilitate innovative food management and **reduce food waste directly** from where it is produced. Food will be catalogued and that which can be consumed will be diverted from disposal. This will result in a reduction of food waste and the delivery of food in good condition to people in need. The project will take place over a four year period, 2016 to 2020.

Lisbon's Food Waste Initiative also has the potential to expand its approach and to connect **humanitarian** and **charitable** network chains with the additional **environmental**, **economic** and **social** benefits of the scheme. In Lisbon, reuse of clothing and toy donations has been increasing through channels such as church and social associations. The city recently promoted a reuse platform in collaboration with 21 charity shops and is installing large containers as **donation** points in partnership with district councils and NGOs. The ReFood initiative could be integrated and coordinated with these schemes.

Ghent: Food Production and Waste to Energy

Introduction and Objectives

In 2013, the city of Ghent initiated the **Gent en Garde Food Policy**. This Policy and related initiatives aim to create a shorter, more transparent **food chain** and more **social added value** for food initiatives, **reduce food waste**, optimise the **reuse** of food waste as raw materials, and so make the entire food chain much more **sustainable**.

As a result, in Ghent, many new **sustainable food and urban farming initiatives** have emerged. These include the **Ghent Old Docklands Project**, which produces **biogas from food waste** and waste water, and the **Urban Smart Farm** which produces food on an unused urban lot using **hydroponics**.

Methodology

Ghent's approach to food production and management is underpinned by the key steps outlined below:

Policy and Governance:

- The development of the Gent en Garde Council and Food Policy.

Specific Goals:

- Translation of the Policy into concrete operational goals through involvement of companies, organisations, citizens, associations, knowledge institutions, cultural centres and governments.

International Cooperation:

- Signing and support for the Milan Urban Food Policy Pact;
- Becoming an active partner of the RUAF Global Partnership for Sustainable Urban Agriculture and Food Systems;
- Active participation in the Workgroup Food of Eurocities Network;
- Engagement and membership with the Global Lead City Network on Sustainable Procurement;
- Partnership in the EU Funded Food Smart Cities for Development project.

Figure 3: Ghent's Initiatives for Sustainable Food Production and Management.

Framework Implementation:

- Formation of a Community Supported Agriculture Network;
- Establishment of a Local Food Council with stakeholders from a wide range of backgrounds. These include the farmers union, NGOs, researchers, retail networks and cooperative initiatives.

Community Engagement and Support:

- Schemes to promote sustainable food habits;
- Support schemes for local food production efforts and reduction of waste;
- Rollout of schemes which encourage local food production and conservation.

Source: City of Ghent, 2017.

Challenges

Ensuring **legitimacy** of a sustainable food scheme, along with **buy-in** from citizens and other stakeholder groups can present challenges. Sustainable food systems are inherently **complex** and a lack of knowledge on food production, distribution and consumption patterns can be a limiting factor. Matching production with demand can also be challenging, as can incorporating and coordinating existing initiatives with food policies, plans and municipal support.

Recommendations

These projects offer **replicable models** that can be adapted by other municipalities or communities. The need to **tailor** such schemes to the individual requirements of a city is emphasised. Useful steps to take when implementing such projects would include the compilation of available **data and information** on the existing food system, the **inclusion of all stakeholder groups** in planning and implementation to ensure a broad **support** base, and the development of a strong **knowledge exchange** network to encourage learning and expansion of the project. Establishing a strong link between urban markets and countryside production is very important when developing sustainable food systems.

GENT EN GARDE

Source: City of Ghent, 2017.

Key Projects

Ghent Old Docklands Project

The Zero Waste Water with Energy and Nutrient Recovery system (ZAWENT) is implemented by a sustainability-themed urban neighbourhood development to generate one third of its energy. This system sources food waste and other organic waste from the residents and uses it to generate biogas through use of an anaerobic digester. The biogas is then used as fuel to generate heat and power. The system also recovers nutrients from the waste for use as fertiliser for food production. The remaining two thirds of the energy required by the neighbourhood are sourced from the residual heat of a nearby soap factory, transported by a heat network. The ZAWENT system also purifies and recycles waste water which is recycled by a nearby company.

Source: City of Ghent, 2017.

Urban Smart Farm

A city-farm has also been developed in Ghent. The Urban Smart Farm uses LED illuminated aquaponics systems to produce vegetables, herbs, micro greens, fish and shrimp in a sustainable way. Grow trays and fish tanks are arranged vertically to minimise the amount of space used. Water for fish production is heated using solar power, and organic waste from the fish is converted into plant fertiliser using tiger worms and bio-filtration. Used water is purified and re-circulated within the system to prevent wastage. The farm also hopes to integrate with social employment initiatives to provide opportunities to vulnerable jobseekers. In 2015, the farm won the annual Ghent Short Food Chain competition and received a €15,000 prize from the City.

Source: City of Ghent, 2017.

Take Back the Cities

This good practice is relevant to European Green Captial Award Indicators:
3: Sustainable Urban Mobility, 4: Sustainable Land Use, 5: Nature and Biodiversity, 6: Air Quality, 7: Noise

Introduction and Objective

Cities are hubs of concentrated economic activity, and **every city has a unique and complex structure that requires a transportation network to allow the flow of people in, out and around the city**. The larger the city, the more complex the network required. With every network, there are a significant number of links that ensure it works efficiently, the more links there are, the higher the propensity for disruption.

There are **numerous issues that can occur in this network**, from poor road infrastructure due to a cities age, inadequate public transport systems, a lack of funding, to poor management. **We have become highly dependent on vehicles and this has put further pressure on the transport networks, namely congestion and pollution**. In order to combat these, **cities need to think about ways to both remove vehicles from cities, and people from cars**.

The **key objective is to improve the quality of urban areas for citizens, in areas such as mobility and comfortable living, while mitigating the impact of car traffic and other negative impacts that can arise as part of the urban environment**. The reduction in vehicles and heavily congested roads allows for cities to be **more pedestrian friendly**, with increased pedestrianised areas, **space for recreation**, and the introduction and expansion of **quiet areas**.

Examples of good practices undertaken by EGCA 2019 Applicants in relation to quiet areas are below, and disussed herein:

These good practices have been selected by our expert panel and commended for their effort. They are detailed below with the anticipation that other cities may learn from these diverse opportunities and apply them or similar ideas to their own cities.

Cities at a Glance

Statistics sourced from EGCA 2019 Applications

Lisbon

- **Gross Domestic Product**: €22,800/capita
- **Population**: 547,733
- **Area**: 84.9 km^2
- **% Population Living within 300 m of**:
  - **Hourly Public Transport**: 93.3%
  - **Green Urban Areas of any Size**: 80%

Oslo

- **Gross Domestic Product**: €83,746/capita
- **Population:** 658,390
- **Area:** 454 km^2
- **% Population Living within 300 m of:**
  - **Hourly Public Transport:** 90%
  - **Green Urban Areas of any Size:** 98.4%

Strasbourg

- **Gross Domestic Product**: €40,000/capita
- **Population**: 275,718
- **Area**: 78.1 km^2
- **% Population Living within 300 m of**:
  - **Hourly Public Transport**: 90%
  - **Green Urban Areas of any Size**: 97.7%

Want to know more?

For further information please see:

- Oslo Toll Ring (Norwegian & English)
- Optimix Website (French & English)

Find out more about the **European Green Capital Award**, and its sister competition, the **European Green Leaf Award** on our website:

ec.europa.eu/europeangreencapital/

Lisbon: A Square in Each Neighbourhood

Objective

With the project **'A Square in Each Neighbourhood'**, Lisbon aims to **improve the open public spaces of the city** including squares, streets, neighbourhood gardens and facilities. This is being achieved through the consolidated urban fabric being interconnected by a network of green corridors, new tree alignments, and pedestrian and cycle paths. The project aims to create meeting points for local communities and to encourage **citizen participation** in city governance.

Method

An evaluation of spaces within the city was carried out utilising '**Project for Public Spaces' (PPS)** guidelines along with input from local authorities and communities and the Portuguese Strategy for Sustainable Cities 2020. The process used identified priorities in the city with regard to public spaces. Citizens were then invited to make suggestions to be included into the project design. This helped to develop a **committed relationship with citizens**.

The project is being carried out over two stages, the first stage began in 2014 and concluded in 2017, and the second stage will take place from 2018 through to 2021. The overall cost of the project is estimated to be approximately €84 million, which is provided through municipal funding.

Challenges

One of the main challenges in this project was the change required to road structure within the city. Existing roads are being converting to boulevards,and pedestrian areas are being extended and the associated road areas narrowed. The planting of trees in a city where the subsoil is heavily embedded under existing infrastructure was another challenge faced. Due to these various elements,the management of the construction phases to keep the city working, and minimising disruption throughout the project was incredibly important. It was important to involve and **engage with citizens and parishes** throughout the process, with **periodic meetings** held to generate ideas on how to **improve projects and to develop strategies** to facilitate the construction period.

Key Benefits

Emissions	•The project will lead to an improvement in the quality of the environment in urban areas and a reduction in the impact of car traffic, which has a direct impact on the level vehicle emissions.
Green Space	•The development of the spaces and the connections between these will create continuities between green areas, parks and squares through new tree alignments, and pedestrian and cycle paths.
Citizens Health	•It promotes active mobility and alternative methods of commuting and travel for citizens. There are also great social benefits as it will create meeting points for citizens, improving social and recreational activity, participation and enjoyment.
Success	•The city can measure the success and benefits by engaging with citizens to measure use of the new spaces and connections, such as measuring the number of cycle path users, the reduction in car use in the city, and the number of citizens enjoying recreational activities in open public spaces.

Key Learnings and Recommendations

The City has indicated the importance of **making arrangements in advance**, taking into consideration the **management of time** periods associated with projects and for other aspects including public participation and construction phases as a **key learning and recommendation for other cities**.

This allows for better involvement of citizens and for the organisation of the construction period that in turn helps avoid the project to avoid causing disruption to citizen's daily lives. **Citizen engagement** is important in a process such as this as it can allow the city to identify the progress and success of the project to date and can be used as an assessement tool at the end of the project.

Oslo: Toll Ring

Objective

In recent years, significant expansion in the public transport system in Oslo has been financed by the toll ring surrounding the city. The toll ring is an **important tool for traffic reduction**, the **reduction of Greenhouse Gas (GHG) emissions** and **improved air quality**.

In 2016, it was decided to adjust the **toll charges based on emissions, favoring zero and low emission vehicles**. Changes in charges are being introduced in stages, Stage 1 started on the 1st October 2017, Stage 2 will begin from 1st March 2019 and Stage 3 from 1st March 2020 (Figure 1).

In 2019, it is planned to **establish more toll points at the city border** in the north and south. In addition to this, Oslo is **establishing a new toll ring at the inner city ring road**. The toll ring is an important part of the **Master Transport Plan** for Oslo and Akershus County. **The masterplan is called the Oslo Package**. The Oslo Package 3 sets a **goal of a 15% reduction in traffic by 2019**, and emphasises the importance of **reducing GHG emissions** and **air pollution**.

Figure 1: Toll Ring Charges in Oslo. *Source: City of Oslo, 2017.*

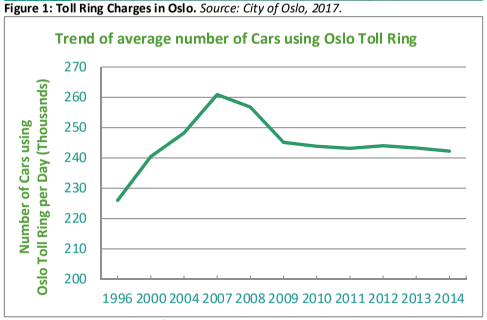


Figure 2: Average Number of Cars passing through the Oslo Toll Ring in the Period 1996-2014. *Source: City of Oslo, 2017*

Methodology

Automated toll stations are located on all entry roads to Oslo. The City uses the toll ring to **reduce congestion by charging people when passing**. Revenues are used to facilitate more trips by public transport, bicycle and walking through investment in better infrastructure. The toll ring charges favour zero and low emission vehicles, **motivating an increased transition to cleaner vehicles** (Figure 1).

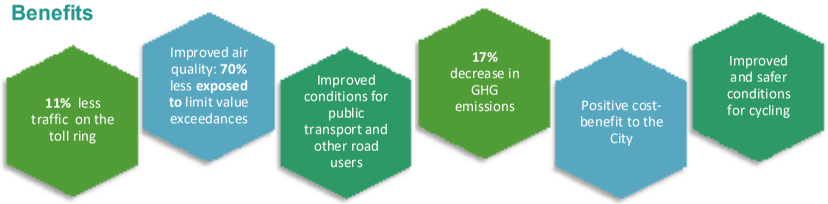
Future Planning

The **effects of the toll ring and its charges will be evaluated before the introduction of Stage 3 in March 2020**. There is also a possibility to **renegotiate the toll charges if the goal regarding 15% traffic reduction is not reached by 2019**.

Learnings

As shown in Figure 2, the number of cars that crossed the toll ring fell after 2008, despite population growth. Part of the explanation is **the increase in the toll charges**, combined **with reduced fares on public transport**. In the period 2005-2015, the public transport share in Oslo increased from 21 to 32%, while the car share has decreased from 45 to 34%.

Benefits



Strasbourg: Optimix

Introduction and Objective

Strasbourg is **promoting the implementation of company travel plans** as part of the policies defined in its **Urban Mobility Plan.** The **Optimix project provides a digital platform** which sets out **operational guidelines for managing mobility** and **utilises 'soft' techniques** including **coordination, communication and awareness-raising**. The platform helps businesses, administrations and associations to **implement mobility plans**. The aim is to **encourage sustainable mobility** that is more **environmentally friendly** and **socially acceptable** whilst **improving employee lifestyle and wellbeing** at work.

Methodology

Optimix is a **diagnostic tool** that is used **to understand the transport habits of employees** and proposes alternate modes of transport. It highlights relevant amenities like tramway lines and cycle lanes and will also map **carpooling solutions** for employees living in the same areas or who have similar hours.

Figure 3: The Optimix Online Tool for Mobility Management. *Source: City of Strasbourg, 2017.*

A mobility survey is carried out with employees, from this a **mobility advice card is personalised according to the survey findings**, and **identifies their optimal commute to work**. This allows all employees to see the alternative **personal commuting and mobility options** available. Employees can decide the most appropriate solution for their needs and their anonymity is preserved throughout the process.

Key Benefits

Since the website was **launched in September 2015**, over **40 agreements** have been signed **with companies and administrations**. These **benefits help reach key objectives with regard to EU Urban Development and the EU Urban Agenda**. Some of the key benefits of the service are:

Behaviour Change	Promotes a behaviour change with regard to mobility and transport. Opens up and identifies better options for businesses and employees and encourages them to leave the car behind.
Carbon Footprint	Contributes to a reduction in Carbon Footprint for businesses and their employees.
Cost & Time Saving	It is a free service that contributes to cost savings for businesses when developing their mobility plans. It also offers a time saving benefit for businesses and employees as it helps them to develop mobility plans efficiently and with ease.
Sustainable Mobility	The platform can support countries and cities Sustainable Urban Mobility Plans (SUMPs) and contributes to overall sustainable urban mobility.

Future Planning

The city plans to continue to **promote sustainable urban mobility** and the **bicycle as an alternative to the car** for commuting through continued **citizen engagement and awareness raising such as the challenge 'Au boulot à vélo' (bike to work)**. The aim of the challenge is to win the prize for **the most 'véloptimiste' enterprise**, by achieving the the highest number of kilometres covered over the duration of the challenge.

Optimix: A Commendable Innovation

This project is characterised by the proactive involvement of the local authority through publicity and awareness raising activity targeted at employees of large companies. Optimix provides a turnkey approach, offered by a local government authority. As well as its ease of use and high quality user interface, one of the key draws of service for companies and governmental agencies is that it provides them with all-in-one service. A key strength of the platform is its individualised approach, where an employee can identify the most suitable journey for themselves.

Waste Water Management

This good practice is relevant to European Green Capital Award indicators: *8: Waste, 9: Water, 10: Green Growth and Eco-innovation*

Lisbon Water Reuse & Recycling

Since 2009, **over 1.5 million m³/year of recycled waste water has been reused through the Lisbon's Waste Water Treatment Plants** (WWTPs) for non-potable uses. The **project is aimed at creating a treated Waste Water Reuse System for non-drinking public purposes** such as garden and park irrigation, road cleaning, vehicle washing and toilet flushing.

It supports the city's sustainable development goals and **provides Lisbon with an alternate option regarding water supply and savings**. The project contributes towards Lisbon's **commitment to the Europe 2020 Strategy** in terms of efficiency in the use of natural resources and is also a significant step in the city's commitment towards the **Urban Water Agenda 2030 (UWA2030)**.

Despite there being no existing Portuguese legislation regarding waste water reuse, **Lisbon wants to increase the level of waste water reuse in the city**. Increasing the levels of the waste water reuse will **contribute to Lisbon's sustainability and resource efficiency goals** including:

Sustainability	Implementation of a sustainable urban water management system supported by smart and resilient infrastructure for the urban water system.
Efficiency	Closing the urban water cycle in order to increase the water efficiency of the city. Developing a circular economy in the water sector.
Targets	Achieving a target of 50% of water reuse by 2020 in line with the city's commitment to the UWA2030.
Security	Developing an alternate water supply to provide water security for future generations.

One of the key objectives in the project is the reuse of treated waste water for green area irrigation with the installation of a complete recycled water infrastructure from the WWTPs to two important green areas; **Parque das Nações** and **Alcântara Valley**.

Cities at a Glance

Statistics sourced from EGCA 2019 Applications.

Lisbon

- **Gross Domestic Product:** €22,800/capita
- **Population:** 547,733
- **% Blue Areas in Overall City:** 14.2%
- **Koppen Climate Classification:** Csa (Mediterran Climate)
- **Water - % Connected:** 100%
- **Water - Total Usage:** 169 litres/capita per day

Ghent

- **Gross Domestic Product:** €41,223/capita
- **Population:** 256,235
- **% Blue Areas in Overall City:** 7.82%
- **Koppen Climate Classification:** Cfb (Marine West Coast Climate)
- **Water - % Connected:** 89.47%
- **Water - Total Usage:** 151 litres/capita per day

Want to know more?

For further information on **Lisbon and Ghent's projects** please see:

- Lisbon Urban Water Agenda 2030
- Oude Dokken - New Life in the Old Docks

Find out more about the **European Green Capital Award**, and its sister competition, the **European Green Leaf Award** on our website:

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Methodology

Lisbon has invested in **Green and Blue infrastructures** to address water management in the city. Plans have been developed and applied to the **two largest water consumption activities, city garden irrigation and street cleaning, which represent 75% of the municipal water consumption in the city**. This included development of **green infrastructure irrigation and design solutions for the reuse of water from the WWTPs** to achieve their commitment towards the UWA2030 targets. With regard to street cleaning, the city also has established regulatory municipal procedures and agreements with the WWTPs to provide **treated waste water for reuse to the municipal cleaning fleet**.

Water Saving Benefits

- The reuse and recycling of water is important to the circular economy and has great potential for addressing current and future challenges of water scarcity. Cities can benefit from the opportunities provided by water efficiency and the application of the circular economy concept to water including the reuse of urban waste water.

Economic Benefits

- The table below (Figure 1) demonstrates the breakdown of Lisbon's water consumption in 2014. This identifies that 75% of the city's water use is on city garden and park irrigation and street cleaning, which represents a substantial cost of €7 million each year. The water reuse initiative is projected to generate savings of up to €3.5 million by 2020.

Social and Environmental Benefits

- The project promotes efficient management of natural resources. By reducing potable water production and consumption the city can ensure water security for the future.

Challenges

Although there is no regulatory obligation to do so, Lisbon has taken on the challenge of **increasing its reuse of waste water**. In 2017, the city launched its **irrigation plan of public green spaces** with large water consumption, working in conjunction with the Portuguese Environment Agency and the National Health Authority.

Distribution	Consumption ($10^3 m^3$)	%
Gardens	4,400	54
Street Cleaning	1,700	21
Fountains & Drinking Fountains	500	6
Fire Fighters	300	4
Schools	200	2
Swimming Pools	200	2
Administrative Services	100	1
Sports Venues & Entertainment	100	1
Others	700	9
Total	8,200	100

Figure 1: Breakdown of Lisbons Municipality Water Consumption (2014).
Source: City of Lisbon, 2017.

Another challenge is **ensuring that there is adequate awareness of plans and projects for the management of water** among citizens. To address this, **the city has developed innovative awareness-raising campaigns**, such as free visits to the WWTPs, creative school presentations and visits to the Lisbon Museum of Water.

As part of the project **the city will provide an educational programme** that will be promoted by The Lisbon Energy and Environmental Agency. This **will include presentations by experts on different themes**, including waste water treatment and waste water reuse in public spaces in order to **engage with citizens**.

Future Planning

Success of the project can be assessed through measurement of the annual waste water consumption and through the preparation of an Annual Economical Assessment Report to evaluate the savings rate. Further development of the project will include **enhancement of the water reuse infrastructure by promoting innovative and sustainable Green & Blue Infrastructure** solutions in Lisbon like **Eco-roofs and Eco-streets**.

Lisbon is also participating in the **UWA2030 core group**, where cities will get a unique opportunity to have a say and contribute to the strategic development of the UWA2030. By participating, **cities can share their commitment to sustainable urban water management** and their readiness to apply innovative solutions to today's pressing challenges on water resources, systems and services.

Source: City of Lisbon, 2017.

Parque das Nações Project

This project aims to replace underground water use with the use of recycled treated water produced by the WWTP Beirolas.

Phase 1 is intended to replace the water use in the North area with 284,784 m², representing 330,000 m³/year water consumption.

In phase 2 the replacement should extend to the South covering the whole area.

Source: City of Lisbon, 2017.

Alcântara Valley Project

The aim of the Vale de Alcântara Green Corridor project, with an investment of €5 million, will be to restore an area of 13 hectares.

The project will improve design solutions for rainwater, drainage and for the reuse of water from the Alcântara WWTP.

One network of recycled water has already been built while two others are projected and budgeted for to the amount of €1.8 million. The target in terms of water reuse is 3.1 m³/capita/year.

Figure 2: Vale de Alcântara - Green Corridor. *Source: City of Lisbon, 2017.*

Learnings and Recommendations

If cities are to address water challenges they will need to **take advantage of opportunities for smart and sustainable urban water management**. These opportunities should support urban development and have economic and environmental benefits whilst ultimately improving the quality of life of citizens.

Cities will need to take action in line with the UWA2030 to **address the urgent need to accelerate the development and uptake of innovative approaches, technology and governance with regard to the water sector in Europe**. Sustainable and efficient water management will **make cities more resilient to the future risks associated with water such as water scarcity, flooding and pollution**.

Action is especially important in **Southern European Cities**, it is very **important to develop climate adapted and dedicated solutions to provide a high resilience to urban water scarcity**. By managing urban water effectively cities can take a leading role in improving the overall status of European waters, the key objective of EU water policy.

Ghent Old Docklands Project

In Ghent, development of the former Old Docklands area, **Oude Dokken**, is taking place. The development of this new district will include 1,500 new homes. In the first phase, 350 homes are being developed, as well as a primary school, crèche and sports hall. The main focus of this project is **sustainable urban development**.

The development will be fully **climate-neutral** by **focusing on energy efficiency and renewable energy, sustainable mobility, quality of life and green spaces**. A key part of these sustainable development plans for this project is the **sustainable management of waste water**.

An innovative approach has been introduced known as the **ZAWENT system (Zero Waste Water with Energy and Nutrient Recovery)**, this sustainable energy system supplies one third of the heat for the development and allows for the purification and reuse of waste water.

This ZAWENT technology is a new and sustainable system which harvests renewable energy from waste water and organic food waste and combines different existing technologies.

Figure 3: The ZAWENT System Process Overview. *Source: City of Ghent, 2017.*

This **innovative combination** involves waste water from vacuum toilets being collected separately along with organic waste, which is then converted into **biogas** through the process of **Anaerobic Digestion**. This results in **biogas for heat and power**. The residual product from this process, **struvite**, can be used as fertilizer grains for green areas in the development.

The remaining two thirds of heat supply for the development will come from the **residual heat generated by a nearby soap factory** and transported through a heat network.

The ZAWENT system not only uses recovered heat, but also purifies and recycles waste water which is in turn used by the nearby soap company, resulting in a **closed loop system**.

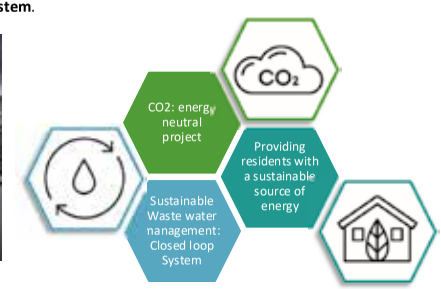

Figure 4: Planned Development at Oude Dokken, Ghent.
Source: City of Ghent, 2017.

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