



## *Good practices for Environment and Sustainability*



*Air Quality*

*Waste Management*

*Energy efficiency*

from  
**Regional Representation of Sarajevo**  
to the European Union



Dear readers,

Recent climate change in Europe has had wide-ranging impacts on ecosystems, water resources and human health. Unfortunately, its effects are already felt throughout the world. Kanton Sarajevo, as well, is not spared from its dreadful impacts. In fact, Sarajevo is exposed to high levels of air pollution, thus causing disease, damage to other living organisms and even death to humans.

The purpose of this brochure is therefore to provide an accurate account of the environmental issues and challenges Kanton Sarajevo is facing. Furthermore, it also aims at presenting the best practices regarding the environmental protection other European countries have been developing.

Consequently, it will feature numerous concrete measures adopted for the improvement of air quality, waste management and energy management in smart cities and domestic heating efficiency all over Europe. Moreover, this brochure is also covering specific challenges the western Balkans have to address in the field of the European Energy and how the LIFE programme contributes to improve the air quality in the European Union.

It is time for action!



Dino Elezovic,  
Head of the Kanton Sarajevo Representation Office in Brussels.



# Air Quality

## Introduction

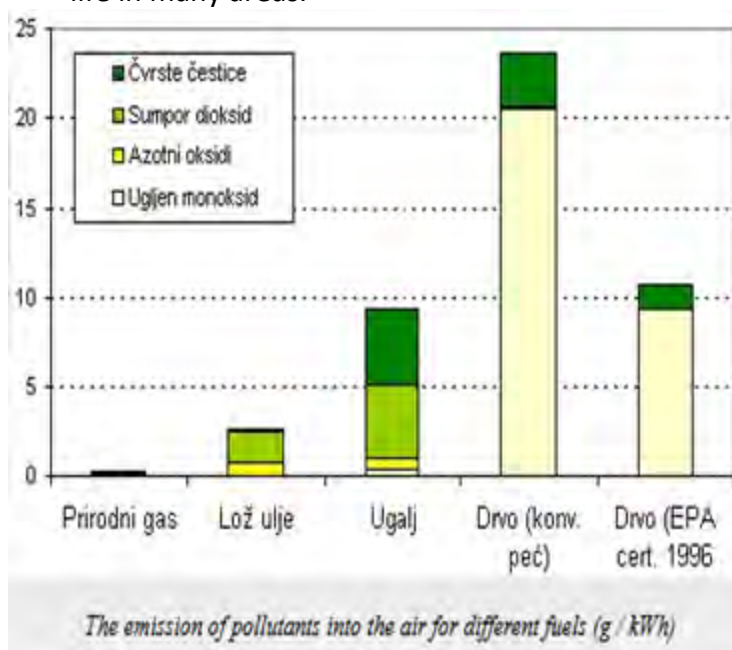
Sarajevo, located in a long and narrow valley which hampers air flow, during the winter has a unique meteorological situation where temperature inversion exacerbates air quality. According to the World Health Organization (WHO), **Sarajevo has the highest concentration air pollution out of all European cities.** In January 2012, for example, the air quality has achieved dramatic levels: **PM** concentration was **500 $\mu\text{g}/\text{m}^3$**  whereas the **WHO guideline number is 50 $\mu\text{g}/\text{m}^3$**  and the sulphur dioxide (**SO<sub>2</sub>**) concentration was **130 $\mu\text{g}/\text{m}^3$**  against the **guideline number of 20 $\mu\text{g}/\text{m}^3$ .**

**The urge to resolve this problem is growing in the citizens.**

## Air Pollution

Air pollution is the contamination of the air by harmful gases and PM of solid and liquid matter in concentrations that endanger health and the environment. Indeed, acid rain is precipitation containing harmful amounts of nitric and sulphuric acids. However, air pollution is a significant risk factor for multiple health conditions including respiratory infections, heart disease, and lung cancer, according to the WHO. Some people might not notice any effects to air pollution, but these pollutants can irritate eyes, throat and lungs. Indeed, when a weather condition known as a temperature inversion prevents dispersal of smog, citizens of the area, especially children and the elderly and chronically ill, are warned to stay indoors and avoid physical stress. In addition, some air pollutants are also climate forcers such as (CO<sub>2</sub> and CH<sub>4</sub>), having a potential impact on the earth's climate and global warming in the short term (decades).

The principal source of air pollution is the combustion of fossil fuels. Normally, the major sources of air pollution are industrial processes, transportation and the incineration of solid waste. Oil, coal, and gas for examples, are burned on a wide scale, releasing pollutants into the air such as carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), particulate matter (PM<sub>10</sub>), volatile organic compounds (VOCs), ozone (O<sub>3</sub>), sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>), which still affect people's quality and length of life in many areas.



Most of the nitrogen dioxide in cities comes from motor vehicle exhaust (about 80%). Pollutants can be classified as primary or secondary. Primary pollutants are substances that are directly emitted into the atmosphere from sources.

The main primary pollutants known to cause harm in high enough concentrations are the following:

- Carbon compounds, for example CO, CO<sub>2</sub>, CH<sub>4</sub>
- Nitrogen compounds, such as NO, N<sub>2</sub>O, and NH<sub>3</sub>
- Sulphur compounds: H<sub>2</sub>S and SO<sub>2</sub>
- Halogen compounds, such as fluorides, chlorides and bromide

➤ Particulate Matter (**PM** or “aerosols”) which is generally categorized into these groups based on the diameter of the particles:

1. Particles less than 100 microns are also called “inhalable”
2. Particles less than 10 microns (**PM<sub>10</sub>**, categorized “fine”).  
These particles are also defined “**thoracic**” because **they can penetrate deep in the respiratory system**
3. **Particles less than 4 microns**, called “**respirable**” **because they are small enough to pass completely through the respiratory system and enter the bloodstream**
4. Particles less than 2.5 microns (**PM<sub>2.5</sub>**, labelled “fine”)
5. Particles less than 0.1 microns (**PM<sub>0.1</sub>**, “ultrafine”).

Secondary pollutants are not indirectly formed in the atmosphere from primary pollutants. The main secondary pollutants identified provoke harm are the following:

- NO<sub>2</sub> and formed from NO. The main effect of breathing in raised levels of nitrogen dioxide is the increased likelihood of respiratory problems. Nitrogen dioxide inflames the lining of the lungs, and it can reduce immunity to lung infections. This can cause problems such as wheezing, coughing, colds, flu and bronchitis.
- Ozone (O<sub>3</sub>) formed from photochemical reactions of nitrogen oxides
- Nitric acid (HNO<sub>3</sub>) and sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) droplets are created respectively from NO<sub>2</sub> and SO<sub>2</sub>: **sulphur dioxide** contributes to the incidence of **respiratory diseases**.

## The EU's position

Commissioner for the Environment, Janez Potočnik, has therefore announced 2013 as the "[Year of Air](#)". Potočnik said: "We must resolve the implementation deficit urgently, to pave the way for deeper reductions in air pollution and its impacts on our lives!"

Indeed, to fight pollution in Europe, the European commission has developed a series of framework directives for controlling ambient air pollution and monitoring concentrations. "Daughter" directives have followed that give thresholds, define the reporting requirements, and specify the monitoring

methods and number of observations for SO<sub>2</sub>, NO<sub>2</sub>, particulate matter (PM), lead, and tropospheric ("low-level") ozone (O<sub>3</sub>). Moreover, the EU should develop guidelines for city authorities on how to develop Urban Logistics Plans (ULPs) within Sustainable Urban Mobility Plans (SUMPS), taking into account the local context.

For more information:

- <http://europe.eu.int/comm/environment/air/ambient.htm>
- <http://ec.europa.eu/environment/air/quality/standards.htm>
- [Air quality in Europe — 2012 report](#)

## EUROPE'S GOOD PRACTICE

### → Air quality, Ljubljana, Slovenia

The [Environmental Agency of the Republic of Slovenia](#) has developed three main duties in air quality protection: monitoring of outdoor air quality, collecting emission data and performing administration procedures for air quality protection. Andrej Piltaver, Department for Environmental Protection of Ljubljana, explained that winter smog

used to be the main source of air pollution in Ljubljana, but it has been almost entirely limited with planned measures such as the introduction of district heating that is currently covering >75% of all individual apartments and houses and most of all industrial needs. The results obtained in these years, are shown in the figure (FIG XX).

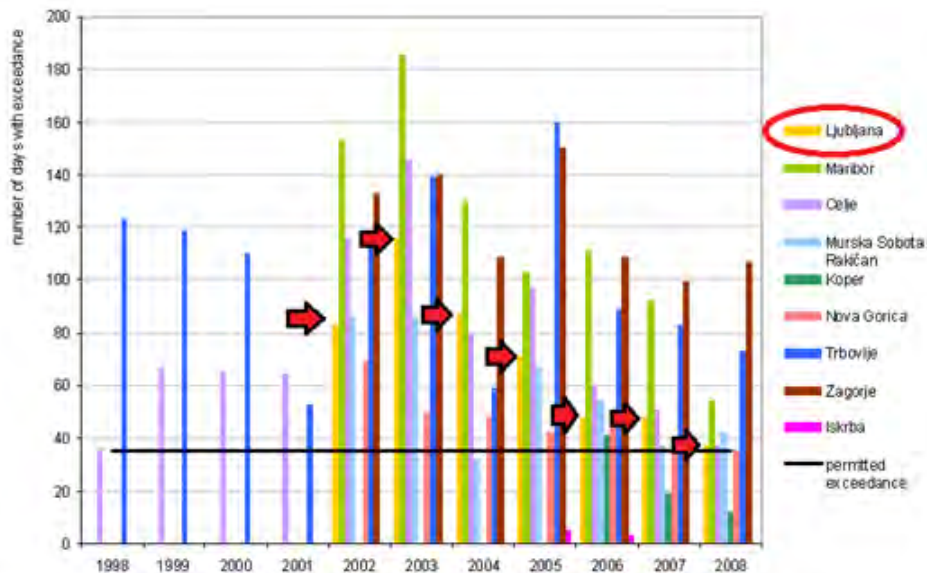


Figure 2: Number of days exceeding limit concentrations of PM<sub>10</sub> – 50 µg/m<sup>3</sup> which may be exceeded at most 35 times in a calendar year

In addition it was promoted the use of natural gas as a heating fuel and improved the import of quality coal because the amount of SO<sub>2</sub> released, depends on the sulphur content in it (normally 0.7% to 2% by weight).

On the other hand, city center has been closed to traffic: the low emission pedestrian zones have been expanded for 550 % since 2007 and covering 80.000 m<sup>2</sup>, comprises over 30 streets and 5 new pedestrian bridges.

A package of measures has been composed to improve public transport, with new Compressed Natural Gas busses (CNG), enlargement of bus lines well further in

Region, development of Park and Road facilities and electronic displays, with predicted bus arrivals on bus stops, that are important elements toward sustainable mobility. Moreover, bicycle zones have been increased in order to increase their safety in traffic and to connecting the cycling network and introducing a web portal for cyclists. The City of Ljubljana has named Janez Bertoncelj as cycling coordinator and the last bicycle path's extension took place during European mobility week 2013.

### → Emissions in Växjö Municipality, Sweden

Växjö is the Greenest City in Europe and all the environmental work has been done, and will be done, by the public and private sector. Fossil Fuel Free Växjö is an excellent example of sustainable development and management: Energy-Efficient Wood-Houses, bio-energy production (power, district heating and cooling), energy efficient dwellings, sewage treatment plant with biogas production, transports and forestry.

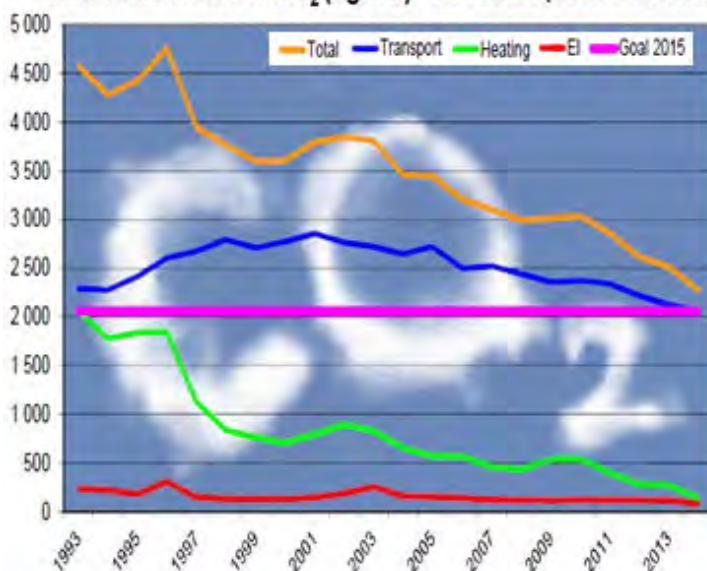
### Clearly, the bicycle is the symbol of Växjö.

The work done by municipalities and the results obtained can be summarised on the right graph (Växjö's Emissions of fossil CO<sub>2</sub>).

The diagram shows clearly the area where most progress has been achieved, that is in the heating sector. Furthermore, Växjö municipality shows that energy autonomy is possible in a 21st century society.

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Emissions of fossil CO<sub>2</sub> (kg/inh) 1993-2009 (2010-14 forecast)



## CONCLUSION

Most European citizens are living in urban areas and hence are exposed to elevated levels of air pollutants. There is a consensus among all levels and stakeholders about the importance of the research and innovation challenges that need to be addressed in the future. Anyway, to ensure safe levels of air quality, tackling emissions is not enough.

It's important to remember that there are many strategies to improve air quality.

As European citizens, we can improve our quality of life if we become more flexible in the

way we travel, for example by combining walking, cycling, public transport, car sharing and car pooling instead of taking the car for short distance trips. Other important solutions should be to replace inefficient heating system, to insulate buildings and to maintain indoor temperature around 19° C because the main source of pollutants in the wintertime is heating.

As a conclusion, it is important to transmit the need for an accurate and deep research with the objective of implementing coherent and integrated policies.



Concerning the development of **Kanton Sarajevo**, the Regional representation to the EU **encourages and promotes the implementation of projects, programs, technology, and innovation in the field of environment** as well as air pollution communication and information with citizens to tackle a problem that each day becomes more troubling in a polluted scenenario. **The Regional representation is at the disposal of any person or entity interested in participate, promote or implement a project in Kanton Sarajevo. From the Regional Representation of Sarajevo Canton we would like to promote these initiatives, we offer collaboration and provide support for any stakeholder interested in those researches, policies, or search for partners.**



# *Waste Management*

## **Introduction**

Waste can be classified by a multitude of schemes: by physical state (solid, liquid, gaseous) and then within solid waste by original use (packaging waste, food waste, etc.); by physical properties (combustible, compostable, recyclable); by material (glass, paper, etc.); by origin (domestic, commercial, agricultural, industrial etc.). Waste production in many Europe countries is still increasing: Europeans generate on average more than 500 kilograms of waste per year, some 300 kilograms of which is food and plant rubbish (according to EU figures). That is the reason why the waste management and prevention, is one of the four top priorities identified by EU's Environment Action Programme. In recent years these important goals have been integrated into European environmental policy, notably the European Commission's Roadmap on a resource efficient Europe (EC, 2011) and the EU's Waste Framework Directive (EU, 2008). But national efforts to shift up the waste hierarchy have been

under way for longer, in large part driven by earlier EU legislation such as the Landfill Directive (EU, 1999). Together, these instruments establish a range of **waste management targets** and wider **goals for the years to 2020** (For more information click [HERE](#)). The European Waste Framework Directive (2008/98/EC) is organised around the recommendations of the Waste Hierarchy. The Waste Hierarchy defines waste prevention as the preferable option, followed by preparation for reuse and then recycling; incineration with high energy recovery, landfilling and incineration without energy recovery are the least desirable options. This Directive introduced a new 50 % recycling target for such waste reducing waste disposal (for example landfilling) and instead focusing on waste prevention, reuse, recycling and recovery. In 2011, 40% of treated municipal waste was recycled or composted, up from 27% in 2001.



## Solid waste management

Solid waste management is the integration of suitable techniques, technologies, and management programs to achieve waste management objectives. The main waste management options available are:

- **Landfill** of untreated waste. Bulk untreated MSW is deposited in landfills.
- **Incineration**. Options assessed include mass-burn incineration of bulk MSW with and without energy recovery (as electricity only and combined heat and power - CHP), refuse-derived fuel combustion and pyrolysis and gasification;
- **Mechanical biological treatment (MBT)**. Bulk MSW, or residual wastes enriched in putrescible materials after the removal of dry recyclables, is subjected to a prolonged composting or digestion process which reduces the biodegradable materials to an inert, stabilised compost residue. The compost, which cannot be used in agriculture or horticulture because of its poor quality, is then landfilled. The treatment results in a significant reduction in methane forming potential of the compost in the landfill compared with untreated waste. Metals are recovered for recycling during the MBT process. Some of the paper and plastics in the incoming waste are diverted from the MBT process. These rejects are sent for either direct landfilling or incineration.
- **Composting**. Good quality garden and food wastes are segregated at source and composted, producing a bulk-reduced stabilised humus residue of compost that is of sufficient quality to be marketed as a soil conditioner or growing medium in agriculture or horticulture. Options of centralised composting facilities and home composting are considered.
- **Anaerobic Digestion (AD)**. Like composting, this option produces a compost residue from source-segregated putrescible wastes for use in

agriculture or horticulture. The waste is digested in sealed vessels under air-less (anaerobic) conditions, during which a methane-rich biogas is produced. The biogas is collected and used as a fuel for electricity generation or CHP.

- **Recycling**. Glass, paper, plastics, metals, electronic equipment, textiles and waste electrical are recovered from the waste stream and reprocessed to make secondary materials. Re-use and recycling of waste are economically attractive options for public and private actors due to widespread separate collection and the development of functional markets for secondary raw materials.

## The EU Situation

The European Union's approach to waste management is based on three principles: waste prevention, recycling and reuse, and improving final disposal and monitoring. Waste prevention can be achieved through cleaner technologies, eco-design, or more eco-efficient production and consumption patterns. Waste prevention and recycling, focused on materials technology, can also reduce the environmental impact of resources that are used through limiting raw materials extraction and transformation during production processes. Where possible, waste that cannot be recycled or reused should be safely incinerated with landfills only used as a last resort. Both these methods need close monitoring because of their potential for causing severe environmental damage. Incineration releases emissions of a variety of pollutants including Particulate Matter (PM), Nitrogen Oxides (NO<sub>x</sub>), Sulphur Dioxide (SO<sub>2</sub>), Hydrochloric Acid (HCl) and Heavy Metals(HM). Toxic pollutants such as dioxins and similar chemicals

are not only highly toxic but also persistent and bioaccumulative. To provide a brief 'snapshot' of how all other EU Member States (Source: Eurostat data 2010) currently handle their waste,

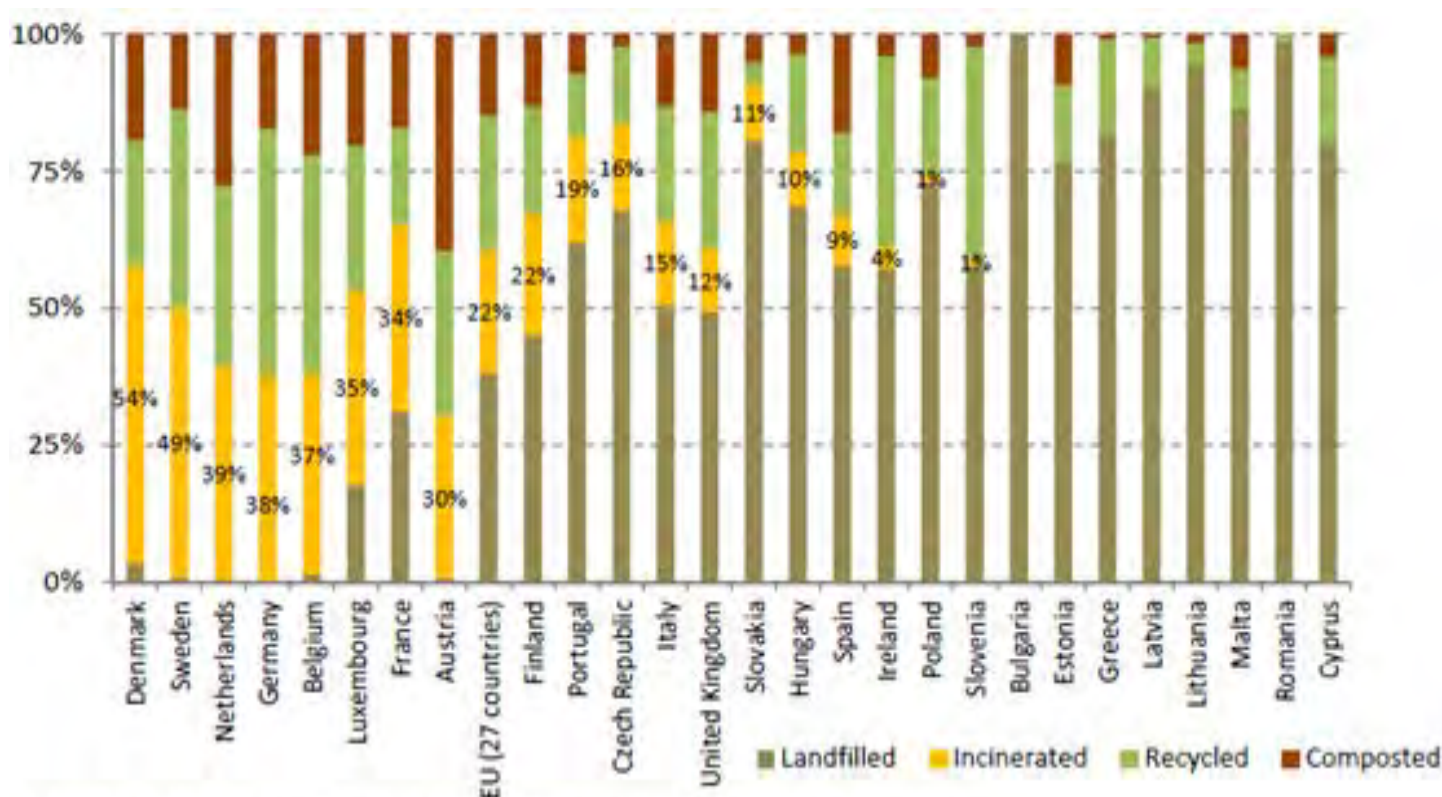
Fig. 1 (below) breaks down MSW management into core categories of recycling, incineration, composting and landfill. For the ten selected countries, the following trends can be identified:

- 1) **High total recovery** (i.e. landfill levels of <25%)- Germany, Netherlands, Sweden;
- 2) **High landfill** (i.e. landfill levels of >50%) - Italy, Spain, Portugal, Poland;

3) **High incineration** (i.e. incineration levels of > 25%)- Denmark (365 kg/inhabitant), Luxemburg, Sweden, Netherlands, Germany, Belgium, France, Austria. However, Germany, France and Italy accounted for 63% of all incinerators and 64% of all waste incinerated.

4) **High recycling** (i.e. recycling levels of >25%) - Sweden, Netherlands, Germany, Belgium, Luxemburg, Austria, Ireland, Slovenia;

5) **High composting** (i.e. composting levels >25%)- Austria.



Graph 2. Waste treatment in the European Union in 2010, by countries.

Concerned about the incineration's problems, in September 2012, the European Commissioner for the Environment, **Janez Potočnik** said: "...There are two major objectives we need to pursue. Obviously, landfill rates must go down as quickly as possible, but it is also important to switch from energy recovery to increased recycling. Plastic recycling rates are far too low across Europe with an average of just 24 per cent. Today, even in countries with high recovery rates, there is simply not enough plastic available for recycling because most of it goes to energy recovery. A dominance of energy recovery over recycling is not acceptable in the medium-term", alerting that member states should be careful with building incineration overcapacity. Is clear that, incineration is not the final solution for the future, only reducing the amount of waste produced, minimising waste and increasing composting and recycling, Europe will achieve a Sustainable Waste Management.

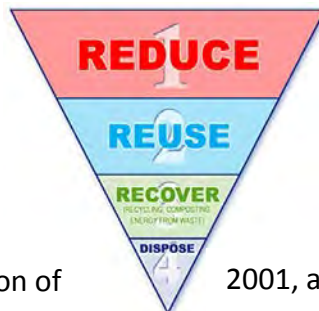
## Is it better to recycle waste or to recover energy from it?

A frequent issue in waste management is whether to recycle or incinerate used products. [Life Cycle Assessment](#) helps address this issue. In this example, plastic bottles are considered, and for simplicity only the energy aspects are taken into account. The production of plastic bottles from raw materials requires about 80 MJ/kg (energy per kilogramme). Incineration can generate about 3 MJ/kg of electricity and about 10 MJ of process steam from the recovered energy. However, despite this small energy gain, new bottles would have to be produced, requiring high amounts of energy. In contrast, recycling and selective collection consumes 9 MJ/kg while also avoiding the much higher energy consumption used in the production of new plastic from raw materials. Unfortunately, plastics are very attractive for burning because they're made with



petroleum and generate more energy when incinerated than almost any other material. However, burning up any type of plastic releases harmful dioxins and dioxin-like compounds into the air which have both been shown to cause cancer. **As a matter of principle, recycling of plastic waste is a better option than energy recovery or landfilling.** Although under a life cycle perspective not all plastic waste may be suitable for recycling, there are no technical reasons why plastic should go to landfill rather than being recycled or exploited for energy recovery. This could be done through a gradual phasing out or a ban on landfilling plastic waste through an amendment to the Landfill Directive 1999/31/EC. Plastic is a major source of [marine pollution globally](#).

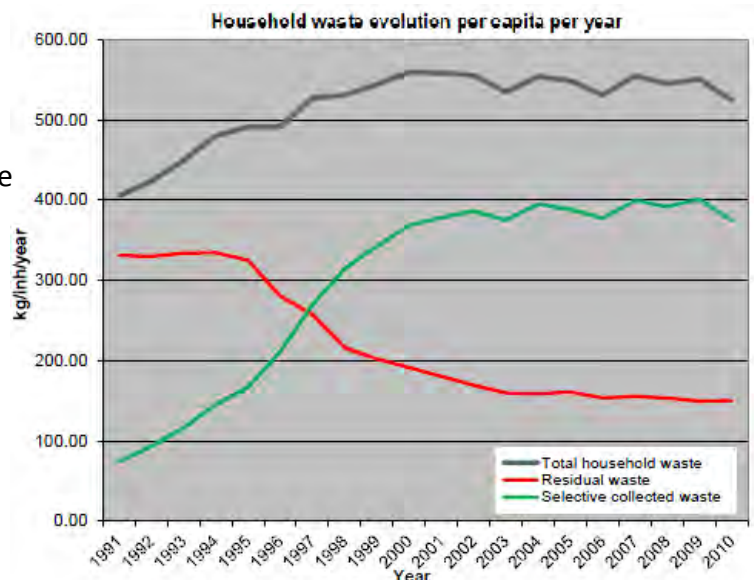
## EUROPE'S BEST PRACTICE:



### → Waste in [Flanders](#), Belgium

In Europe, Flanders (the Flemish region of Belgium), is the leader in waste management achieving some of the highest levels of recycling and composting in Europe. In this region, around 20 million tonnes of (primary) industrial waste are produced and almost one third is construction and demolition waste. Only, 15 % of the industrial waste in Flanders is landfilled or incinerated and the remaining **85 % is recycled**, composted, reused or conditioned for the purpose of further treatment. Specifically for biological waste it is the aim to find a balance between recycling and producing energy: with a priority to recycle biological waste where-ever possible, according to the **Waste Hierarchy**. Flanders possesses more than 20 years' experience in developing a regional approach to waste management. The first plan (1997-2001) imposed a goal to reduce its residual household waste, to 220 kg/person/year by

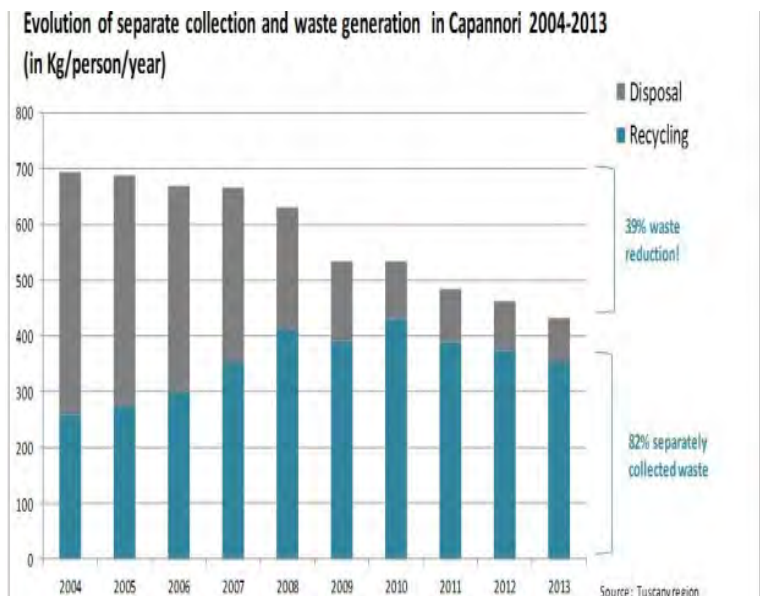
2001, and 150 kg/p./year by 2010, from a starting level of around 330 kg/p./year in the early 1990s. 2001 goal was achieved early, and so the second five year plan (2003-2007) set 2007 as the deadline for reaching the 150 kg/p./year target. The final result is shown in the [graphXX](#).



## → Waste in [Cappannori](#), Tuscan, Italy

The municipality of Cappannori, in Tuscany (Italy), built a successful strategy to reduce its waste and became the first Italian (and EU) municipality to declare a Zero Waste goal for 2020. ([See more](#)). This public action is supported from the municipal budget, as Cappannori has not got any EU, national or regional funds. In five years, waste volumes diminished by 35%. Today, waste sorting represents 82% of the global amount of waste. The most important factor of success was to involve people and retailers. The municipality organised more than a hundred meetings with citizens. At the beginning, some people were reluctant to change their habits: reactions were exacerbated. "We used a "carrot". If you participate in recycling, you get a discount of 10% on your invoice; if you participate in

composting you get another 10%..." commented Giorgio del Ghingaro. Cappannori thus got to have one of the lowest tax rates of the region.



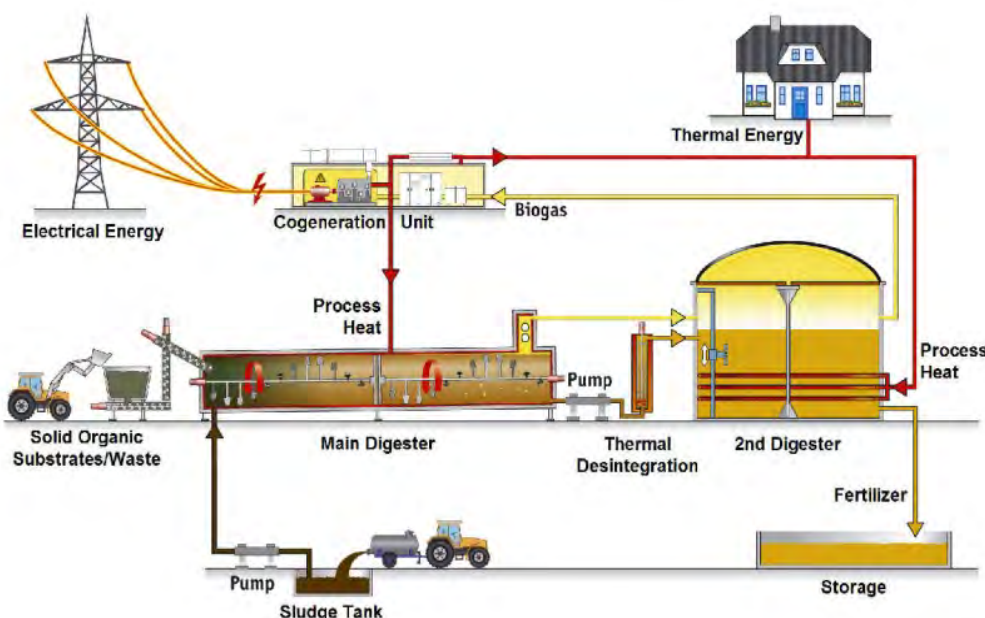
## NEW TECHNOLOGIES FOR WASTE TREATMENT: THE BIOGAS PROCESS

Incineration is itself a highly polluting process and produces toxin harmful to health. Incineration maybe tolerated in areas where there is a good air circulation. Sarajevo is a valley, therefore the poisonous gasses remain trapped in the air and would thus be harmful to the population. In all cases, incineration should always be considered as the **LAST OPINION**. Because, there are other technologies which have been developed recently which are much more effective for the production of energy for organic matter and which do not, under any circumstances, cause harm to human health nor pollute the planet.

The new approach is to use the organic matter to produce **Biogas**.

Biogas is itself a valuable resource which generates capital and the fertilizer which is the other valuable by-product. The two main technologies developed in Europe for the production of biogas from waste organic matter are the "[Aikan](#)" and the "[Kompogas](#)" systems. Both systems take in the organic feedstock and utilize bacteria to 'eat' the easily digestible organic substances and turn them into biogas.

The biogas, which contains methane, is then used as fuel, either in conventional internal combustion engines that power electric generators, or fed through a microgas-turbine. The production of renewable energy from a biogas process can substitute energy derived from fossil fuels, which means no new carbon dioxide into the atmosphere.



## Conclusion

Member States with landfill rates below 5%, such as Germany, the Netherlands, Sweden, Denmark, Belgium, and Austria achieve between 80% and 100% plastic waste recovery, including recycling. All of these countries have enacted measures leading effectively to a diversion of combustible waste from landfills, equivalent to a landfill ban. The majority of less performing Member States apply no such measures and base acceptance of waste in landfills on landfill taxes/fees sometimes as low as only 7€ per tonne. However, some Member States with high recovery rates and landfill bans still have modest plastic recycling rates of around 28% on average. The present ratio between plastic recycling and plastic waste energy recovery could be improved via measures on separate collection, sorting and material recovery.

**A landfill ban generating an automatic preponderance of energy recovery over recycling would not be in line with the waste hierarchy. It may be useful to reflect on how economic instruments could be used to steer the waste flow through the waste hierarchy, avoiding a "vacuum cleaner effect" in favour of waste to energy.**

Nearly 50% on average of all plastic in the EU goes to landfill, most of it packaging. The widespread absence of separate waste collection and the lack of other alternatives in many Member States help explain the high disposal rate of plastic in landfills.

Landfilled plastic contributes nothing to material recovery and energy recovery and is therefore highly resource inefficient.

A study on European waste generation projections to 2035 assessed the introduction of strong policies to extend recycling and found plastic to have the largest potential for reducing the environmental impacts of waste.





## *Innovative tools for energy management in Smart cities*

### Introduction

The use 'smart tools' can help Europe's cities and regions optimise their energy and transport infrastructures. The goal to reduce greenhouse gas emissions more than 80 per cent below by 2050 is very challenging and ambitious. In order to reach these objectives major changes in energy and transport systems are required. **The decarbonisation of energy production and the shift for a more sustainable use of transport need to be supported by advanced information and communication technologies.** The trends towards urbanisation in Europe continue at high rates and this fact requires a high consumption of energy by the population living in urban areas. These risks of increasing traffic congestion and pollution are very high, therefore there is a clear need to tackle them and avoid the loss of competitiveness, decrease of life quality, and dysfunctionality of cities. There are a number of technologies that have the potential to be used as part of smart solutions, delivering resource-

efficient energy and transport management. If these "smart tools" were widespread across Europe, cities could optimise their energy infrastructures and make their traffic management systems more efficient.

### EU Sustainable Energy Week 2013

During the sustainable week held in Brussels last July the innovative tools and pilot projects that are carried out along Europe played an important role in the discussions among professionals, policy makers, and decision makers. ETRA a company that currently is managing few European projects in the field of energy management for smart cities presented its projects and best practices, a way to promote pilot projects, explain the possibilities, and impulse the use of smart tools.

The projects presented are considered good examples of the opportunities that this technology can offer to our Region and therefore can inspire the creation of innovative tools in Sarajevo Canton in order to serve to the community and the common interest.

### **Smartkye**

Smartkye is a smart grid neighbourhood cockpit. The project is a consortium of different stakeholders to create an open service platform that conveys decision support system for municipalities. The strategic goal of the project is to develop a system for the future smart grid neighbourhood that will enable better business decisions to be made based on real-time fine-grained data.

The challenge for the future Smart Cities is to rely upon their districts to be monitored and managed efficiently in the smart grid era. Due to the fact that districts might have significantly differ from each other and follow their own goals and also the energy infrastructure is expected to be highly heterogeneous, thus there is a need for tools to enable the monitoring of Key Performance Indicators at district-wide level and to assess the behaviour of the Energy Infrastructure deployed. For this purpose Key end-users targeted are the public authorities who can monitor and manage key indicators in neighbourhoods for better energy efficiency and CO<sub>2</sub> reduction. The Smartkye project expects to deliver common service oriented architecture, information models and interfaces; integrating different energy management systems. There are 2 scenarios where these advances can be observed. For instance SmartKYE will run its main demonstrator in the 22 Barcelona district, following up the developments in previous projects addressing energy efficiency; including public lighting, media-TIC building, electric vehicles charging points and urban wind mills.

The projects presented are considered good examples of the opportunities that this technology can offer to our Region and therefore can inspire the creation of innovative tools in Sarajevo Canton in order to serve to the community and the common interest.

The other site for demonstration is Crete focused in the area of Lasithi, which is the eastern part of the island, it involves electric infrastructure in 2 public buildings, 3 private buildings, 5 wind farms.

After demonstrations conclude the consortium will evaluate the amount of energy and CO<sub>2</sub> emissions saved, this amount is expected to be around 25%. This requires an evaluation methodology based in 2 two categories, in one hand energy efficiency measurement on the other hand energy impact as social awareness, user behavior, etc.

### **BEAMS project**

BEAMS project address the commitment of European leaders to reduce primary energy consumption by 20% compared to projections for 2020. Energy efficiency is the most cost-effective way of achieving such goal. Beams project tries to provide subsystems in buildings and spaces of public use consuming or producing energy. There are some challenges regarding public building and spaces, for instance it is not possible to implement a common integrated energy efficiency strategy or to interface with external actors (ESCOs, TSO, DSO, Utilities, etc). The purpose is to develop an advanced (i.e. smart, with learning capabilities), integrated (i.e. including or interoperating with the main ICT based legacy subsystems) management system which enables energy efficiency in buildings and special infrastructures from a holistic perspective.



The solution proposed will not only support the human operator of the building or facility to achieve higher efficiency in the use of energy, but it will also open new opportunities to third parties -such as Energy Service Companies (ESCO), utilities and grid operators– needing and willing to interact with BEAMS management system through the interoperability gateway in order to improve the quality and efficiency of the service –both inside and outside the perimeter of the facility.

The project is implemented through an open software platform for energy management which links the customer's loads and generators to the control stations of the power supply system. By providing a manufacturer and hardware-independent platform, the software allows energy flows within end customer premises to be optimized with high degree of modularity. Web based user interaction and other basic functions are provided by framework architecture. This open gateway proposed by BEAMS will provide also a more accurate tool to respond to emergency situations without actually interrupting the service.

#### The **SEEMPubS** and **DIMMER** projects

SEEMPubS addresses energy and CO2 footprint reduction in existing public buildings and spaces without significant constructions works, by an intelligent ICT-based service monitoring and managing energy consumption. The concept of SEEMPubS is an integrated electronic system and interoperable web-based software solution for real-time energy performance monitoring and control of lighting, heating, ventilation and air conditioning services through wireless sensor networks in existing buildings and open public spaces. This significantly increases people's awareness for energy efficiency in public spaces basing on the management philosophy of the integrated facility. The system provides

multidimensional visualization of parameters of building operations and data sharing from energy-consuming equipment and appliances.

In the case of DIMMER project, a web-service oriented open platform with capabilities of real-time district level data processing and visualization will be developed. Thanks to the web-service interface, applications may be developed exploiting such an interface to monitor and control energy consumption and production from renewable sources. The Dimmer project will develop real-time data collection, advanced middleware technology for data integration, simulation and virtual visualization, user/social profiling, visualization and feedback, energy efficiency and cost analysis engine, and web interface and interaction.

#### The EU-funded **MOLECULES** project

MOLECULES is part of a cluster of four pilot actions funded under the FP7 Programme. The pilots will test urban and inter-urban ICT-based services that facilitate and enhance the user experience of electrical vehicles. The objectives of these pilots are: to achieve a smooth integration of the EV (electric vehicle) in the overall mobility system; to optimise the energy used/emissions generated by passenger transported; to attain operational new business models for the deployment of EV; to promote ITS contribution to the long term sustainable success of EVs.

The pilot in Barcelona is "Motit" electric motorbike sharing. It consists of a service deployment of electric motorbikes in which it is possible to pick up the bike anywhere in the street and return it to any destination. Phase I deploys 50 electric motorbikes and the phase II expected for 2014 will add motorbikes up to 500. The rental of these electric motorbikes is managed through online reservation. This system is expected to be successful especially

among visitors and tourists therefore the motorbikes integrate navigation system which facilitates the activities of these groups. In Berlin MOLECULES will integrate car sharing schemes within the traditional transport solution to enhance the users experience with electric vehicles and to foster multi-modal mobility options. DriveNow project is a flexible car sharing in which cars can be booked just 15 minutes before their use, it also enables to use them spontaneously without any reservation if cars are available.

Finally Grand Paris is developing the pilot "MOPeasy" which includes a car-sharing brand "monautopartage.fr". This car sharing service should be understood as complementary to public transport. Within the pilot project MOPeasy together with Sodetrel have launched an integrated electric car-sharing scheme for companies in Neuilly-sur-Seine. In addition to those initiatives new stations were launched at Disney RER a (RATP) and TGV (SNCF). This pilot is expected to provide an efficient and sustainable alternative for transport in urban areas as Grand Paris.

## Conclusion

The EU launched in 2011 the Initiative was. During the first year (2012) € 81 Million has been allocated to finance projects on the transport and energy sectors. From 2013 the budget has been increased to € 365 Million to covering the sectors aforementioned and adding ICT sector. In addition the demonstrations projects financed under the scheme must combine the 3 sectors in order to achieve synergies. With this Smart Cities Partnership, the EU try to establish partnership between different industries and European cities to develop systems for the energy efficient cities of tomorrow.

By autumn 2013, the European innovation partnership will identify specific challenges, define concrete priorities and set out the

necessary actions for the widespread deployment of smart city concepts. The demonstrations and pilot projects for the smart cities must be integrated and large scale projects. These projects can be co-funded through a number of channels, for instance horizon 2020, structural funds or the Smart Cities and Communities initiative

The smart cities offer great opportunities for the industry to deliver what cities and regions need. The most efficient and cost-effective way to speed up the mass take-up of innovative technologies is when energy, transport and ICT companies work together. Smart and innovative cities can make the best use of Europe's great capacity for research and innovation to improve the urban environment.



### FOR MORE INFORMATION:

⇒ [The EU Framework Programme for Research and Innovation](#)

⇒ [DG Energy web page on Smart Cities](#)

⇒ [DG Transport and mobility web page on Urban Mobility](#)

⇒ [DG CONNECT web page on Smart Cities](#)



# Domestic Heating

Around 70 percent of energy is used for heating therefore the role of the building sector is crucial for the 2020 strategy of the EU, but also beyond that strategy, within the Low – carbon economy roadmap 2050 emissions could be reduced by 90 % in this sector. Therefore there is significant EU legislation in this regard as the Energy Efficiency Directive which delivers a concrete energy efficiency target, 1474 Mtoe (Megatons of oil equivalent). Also important is Energy Performance of Buildings Directive which includes systems requirements like heaters and water heaters, insulation, or windows. Apart from energy, a key for the future will be indoor air quality in the context of a move towards more airtight buildings (role of mechanical ventilation). On the way towards 2020 there are several legislative works on-going, the Energy Efficiency Directive Commission reports on progress for June 2014, the Review of Energy Labelling Directive and certain parts of Ecodesign also for next year and the Energy Performance of Buildings Directive – review expected for 2017.

Emissions from small scale space and water heating, in particular related to oil, coal and biomass, are an important source of particulate matter (PM) in Europe. It is also an important source of greenhouse gases (GHG) emissions. The reduction of emissions from those installations is crucial because they often have a very long lifetime. There are a number of options, to replace the direct use of fossil fuels, which mitigate the emissions from small scale residential heating. They include electricity, natural gas and advanced solutions for bioenergy stoves and boilers.

Electricity is one of the options to tackle Air pollution, “for instance in the case of Ireland except in urban knots due to the traffic, electricity is working efficiently in the rest” in words of Owen Wilson, Chief Executive of the Electricity Association of Ireland. The penetration of renewables is high and this helps to advance in very challenging future. The consumption of solid fuels and oil has decreased while Gas and electricity have increased considerably specially natural gas.

Following with the case of Ireland Electricity presents some advantages, for instance the contribution of Wind energy has reached peaks of 50%, and there are charge points for electric vehicles in 90% of urban areas and every 60 km inter urban. A key issue for electricity in the short future will be the store of energy in which there are several advances ongoing.

“Air quality has improved enormously thanks to home heating switching to natural gas in 40 Years since 1970” Simon Blakey from EUROGAS explained during the conference about air quality and domestic heating. He presented confidently, that today it is possible to make a realistic assessment of the potential based on known technologies, and that natural gas will continue to improve in next 40 Years thanks to higher energy efficiency from better heating appliances - driven by climate agenda more than local air quality issues.

There are mainly 3 routes of improving air quality through domestic heating: switch to less pollutants fuels, highly efficient heating tech, and more efficient equipment and hybrid tech. In the case of Natural gas there is a large potential due to the fact that some countries have a small percentage of homes that use this type of gas heated boilers. The drivers of change regarding natural gas are: renovation of buildings which allows saving energy; the behaviour maintaining temperature around 19° C; the implementation of New Equipment much more efficient; and fuel switching.

Biomass as a renewable energy source can be used directly via combustion to produce heat, this is clear option and it has already been studied as an alternative for fossil fuels. However, Richard Ballaman, Head of Air Quality Management Section, Federal Office for the Environment (FOEN) in

Switzerland mentioned that biomass open fires restricted because they release high emissions without energy use. He continued explaining the needs for an efficient Biomass domestic heating system which they must achieve good operation and ignition practice, for instance wood Stoves design should be developed to avoid improper operation like overfilling or reducing the air inlet, resulting in smoldering conditions. It is important to remark that for residential wood combustion, strictly native and well dried wood is applicable which is crucial for existing wood stoves and boilers.

The Regional Representation of Sarajevo Canton understands the need of alternatives to fossil fuels in the Region and enhances the need to switch to new systems for domestic heating. Thus it will be a decrease in pollution and an increase in health conditions for our citizens. The Regional representation encourages any project in this field and supports any initiative that improves domestic heating efficiency in the Sarajevo Canton.



# The Future

NEXT EXIT



## Challenges for the western Balkans in the EU Energy field

The western Balkan countries have now realised that they have responsibilities towards each other and that they have many challenges in common. A clear challenge is to shape a sustainable Energy future, the stakeholders of the Western Balkan Region need to cooperate with each other and with neighbouring countries in order to tackle the key energy and evident environmental challenges and profit the considerable benefits of increasingly close regional cooperation. The local authorities must play an important role in this regard, not just in the Balkan region but in the whole Europe. The decisions taken today will influence the coming decades, not only in the environmental and energy fields but it will affect the entire society. Within the sustainable week energy in Brussels, the SEEFED organized a conference about the challenges for the western Balkan countries in the EU energy field. The discussion counted on the participation of several representatives of the Balkan countries at different levels the

president of SEEFED Zoran Milinkovic, Brian Meany from the committee of the regions, Malija Milosevic liaison officer central Serbia region; Iris Jakupic head of office Croatia regions; and Pascal Appere international director COVED. During the conference was mentioned that there is a need to progress significantly on forming a regional energy market and rebuilding infrastructure. The projected South-Eastern Europe regional energy market, which should provide modern and liberalized gas and electricity systems, will be a determined step to a regional energy market based on European standards, transparent rules and mutual trust, and it will set the right environment for the optimal development of the energy sector. These steps will substantially contribute to attracting investment into this strategic sector. More specifically Mr Milinkovic focus on energy policies and the necessity of harmonization, he also gave importance in the sector to the geostrategic gas pipelines planned to build through the region from Russia to

to Europe, he focused in the need of security in terms of energy and also stressed the importance of diversification of the energy resources. Currently are based on coal and electricity, but with the construction of the pipelines the increase of natural gas would potentially be as high as 80%, this together with efforts in renewables could lead to a more integrated market . The investment needed for these infrastructures, he pointed out, could be finance by the consumer in the tax bill due to the low prices of energy in the region, a very controversial issue that should be longer studied.

The Head of the Croatian regions mentioned the last achievements of Croatia in the last years of integration to the EU and shared with the attendants some of the best practices they have carried out in the country, for instance. Ms Jakupic was accompanied for a director of one of the regional agencies of energy who explained some of the projects they have accomplished. He showed their willingness to cooperate with other western Balkans in the energy field and the possibility to carry out projects together.

Ireland has developed a transition along the years to achieve 2020 objectives and more sustainable energy field for the future. It is a good example of an integrated regional strategy, consistent with the European standards; he marked as a high priority the decarbonisation targets and alerted of the many difficulties appeared on the way. For instance the difficulties to include create self-awareness among citizens and how get on board trustable people within the communities or finally interconnection of grids as fundamental for desired achievements. For the purpose of reach an efficient management of energy and therefore tackle environmental challenges, a high degree of

technology is required, an example of this technology is the possibility to produce energy from the waste deposited in the landfills of the region. Pascal Appare offered the opportunity to implement this technology in the Balkan region as a step towards a more efficient and green Energy policy.

The EU also supports projects of regional significance and regional initiatives in the areas of environmental protection, science and technology, information and communication technology, and statistics.



## The contribution of the LIFE programme to air quality in the EU

The LIFE programme is the European Union's funding instrument for the environment. LIFE programme has as objective to contribute to the implementation, updating and development of EU environmental policy and legislation. LIFE uses co-finance method for pilot or demonstration projects on a wide range of areas with European added value. The programme started in 1992, during this time has been 3 different phases and it is a important tool to present solutions for the environmental issues and its protection.

Along the green week the LIFE programme and the projects financed through appeared several times, especially important was the discussion about the contribution of LIFE to Air quality in Europe, the current achievements and future prospects. The session focused on air quality projects within the LIFE programme. Moderated by Alexis Tsalas of the LIFE – Environment & Eco-innovation Unit, and with Dr Georgia Valaoras, Regional Coordinator for

South- East Europe among the participants, the speakers presented the findings and highlights of a 2012 study commissioned by the European Commission *"The contribution of LIFE projects to the implementation and development of EU air quality policy and legislation"*.

In view of the results of the study, it is possible to conclude that the majority of observed LIFE projects have the capacity to make a meaningful contribution in the development of environmental related policies and legislation. It explains that the Thematic Unit's working groups should follow the latest innovations, implemented through LIFE projects; this would help to develop a more sophisticated and up-to-date policy measures that would correspond to the actual 'state of technology' and promote the introduction of effective noise mitigation measures. The study is also a bulk of LIFE projects that tends to correspond to the crucial necessities of particular region, industry or sector.

Some projects focus on regional issues, the beneficiaries, which are almost always public bodies, draw the attention to the situation in particular areas and provide means and ways to improve.

The study found that the main focus was on preventing pollution from industrial activities, which accounted for 28.57% of all projects. For instance one of the reasons for the progressively decreasing number of projects addressing end-of-pipe emissions is the fact that it is more efficient and cheaper to prevent pollution in the first place.

Local intervention was focused on an integrated example with emphasis on how these projects bring about a multiplier effect to enable local and global problems to be addressed in a more comprehensive and effective way. For instance the operation ASTRALE, responsible for the monitoring of and LIFE+ projects (LIFE Action grants) within and outside the European Union also participated in the initiative. ASTRALE deals as well as with the involvement of NGOs that received funding from the LIFE programme, more specifically Astrale GEIE is eligible for LIFE Operational Grants.

These funds have the purpose of easing implementation, favouring further improvement, facilitating dissemination, and raising public awareness. They serve to a wide range of fields in a multidimensional way from waste management or industrial plants to reduction of pollutants through vehicles. LIFE projects can also help to implement legislation; the feedback of the beneficiaries can provide solutions and suggest instruments or best possible techniques.

The European Commission has recently approved funding for 248 new projects under the LIFE+ programme, the European Union's environment fund. The projects have been submitted by beneficiaries in 26 Member States and cover actions in the fields of nature conservation, climate change, environmental policy and information and communication on environmental issues across all 28 Member States. The investment they represent is €556.4 million, of which the EU will provide €281.4 million.

Environment Commissioner Janez Potočnik said: "The LIFE+ programme continues to provide vital financial support for innovative and replicable environmental and nature conservation projects with significant added value for the EU. These new projects will make a significant contribution to protecting, conserving and enhancing Europe's natural capital and to improving the environment. And through practical actions and concrete examples, they will also support the goal of turning the EU into a resource efficient, greener and more competitive low-carbon economy."