MINIMISATION OF CARBON FOOTPRINT IN MUNICIPAL SOLID WASTE MANAGEMENT

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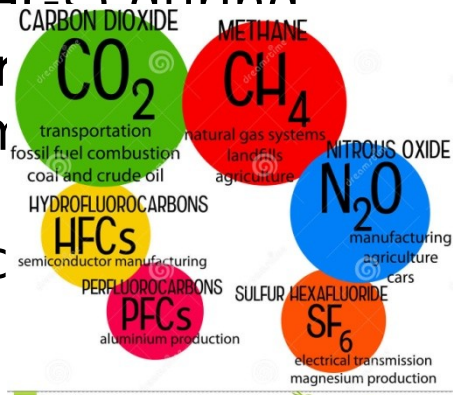
Introduction

The increase of **greenhouse gas emissions** (GHGs) during the last several decades, has led to **climate char** worldwide, causing serious ecological and econon



Waste management is one of the sectors that c to this effect. Emissions are generated during:

- **waste collection** (truck emissions) and,
- **waste treatment / disposal**.

However, proper waste management **offers the opportunity to minimize emissions**, when treated waste is recovered - either through **material recovery** (reuse, recycling, composting etc.), or as **energy recovery** (electricity and/or heat produced out of biogas etc.).

Material and energy recovery, when they occur, may result in an **environmental benefit** accounted for as avoided emissions.

EU Targets

For **2020** the EU has set itself binding climate and energy goals designed to:

- **cut EU GHG emissions to at least 20% below 1990 levels**
- increase to 20% the share of EU energy consumption coming from renewable sources
- improve energy efficiency to reduce the amount of primary energy used by 20% compared with projected levels.

EU leaders agreed in October 2014 on new climate and energy targets for **2030**. They include:

- **40% cuts (at least) in greenhouse emissions compared to 1990 levels**
- 27% - minimum share of renewable energy
- 27% - minimum improvement in energy efficiency.

In the longer term, much deeper cuts in world emissions will

Targets

However, it is not enough only to have regulations made by EU or governments.

Rather it is necessary that all stakeholders have an understanding about the impacts of GHGs and **when/how these emissions are produced** and can be reduced.

Follow the rule that only measurable is manageable.

Agreements and initiatives

In the above framework, important agreements and initiatives (e.g. Covenant of Mayors, etc.) are being implemented to measure & reduce GHG in an effort to mitigate the serious anticipated impacts of climate change.

The Covenant of Mayors for climate and energy aims to increase support for local activities, provide a platform for greater engagement and networking by cities awareness about adaptation and mitigation.

Covenant of Mayors
for Climate & Energy
EUROPE

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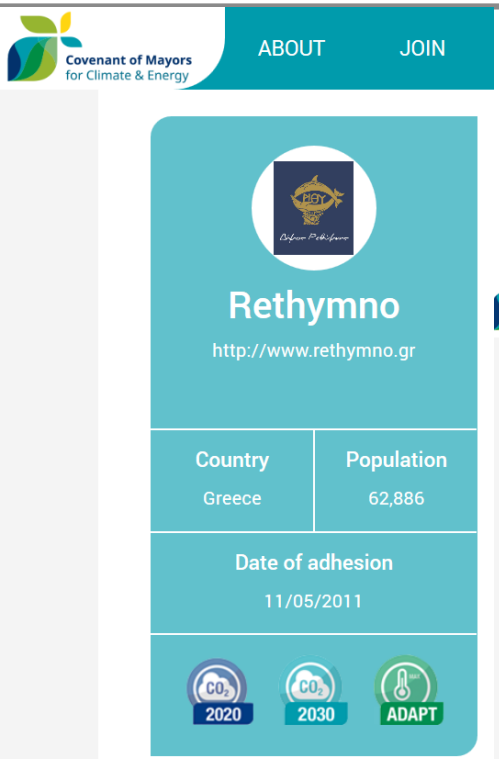
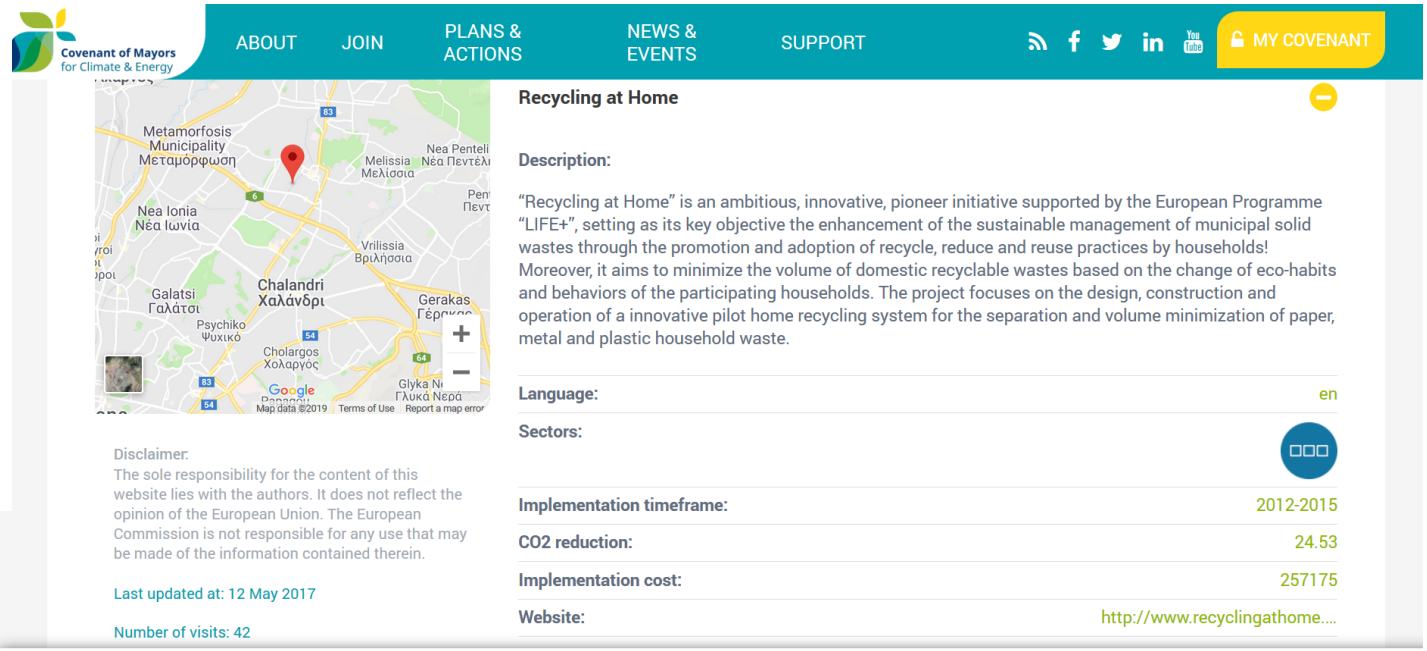
Among others, **Covenant of Mayors** offers:

- ✓ **Guidance** material and tools.
- ✓ A flexible **reference framework** for action, adaptable to

Covenant of Mayors





Actions

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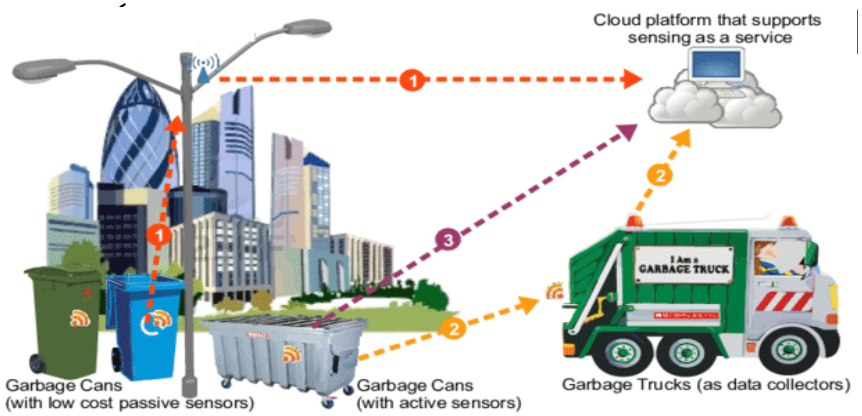
- ✓**Proper Waste Treatr**

Efficient Waste Collection

✓The collection system should aim to schedule trucks by finding shortest path between the almost filled waste bins.

✓The system should consist of setting up smart waste bins and vehicles, which will be Internet of Things (IoT) enabled



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Efficient Waste Collection

The **LIFE PAYT** project will implement an integrated, cost-efficient and highly replicable PAYT (pay-as-you-throw) system in five southern EU municipalities: Lisbon, Condeixa and Aveiro (Portugal), **Vrilissia** (Greece) and **Larnaka** (Cyprus).

One of the projects objectives is to **optimize residual waste collection** with the installation of sensors and smart locks on waste bins.

A reduction of around **20-30%** in GHG emissions is expected, through direct reduction of fossil fuel consumption.

Proper Waste Treatment

Separation at source!

- Recyclables
- Biowaste (constitutes ~40% of MSW)

Proper treatment of wastes and disposal minimization

- Recycling, composting, anaerobic digestion etc

Local treatment of separated wastes

- Minimization of transfer costs
- Growth of local economy

The decentralisation of waste management enables the population to be actively involved in organizing and financing waste management services.

GHG Emissions example

Concerning the reduction of greenhouse gases, it is estimated that the environmental benefit of not transferring biowaste to landfill may reach **40 kg CO2 eq / t of biowaste**, assuming an average distance of 30 km from the source.

Also, the environmental benefit from landfill can **exceed 300 kg of CO2 eq / t of biowaste** over 100 years.

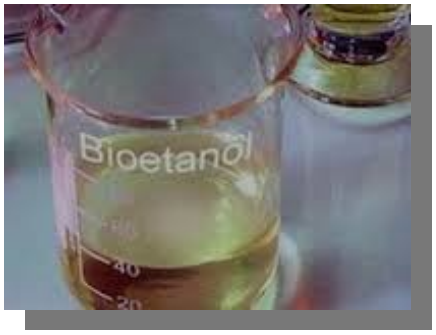
Without taking into account further benefits from composting, proper treatment of biowaste can avoid ~ **350 kg of CO2 eq / t of biowaste.**

New biowaste treatment technologies

Household biowaste drying

- Significant reduction of biowaste mass & volume at source (70 to 90% reduction)
- Significant reduction of waste collection & transportation cost → **Cost minimization: ~ 60%**
- Absence of nuisance
- Production of high added value bioma

Biofuel (bioethanol**) production from biowaste**



Sustainable decentralized MSW management plan

1. The special characteristics of the region (*seasonal variations of the generated quantities, availability of land for waste management facilities, size of the served areas, need for cooperation with neighboring municipalities, etc.*)

2. Adoption of the priorities of environmental policy and legislation

3. The current progress in the methods, practices and technologies for the **collection** & **treatment** of municipal solid waste

4. Assessment of alternative waste management scenarios for separation at source, based on specific criteria (*e.g. population density, costs etc*) and identification of the most efficient scenario.

One step further

Carbon Neutral Waste Management

Following a simple 3-steps method

1. Measure carbon footprint, based on accredited methods & databases (*Kyoto protocol, IPCC, ISO etc*).

2. Reduce GHG emissions as much as it is possible.

3. Compensate the emissions that are unavoidable by using Voluntarily Schemes or Certified Emissions Reductions generated by

Thank you for your attention.

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