

# Everything you always wanted to know about Waste-to-Energy



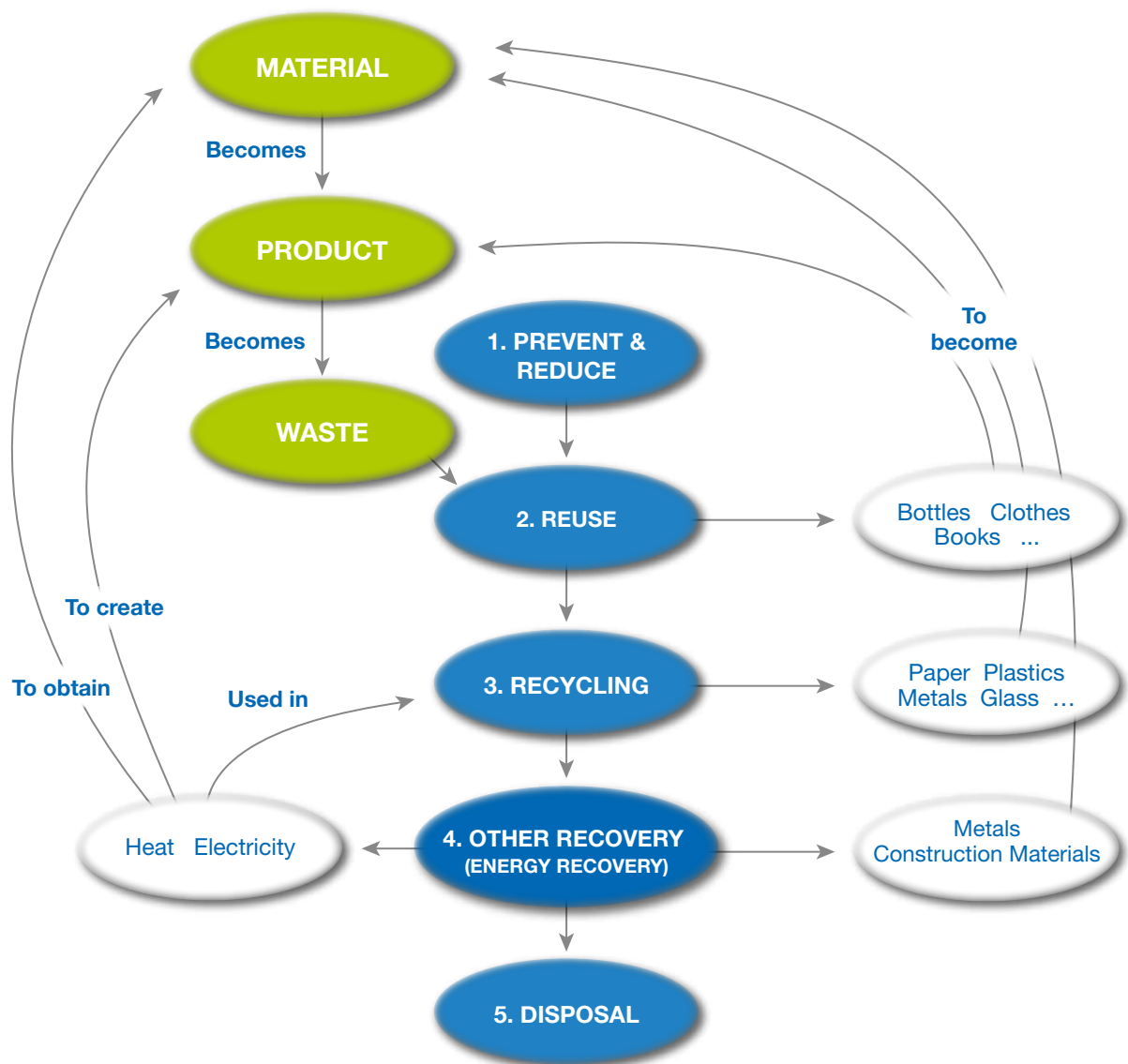




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# What is Waste-to-Energy?



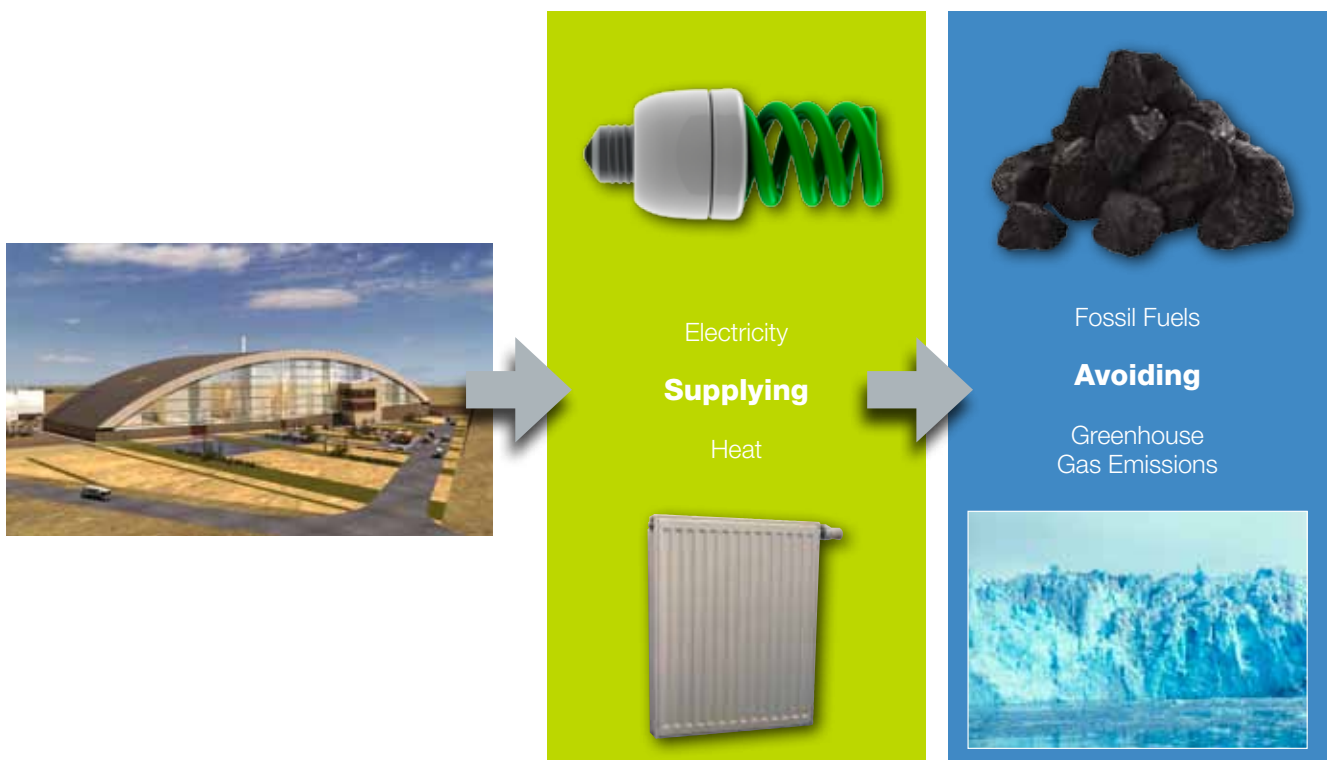
The Waste Hierarchy, from the Waste Framework Directive (2008).

*Waste should first be prevented & reduced, reused and recycled.*

*What about unrecyclable waste?*

*Efficient Waste-to-Energy plants perform a Recovery operation (Step 4 of the hierarchy), providing energy that avoids the use of fossil fuels and reduces Greenhouse Gas emissions.*

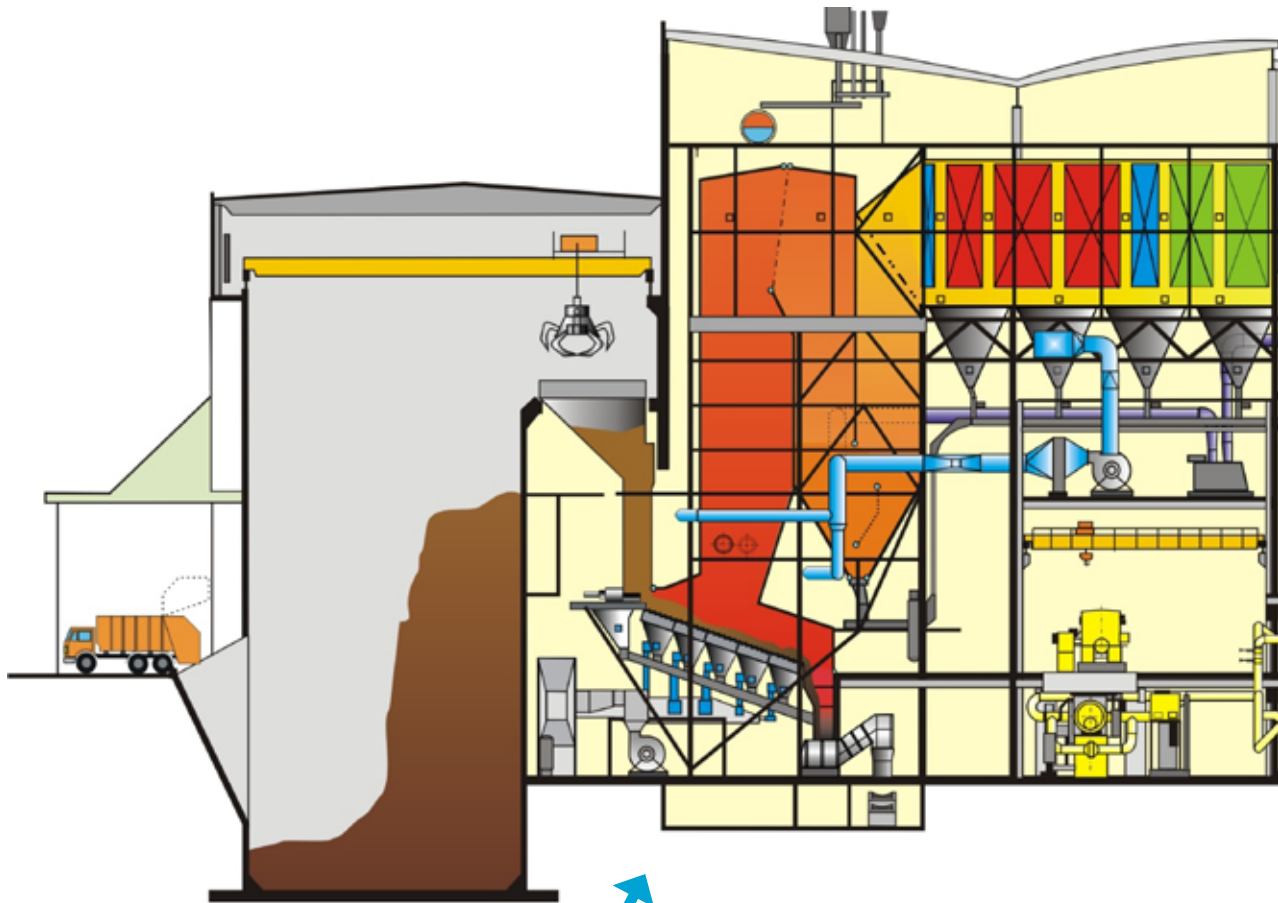
*Waste-to-Energy handles waste that would otherwise be landfilled, the worst option for the environment.*





## How does it work?

Waste-to-Energy plants are designed to incinerate unrecyclable Municipal Solid Waste as well as other accepted industrial or commercial waste. They also simultaneously recuperate the energy and clean the gases generated by the combustion.



### **1. Waste Combustion**

The grate transports the waste through the combustion chamber. The waste is thus also mixed and burns out completely. Unburnable material is left as bottom ash at the end of the grate. Metals and construction materials can be recovered from this bottom ash and returned to the material cycle, thereby saving other raw materials.



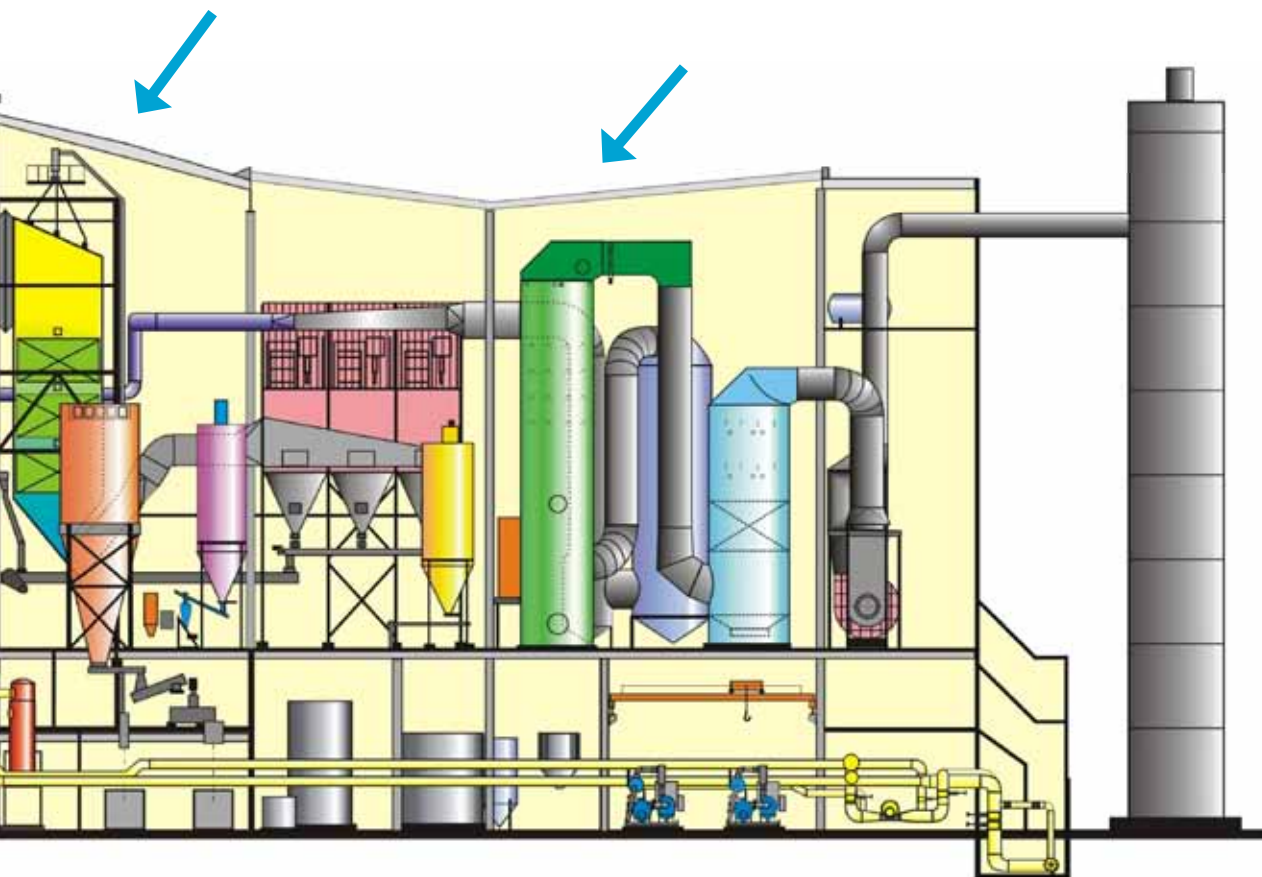


## 2. Energy recovery

The boiler recovers over 80% of the energy contained in the waste and makes it usable as steam.

## 3. Flue Gas Cleaning

Highly sophisticated processes assure that all pollutants contained in the waste and transferred into the flue gas through combustion are eliminated in an efficient, sustainable and reliable way.



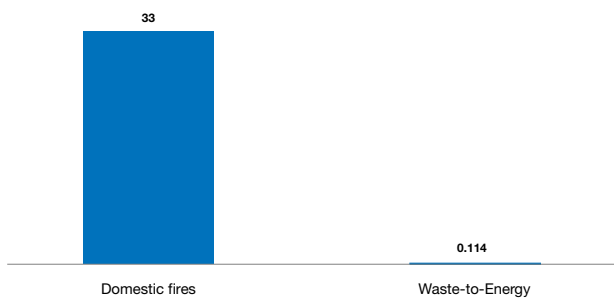
## 4. Energy utilisation, e.g. turbine, heat pump.

The energy recovered is usable as electricity and/or heat (e.g. District Heating and Cooling, Industrial Processes). Roughly half of the energy produced is renewable because it comes from the carbon-neutral biogenic fraction of waste.

# Waste-to-Energy is clean. How does it compare to other sectors?

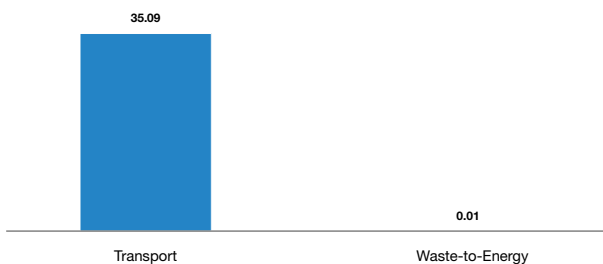
## Dioxins?

Dioxins Emissions in g TEQ per year

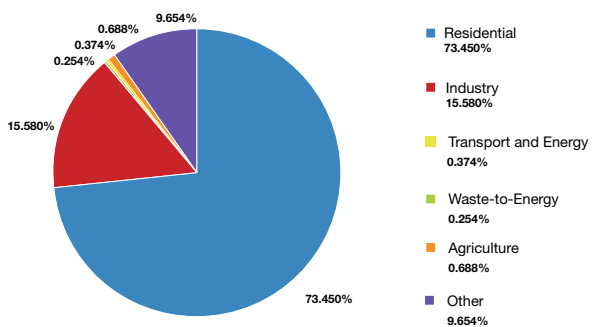


## Particulate Matter/PM10?

PM10 Emissions in 1000 tons per year

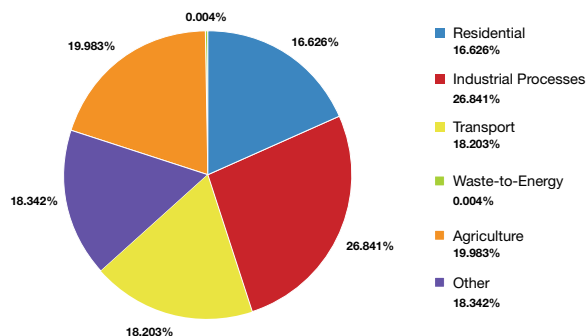


## Dioxins Emissions in Flanders



Source: Flemish Environment Agency, Emissions to Air Annual Report 1990-2010, 2010 values.

## PM10 Emissions in Germany



Source: German Environmental Agency, National Trend Tables 1990-2010, 2010 values.



### Save the Mozzarella!

Did you know that dioxins, contained in waste, tainted the famous Mozzarella cheese in March 2008? Find out more in our Save the Mozzarella flyer.



## Myths versus Reality

### ***Waste-to-Energy hinders recycling.***

European countries with the highest recycling rates are also the ones where waste-to-energy is most present. This may be explained by the fact that waste-to-energy is an essential part of the waste management process.

### ***Waste-to-Energy pollutes.***

Subjected to strict emission regulations, waste-to-energy plants have the lowest emission rates in the industrial sector. For data, please refer to <http://prtr.ec.europa.eu/>

### ***Waste-to-Energy is no better than landfilling.***

While removing the pollutants from the eco-cycle safely, waste-to-energy does not emit methane, unlike landfilling. It recovers the energy, therefore offsetting Greenhouse gas emissions.

### ***Waste-to-Energy = Dioxins?***

Waste is treated at high temperatures and, due to advanced flue gas cleaning treatment, dioxin emissions are no longer a concern. This was also recognised in 2005 by the German Environment Ministry, when it was headed by Mr. Trittin (Member of the German Green Party).

For any further question on Waste-to-Energy, do not hesitate to contact us at [info@eswet.eu](mailto:info@eswet.eu)

### **Waste and Dioxins**

***“Emissions from Waste-to-Energy plants are unproblematic”, as stated by Germany’s Minister for the Environment.***

**On the other hand, Landfills can spread dioxins into the soil and groundwater; this is dioxins into the soil and groundwater, which is potentially hazardous for humans, livestock, and crops.**



Stavenhagen, Germany



Jonköping, Sweden

# Frequently Asked Questions

## **How big?**

In the EU, the average citizen generates 500 kg of waste per year. Assuming a recycling rate of 50% (today it is 40%), still 250 kg of residual waste per citizen per year need to be treated. Thus a city with 500,000 inhabitants will need a Waste-to-Energy plant capable of treating 125,000 tons of waste per year.

The minimum size, from an economic viewpoint, for a Waste-to-Energy plant is around 40,000 t/year. The largest plants have capacities of more than 1 million t/year. Individual combustion lines can have capacities from around 2.5 – 50 t/hour (20,000t/year to 400,000t/year), whereby the more typical range is 5 – 30 t/hour (40,000 to 240,000t/year). A Waste-to-Energy plant is expected to run for at least 8,000 hours per year, roughly 94% of the time.

## **How much?**

Waste-to-Energy plants are most often tailor made, depending on very specific local requirements. Construction costs hence vary widely, but a typical range in Europe is around 500 - 700 € per ton per year installed capacity, not including cost for the site and for project development.

## **What waste?**

Waste-to-Energy plants are designed to incinerate Municipal Solid Waste (MSW), but similar waste from industry and commerce can be treated as well. Sewage sludge and medical waste can be co-incinerated in certain percentages, but they need special storage and handling facilities.

No pre-treatment is needed, except that very large pieces (more than around 1 m) and bulky items have to be shredded. Hazardous and radioactive waste is not permitted, it has to be treated in dedicated facilities.

# Where does Waste-to-Energy come from?

Just like mobile phones evolved a lot since the 1980s, Waste-to-Energy plants have also seen tremendous changes since they were first introduced more than 120 years ago. The core purpose of both has not changed, but new technologies and developments have significantly expanded their range of application.

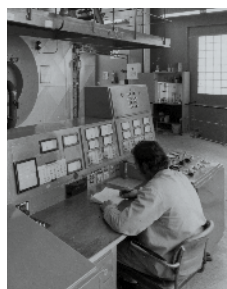


Reduction of volume, weight and hygienic concerns were the first reasons to build waste incineration plants. Even though the composition and quantities of waste have changed considerably, these reasons still apply. During the last decades, public opinion and political will for a stronger emphasis on environmental protection have increased.

Usage of Best Available Techniques ensures very low emissions, meeting the strictest emission limit values of all combustion industries.

Another opportunity arose and was seized when concerns over the cost and security of energy supply made the recovery of the energy contained in residual waste ever more important. At the same time this valuable energy recovery helps reducing greenhouse gas emissions significantly, through decreased use of fossil fuels and reduced landfilling. Growing worldwide demand for material, especially metals, is another challenge being currently tackled by Waste-to-Energy plants.

As for mobile phones, Waste-to-Energy plants have a long history of continuous improvement and are sure to contribute to meet the next challenges.



**There is not a doubt that reduction, reuse and recycling of waste are the top priorities in waste management. But as 'Zero Waste' is not realistic in the foreseeable future, Waste-to-Energy has an important role to play for residual waste, since it is a preferred alternative to landfilling.**

# Glossary

**Biogenic:** Biodegradable substance, e.g. food, paper, garden trimmings, wood, natural textiles, manure, sewage sludge etc. These substances capture CO<sub>2</sub>, which, when released, is not included in GHG Inventories.

**Bottom ash:** Unburnable fraction of waste, e.g. sand, stones, glass, minerals etc, collected at the end of the grate.

**Carbon footprint:** Measure of the impact of ones daily activities on the environment. The calculation sums the amount of GHGs emitted through daily consumption of fossil fuel and energy (used for heating, transportation, electricity, etc.).

**Flue gas:** Gas released from combustion which carries the pollutants contained in the waste. It must therefore be treated in a flue gas treatment system before being released into the atmosphere.

**Fly ash:** particulate residue conveyed with the flue gas and removed from the boiler, the fabric filter or the electrostatic precipitator.

**Greenhouse gas:** GHG is a gas that absorbs and emits heat. This is the main cause of the Greenhouse effect. Even though this process is natural and necessary, high concentration levels of certain gases (e.g. CO<sub>2</sub>, CH<sub>4</sub>) can cause involuntary heating of the eco-cycle. They are the main cause of Climate Change.

**Grate:** Series of mobile/stationary metal bars on which the waste is transported and incinerated.

**Methane (CH<sub>4</sub>):** Gas created by anaerobic digestion of biological waste (e.g. in a landfill). It is 25 times more potent than CO<sub>2</sub>.

**R1:** Formula judging whether Waste-to-Energy plants are classified as a “recovery operation” or not.

**Waste hierarchy:** 5 step hierarchy adopted in the EU waste Framework Directive in 2008.



# Who is ESWET?



***Waste-to-Energy is a bright idea for the EU:  
ESWET seeks to raise positive awareness about it.***

ESWET is an association grouping the European Suppliers of Waste-to-Energy Technology. Our main task is to foster the development and dissemination of Waste-to-Energy Technologies. We seek to raise awareness of the positive implications of the technology both for the Environment and the production of Energy.

To learn more, visit [www.eswet.eu](http://www.eswet.eu)

***“Energise Your Waste!”***











**ESWET**   
**EUROPEAN SUPPLIERS OF WASTE TO ENERGY TECHNOLOGY**

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