



EUROPEAN SUPPLIERS  
OF WASTE-TO-ENERGY  
TECHNOLOGY



EVERYTHING YOU ALWAYS  
WANTED TO KNOW ABOUT  
WASTE-TO-ENERGY

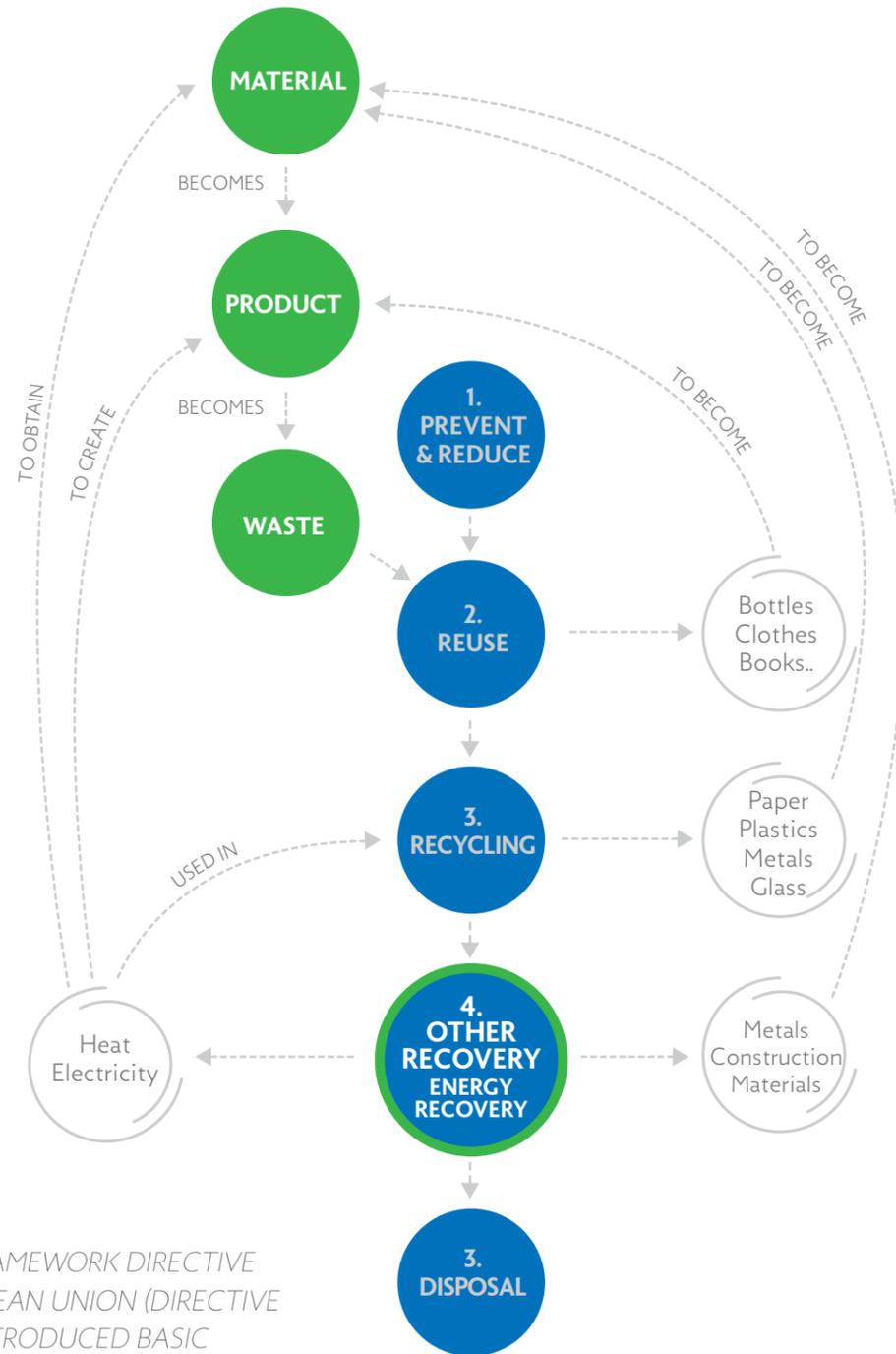
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# WHAT IS WASTE-TO-ENERGY?



THE WASTE FRAMEWORK DIRECTIVE OF THE EUROPEAN UNION (DIRECTIVE 2008/98/EC) INTRODUCED BASIC CONCEPTS AND DEFINITIONS RELATED TO WASTE MANAGEMENT, INCLUDING THE WASTE MANAGEMENT HIERARCHY.

# 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?

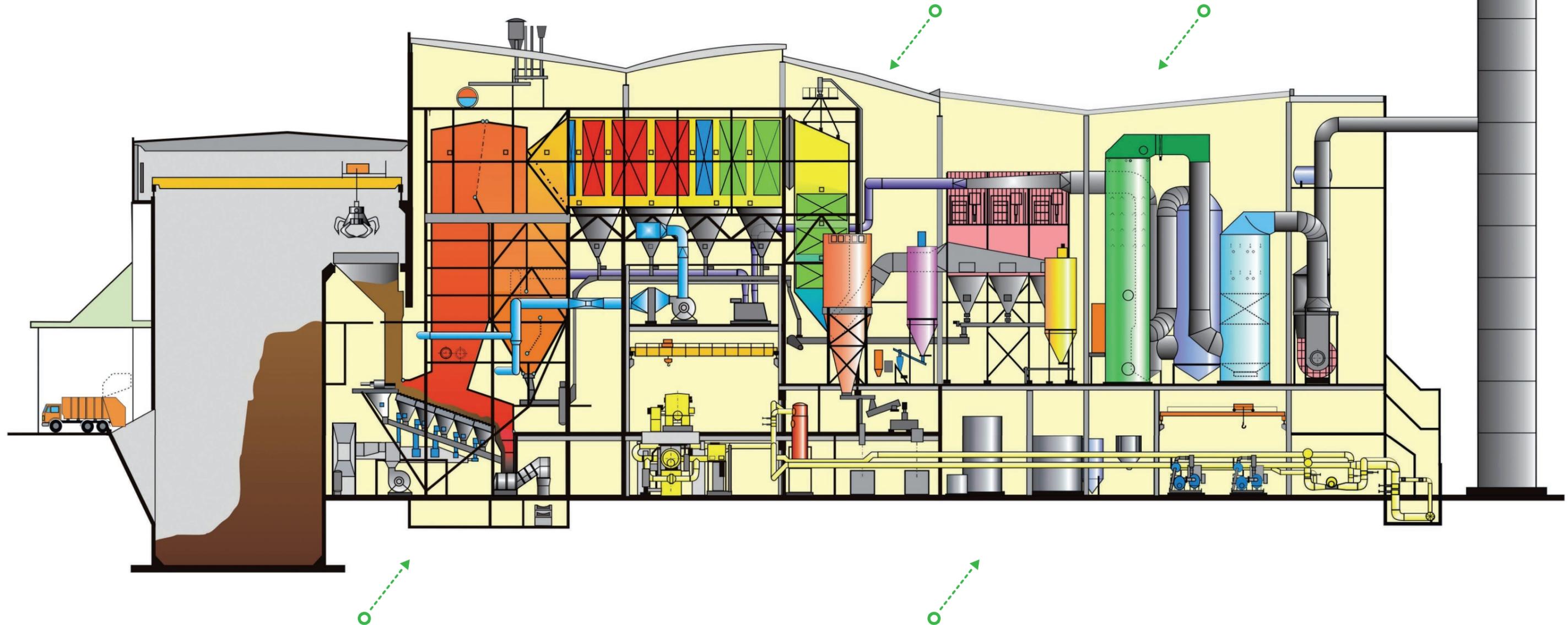
Waste-to-Energy plants are designed to incinerate unrecyclable Municipal Solid Waste (MSW) as well as other accepted industrial or commercial waste. They also simultaneously recuperate the energy and remove the pollutants from the eco-cycle thanks to very stringent flue gas cleaning processes.

## 2 ENERGY RECOVERY

The boiler recovers around 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.



## 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 and energy that would be used to produce them.

## 4 ENERGY UTILISATION, e.g. TURBINE, HEAT PUMP.

The energy recovered is usable as electricity and/or heat (e.g. district heating, industrial processes). About half of the energy produced is renewable because it comes from the carbon-neutral biogenic fraction of waste.

# WASTE-TO-ENERGY IN EUROPE

60%

About 60% of the Waste-to-Energy plants across Europe provide both electricity and heat (CHP)

19%

The energy content of the waste treated by WtE plants in the EU equals 19% of the energy content of Russian gas imports in 2012

99%

In Denmark, 99% of the generated bottom ash is recovered and used as an aggregate for construction purposes

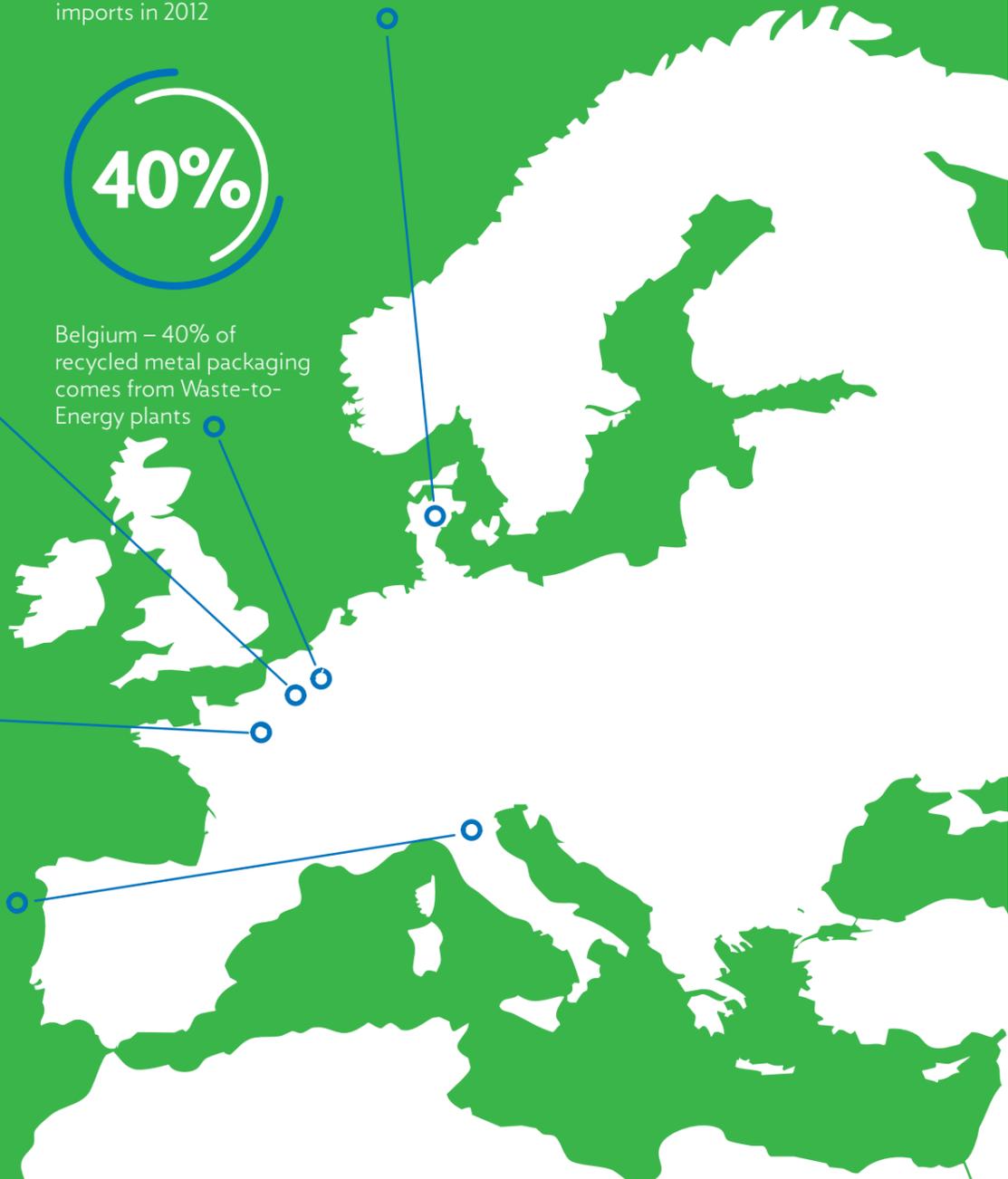
40%

Belgium – 40% of recycled metal packaging comes from Waste-to-Energy plants

50%

50% of district heating network in Paris is supplied by Waste-to-Energy plants

Everyone can check emissions from most Waste-to-Energy plants online (e.g. Bologna, Italy)



# MYTHS VERSUS REALITY



Waste-to-Energy pollutes



**Waste-to-Energy technology improved significantly over the decades.** Currently, subject to strict emission regulations, Waste-to-Energy plants have one of the lowest emission rates among industrial sectors.



Waste-to-Energy hinders recycling



**Waste-to-Energy is an integral part of waste management and there is still a lot of room for growth of recycling rates in some Member States.** Waste that cannot be recycled should be incinerated rather than landfilled so that it does not pollute the environment.



Waste-to-Energy is no better than landfilling



**Unlike landfilling, Waste-to-Energy does not emit methane.** Instead, it removes pollutants from the eco-cycle safely and it recovers the energy contained in waste. Hence, it lowers demand for fossil fuels while being a stable source of energy.



Waste incineration produces bottom ash that pollutes the environment



**On the contrary, materials recovered from bottom ash can be safely recycled.** Metals keep their composition and are accepted by smelters. The mineral fraction fulfils all requirements and legal obligations to be used for construction purposes, e.g. roads, foundations, noise barriers.



## WASTE AND DIOXINS

*EMISSIONS FROM WASTE-TO-ENERGY PLANTS ARE UNPROBLEMATIC”, AS STATED ALREADY IN 2005 BY MR. TRITTIN, GERMANY’S MINISTER FOR THE ENVIRONMENT AT THE TIME. ON THE OTHER HAND, LANDFILLS CAN SPREAD DIOXINS INTO THE SOIL AND GROUNDWATER; AND THIS IS HOW DIOXINS CAN POTENTIALLY BECOME HAZARDOUS FOR HUMANS, LIVESTOCK, AND CROPS.*



Did you know that dioxins from a leaking landfill tainted the famous Mozzarella cheese in March 2008? Find out more in our Save the Mozzarella flyer.





# FREQUENTLY ASKED QUESTIONS

## HOW BIG?

In the EU, the average citizen generates 475 kg of waste per year. Assuming a recycling rate of 65% (today it is 44%, including composting), still 165 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 82,500 tons of municipal waste per year. However, it is worth remembering that Waste-to-Energy plants treat also commercial and industrial waste that in certain countries can constitute up to 50% of incinerated waste.

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. Hence, construction costs 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 and security of energy supply made the recovery of the energy contained in residual waste even more important. At the same time this valuable energy recovery helps to reduce greenhouse gas emissions 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. Usage of Best Available Techniques ensures very low emissions that meet the strictest emission limit values of all combustion industries.



*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.*

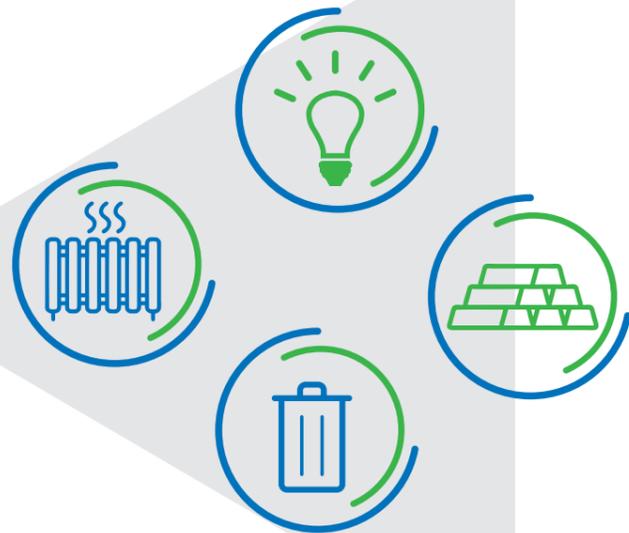
# GLOSSARY

- 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.
- 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.
- BOTTOM ASH** Unburnable fraction of waste, e.g. sand, stones, glass, minerals etc, collected at the end of the grate.
- FLY ASH** particulate residue conveyed with the flue gas and removed from the boiler, the fabric filter or the electrostatic precipitator.
- CARBON FOOT-PRINT** Measure of the impact of one's 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.).
- 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** Gas created by anaerobic digestion of biological waste (e.g. in a landfill). It has 28 times bigger global warming potential than CO<sub>2</sub>.
- 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** 

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