

**Waste in
▶ (mega) watt out**

Confederation of European Waste-to-Energy Plants



CEWEP

Confederation of European Waste-to-Energy Plants



CEWEP represents about 380 Waste-to-Energy Plants across Europe, 88% of the European market. Waste-to-Energy is a hygienic method of treating waste, reducing its volume by 90%.

Waste-to-Energy plants thermally treat household and similar waste that remains after waste prevention, reuse and recycling by generating energy from it. This is how they replace fossil fuels, such as coal, gas and oil, used by conventional power plants.

www.cewep.eu

Recycling and **Waste-to-Energy**

together divert waste from landfills

Waste is a resource. However, more than 40% of municipal solid waste across the EU 27 is still landfilled, although landfill gases (methane) contribute significantly to global warming (25 times more than CO₂).

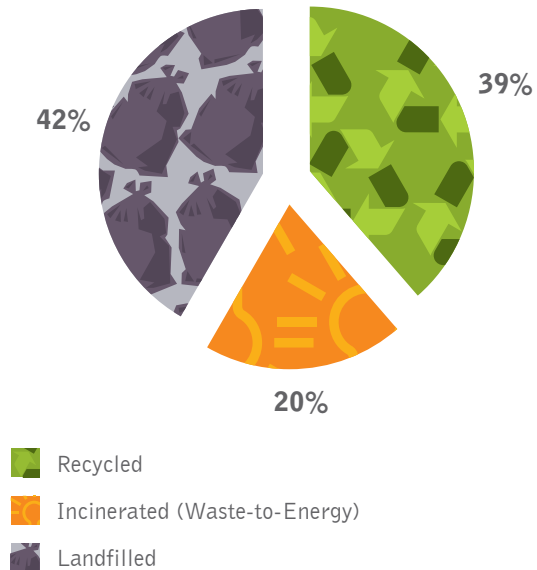
How can Member States, who still mainly rely on landfilling, fulfil the aims of the European Landfill Directive, i.e. diverting biodegradable waste from landfills and progress beyond this aim?

What are the alternatives and how can they be intelligently combined to achieve maximum reduction of environmental impact?

The 5-step waste hierarchy helps to achieve sustainable waste management, placing prevention at the top and disposal as the least favoured option (landfilling). Recycling should have priority over recovery if the waste is properly recyclable without transferring pollutants into the product.

Treatment of municipal waste in EU 27 (2007)

Source: EUROSTAT (rounded figures)





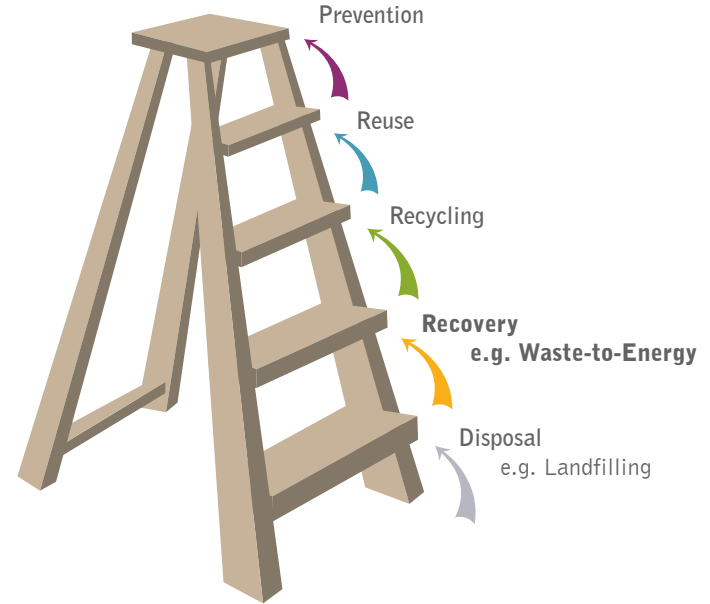
However, from the remaining waste which cannot be reused or recycled in a technically or economically viable way, energy should be produced and this should have clear priority over landfilling.

The Member States who have most successfully reduced dependence on landfill have done this by combining recycling, biological treatment (e.g. composting and anaerobic digestion), and Waste-to-Energy.

Regarding growth in the number of Waste-to-Energy Plants, for the period 2005-2013 the top three countries where the highest increase is observed are Germany, the Netherlands and Sweden – countries that are well known to be environmentally conscious and which have reduced dependence on landfilling to below 4%.

It is also worth bearing in mind that residues from recycling processes quite often need to be thermally treated.

The waste hierarchy



Recycling and Waste-to-Energy: Moving from dependence on landfills to more sustainable waste management

The **European Environment**
Agency says:



“ *Increased recovery of waste and diverting waste away from landfill play a key role in tackling the environmental impacts of increasing waste volumes. As recycling and incineration with energy recovery are increasingly used, net greenhouse gas emissions from municipal waste management are expected to drop considerably by 2020.* ”

From a briefing published by the European Environment Agency in 2008
http://reports.eea.europa.eu/briefing_2008_1/en/EN_Briefing_01-2008.pdf

The **German Federal Environment
Agency (UBA)** says:

“ *As waste is indeed incurred in our consumer society, thermal valorisation of waste which is not otherwise redeemable will also continue to be necessary and useful. A comparison across Europe shows that countries with progressive waste management systems in place have both a high proportion of waste incineration as well as high rates of materials recycling, as for example in Denmark and the Netherlands, where waste incineration does not impede high rates of recycling.* ”

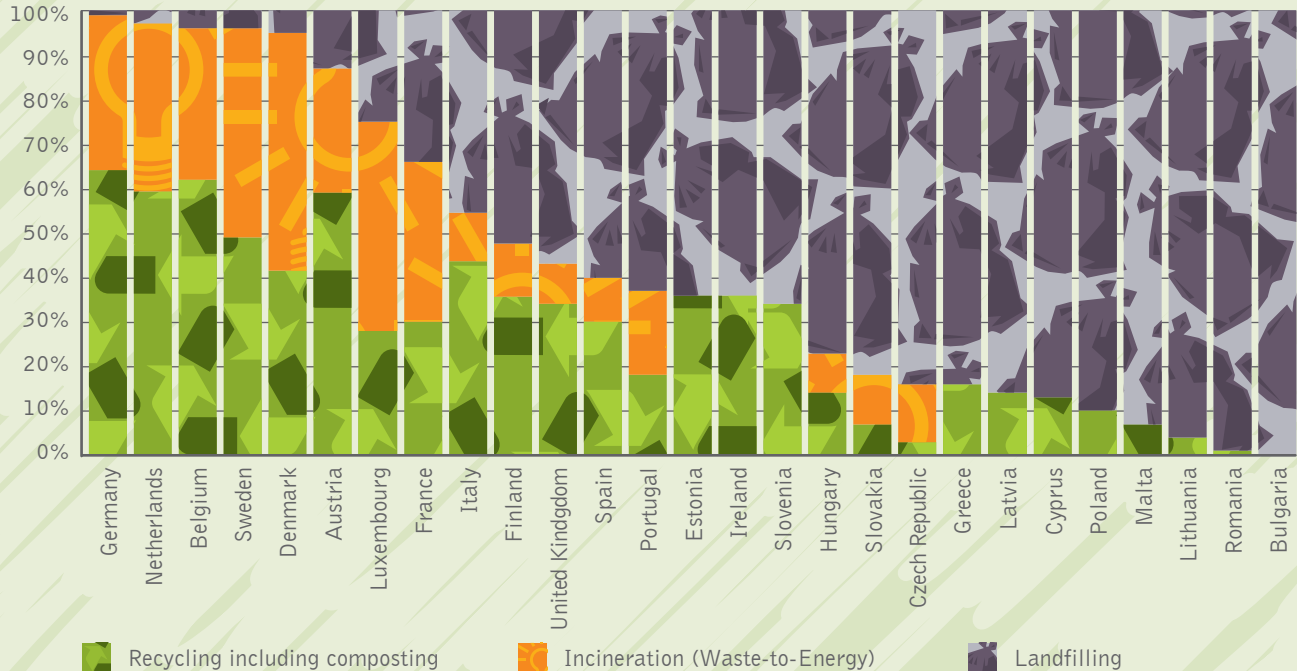
“ *... the energy content of residual waste from human settlements is about 50 percent biogenic content, which can be classed as carbon dioxide-neutral.* ”

From press release for background paper “Waste incineration does not oppose waste prevention” published in July 2008:
<http://www.umweltbundesamt.de/uba-info-presse-e/2008/pe08-052.htm>



Treatment of municipal waste in Europe ▶ 2007

Source: Eurostat





DIVERTING WASTE FROM LANDFILLS

Recycling and Waste-to-Energy (waste incineration with energy recovery) are complementary options to divert waste from landfills. Waste-to-Energy reduces our dependence on landfills and recovers precious energy.



Waste-to-Energy

reduces dependence on landfills and on fossil fuels

Energy Resources and Climate Change

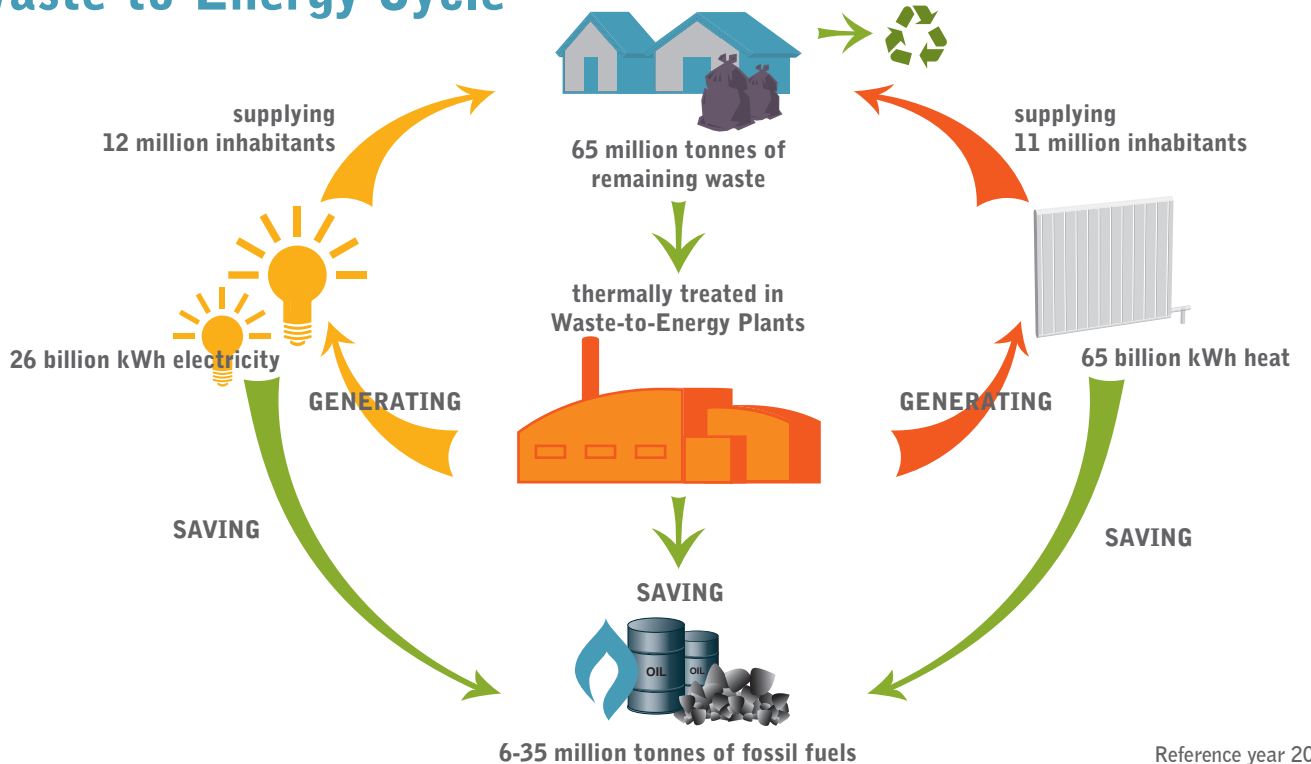
Waste-to-Energy technology is one of the most robust and effective alternative energy options to reduce CO₂ emissions and to save limited fossil fuel resources used by traditional power plants.

Currently, Waste-to-Energy Plants in Europe can supply 12 million inhabitants with electricity and 11 million inhabitants with heat.

This means that 6-35 million tonnes of fossil fuels (gas, oil, hard coal and lignite), emitting 17-35 million tonnes of CO₂, would not need to be used by conventional power plants to produce this amount of energy.



Waste-to-Energy Cycle





THE WASTE-TO-ENERGY CYCLE

Citizens' waste that could not be prevented or recycled should be sent to a Waste-to-Energy Plant that:

- ▶ generates electricity and heat from it and
- ▶ returns this energy to homes
- ▶ replacing fossil fuels that would be used to produce this energy.



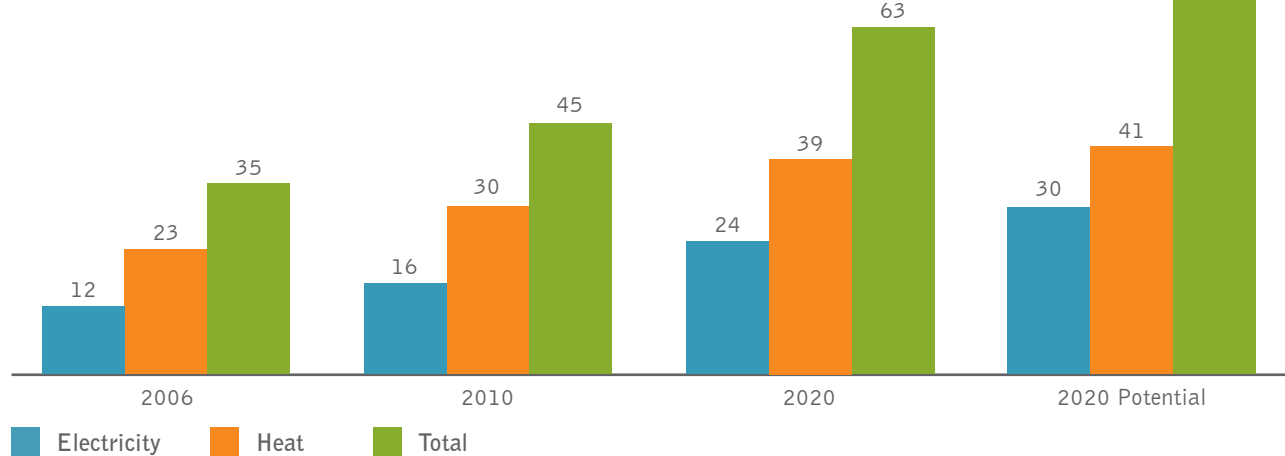
Waste-to-Energy

contributes to security of energy supply and climate protection

Waste-to-Energy is a reliable energy source and makes an essential contribution to security of energy supply

Growth of Renewable Energy from WtE for the EU 27 in Terawatt-hour (TWh)

1 TWh = 1000 million kWh



Source: CEWEP study "The renewable energy contribution of "Waste-to-Energy" across Europe" 2008

According to EU legislation¹ the biodegradable fraction of municipal and industrial waste is considered biomass, thus a renewable energy source. The biodegradable part of municipal waste is about 50%.²

Waste-to-Energy Plants already supply a considerable amount of renewable energy (about 35 billion Kilowatt-hours, based on 2006) and by 2020 this amount will grow to 63 billion Kilowatt-hours for EU 27 – Enough to supply 17.3 million inhabitants with renewable electricity and 6 million inhabitants with renewable heat.³

If ambitious waste policy was achieved in Europe replacing landfilling through a combination of recycling (60%) and WtE (40%), **71 billion Kilowatt-hours of renewable energy could be generated in Waste-to-Energy plants in 2020.**

In order to move away from Europe's high dependence on fossil fuels we should explore the cost-effective and available alternative energy option: Waste-to-Energy.

¹ Directive on Energy from Renewable Sources 2009,
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>

² Among others, German Environment Agency UBA in July 2008,
<http://www.umweltbundesamt.de/uba-info-presse-e/2008/pe08-052.htm>

³ CEWEP study "The renewable energy contribution of Waste-to-Energy across Europe" 2008,
http://www.cewep.eu/storage/med/media/wastepol/250_ExtRES_Report_JM.pdf?fCMS=55d76946a113beae58f81d7e9321b4f4

Protecting **Health** and the **Environment**



Waste-to-Energy Plants comply with the strict emission limit values laid down in the European Waste Incineration Directive 2000/76/EC (WID) and they achieve very low emission levels.

According to the UK Institution of Mechanical Engineers

“ *The dioxin emission limit value required by WID from an EfW [Energy-from-Waste] plant is a concentration in the chimney of 0.1 ng/m³ (one billionth of a gram per cubic metre at ambient temperature and pressure). This is an equivalent concentration to one third of a sugar lump dissolved evenly in Loch Ness.* ”

(Scotland's Loch Ness, famous for its "monster", is well known for being the largest – and deepest – lake in the UK.)¹

While dioxins exist naturally in the environment the manmade ones come from a variety of combustion processes including steel mills, power plants, cement kilns, diesel vehicles, buses, open fires in the home, bonfires, barbeques, jet engines, forest fires... Emissions from Waste-to-Energy plants present just a tiny fraction of such emissions.

A study carried out by Lisbon University's Institute of Preventive Medicine concluded that waste incineration "does not impact on dioxin blood levels of nearby residents" of Waste-to-Energy Plants.²

Whereas in 1990 one third of all dioxin emissions in Germany came from Waste-to-Energy Plants, for the year 2000 the figure was less than 1%. Today it is even lower.³

The German Environment Ministry has also calculated that there would be at least 3 tonnes of arsenic and 5000 tonnes of particulate matter more in the air in Germany if the energy generated by Waste-to-Energy Plants would have been produced by traditional power stations.

Already in the 1990's following the introduction of the German law on waste incineration the Scientific Advisory Council of the Federal Medical Association investigated potential health risks caused by emissions of Waste-to-Energy Plants.⁴ They concluded by saying:

“ *The evaluation conducted shows that currently operating Waste-to-Energy Plants, which are conform to the technical standards, cause very marginal health risks which can therefore be classified as negligible health risks for the population living in the vicinity of Waste-to-Energy Plants.* ”

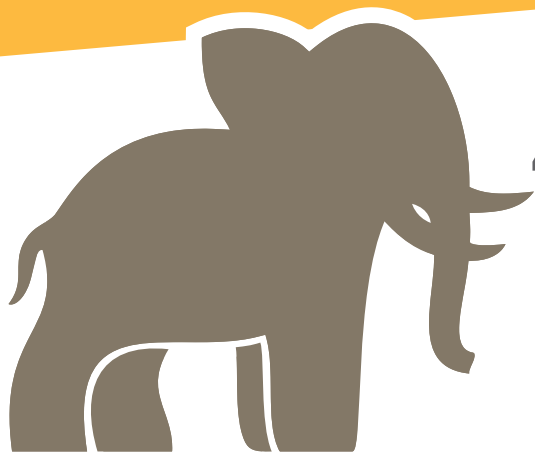
Since the introduction of the Waste Incineration Directive the emissions from Waste-to-Energy Plants across Europe have been dramatically reduced.

Sources:

- ¹ UK Institution of Mechanical Engineers report "Energy from Waste: A Wasted Opportunity?" 2008 p. 15,
<http://www.cewep.eu/subdir/index.html>
- ² Lisbon University's Institute of Preventive Medicine, Determinants of Dioxins and Furans in blood of non-occupationally exposed populations living near Portuguese solid waste incinerators, 2007, www.sciencedirect.com
- ³ German Environment Ministry study: Waste Incineration – A Potential Danger?, September 2005,
http://www.bmu.de/english/waste_management/downloads/doc/35950.php
- ⁴ Scientific Advisory Council of the Federal Medical Association (Germany) German Medical Journal 90, edition 1/2,
11th January 1993, p. 45-53



Waste-to-Energy ► REDUCING EMISSIONS



400g
1990

dioxin emissions
dropped to
approx. 1/1000



less than
0.5g
2000

In 1990 one third of all dioxin emissions in Germany came from waste incineration plants, for the year 2000 the figure was **less than 1%**. While the amount of waste thermally treated has more than doubled.

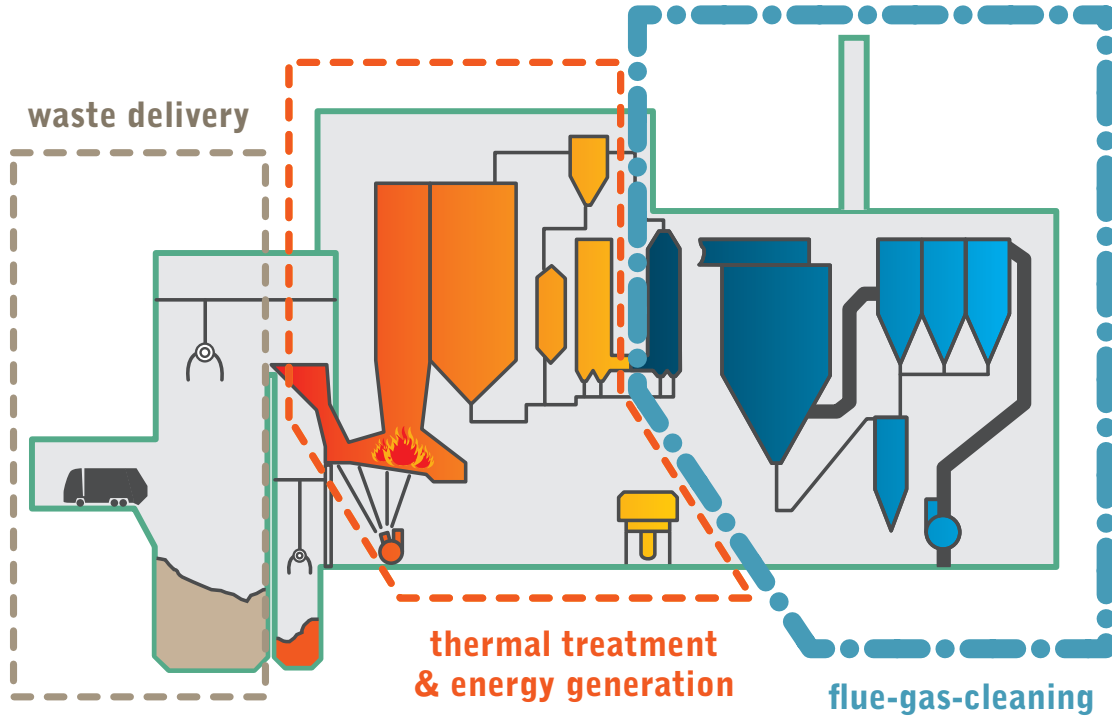
German Environment Ministry study: Waste Incineration – A Potential Danger?, September 2005
http://www.bmu.de/english/waste_management/downloads/doc/35950.php



HEALTH AND ENVIRONMENT

Waste-to-Energy Plants are strictly controlled. They comply with the most stringent emission limit values applied to any single industry, set out in the European Waste Incineration Directive.

Waste-to-Energy Plant





CONTROLLING EMISSIONS

Sophisticated flue-gas-cleaning systems guarantee low emissions.

CEWEP ▶ Confederation of European Waste-to-Energy Plants ▶ info@cewep.eu ▶ www.cewep.eu



**“ Nature knows no pause in progress and development,
and attaches her curse on all inaction. ”**

Johann Wolfgang von Goethe

Don't waste waste
▶ it is a resource

Waste-to-Energy: low emissions, strictly controlled

Waste-to-Energy Plants have invested heavily in sophisticated filtering devices to minimise the emissions into the atmosphere, and in increasing the energy efficiency of the Plant so that it can generate as much sustainable energy from the waste as possible.

Waste-to-Energy: a cost-effective, reliable and renewable energy source

A major part (about 50%) of household and similar waste is biodegradable - biomass - and therefore a source of renewable energy.

In order to improve energy efficiency and generate more sustainable energy, it is of utmost importance that Waste-to-Energy Plants have easier access to infrastructure for the use of steam, district heating or cooling, as well as to the electricity grid.

Generating energy from waste substitutes energy produced from fossil fuels in conventional power stations, thus reducing CO₂ emissions and contributing to climate protection and security of energy supply.

Waste-to-Energy hand in hand with recycling

The Member States who have most successfully reduced dependence on landfill have done this by combining recycling, biological treatment (e.g. composting and anaerobic digestion), and Waste-to-Energy.



Legend of the Phoenix

The phoenix is a mythical bird, immortal, being re-born in its flames.

Much in the same way that Waste-to-Energy Plants bring forth new energy from waste that is discarded.

Painting by Maurizio Tazzuti

Waste-to-Energy

Waste-to-Energy

- ▶ Cleanly and Safely Treating your Residual Waste

Waste-to-Energy

- ▶ Contributing to Climate Protection

Waste-to-Energy

- ▶ Hand in Hand with Recycling





WASTE-TO-ENERGY PLANTS

Waste-to-Energy Plants generate energy from the remaining waste which cannot be reused or recycled in a technically or economically viable way.

The energy they produce substitutes energy generated in conventional power plants using fossil fuels.

Waste-to-Energy Plants comply with the strict emission limit values laid down in the Waste Incineration Directive and they achieve very low emission levels.

Recycling and Waste-to-Energy are complimentary waste treatments methods, which are instrumental to fulfil the targets of the European Landfill Directive, to divert biodegradable waste from landfills.



For more information about Waste-to-Energy and its role in sustainable waste management

www.cewep.eu

CEWEP - Confederation of European Waste-to-Energy Plants

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