

Energising waste ▶ a win-win situation

CEWEP would like to highlight the role Waste-to-Energy (WtE) plays in producing

▶ Sustainable ▶ Low Carbon ▶ Cost-Effective ▶ Reliable ▶ Local Energy

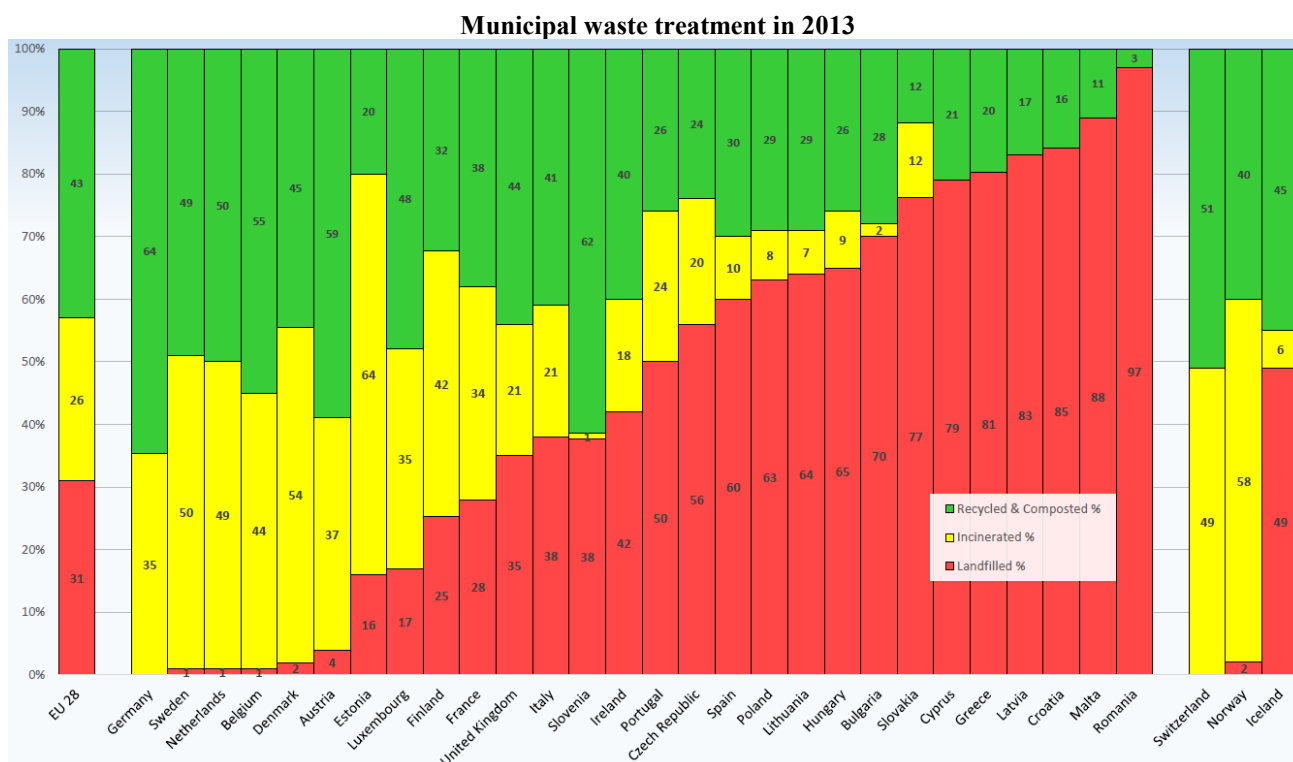
while replacing fossil fuels and helping to divert waste from landfills

Waste-to-Energy Plants (waste incineration with energy recovery) thermally treat waste, which is not suitable for recycling and which would otherwise be consigned to landfills, and transforms it into sustainable energy. CEWEP respects the priority given to recycling according to the waste hierarchy, and experience shows that Waste-to-Energy and recycling are complementary in order to divert waste from landfills and reduce Greenhouse gas emissions¹.

Waste-to-Energy has a role to play in both:

Sustainable Waste Management and Energy supply

Recycling and Waste-to-Energy in combination for sustainable waste management



Graph by CEWEP, Source: EUROSTAT

From 6 Member States an important lesson can be learnt about how to reduce the amount of municipal waste landfilled to a minimum: Austria, Belgium, Denmark, Germany, the Netherlands and Sweden landfill 4% of municipal waste or less. They have all introduced landfill bans and worked towards a complementary waste management system where **both Recycling and Waste-to-Energy play a role in diverting waste from landfills, proving that Waste-to-Energy and Recycling go hand-in-hand.**

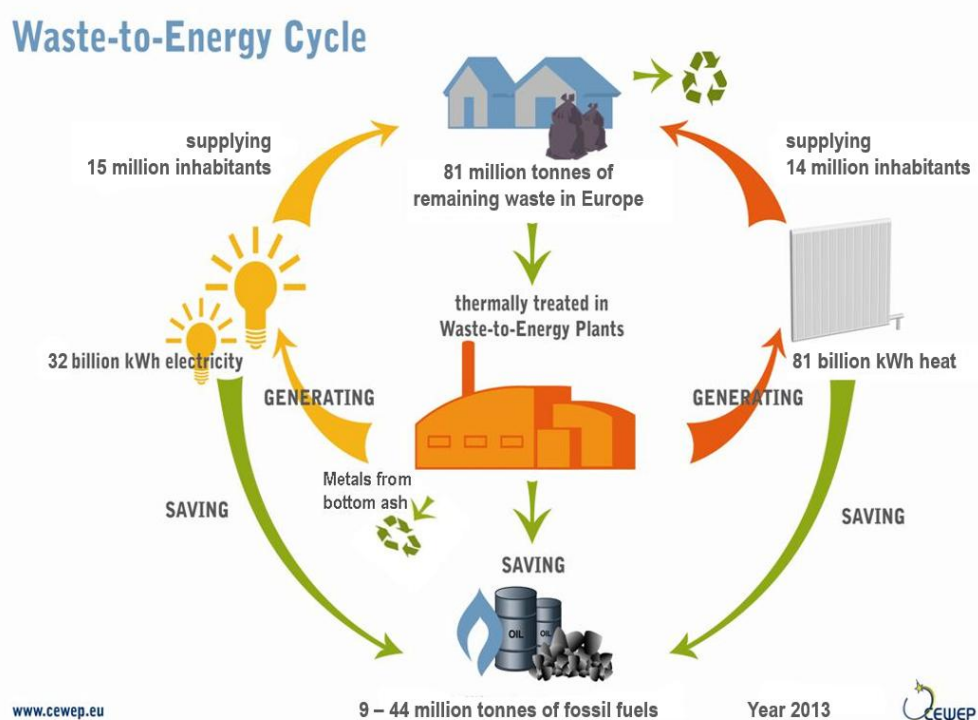
¹ Recycling and Waste-to-Energy in combination for sustainable waste management, http://www.cewep.eu/information/policy/m_1038

Waste-to-Energy replaces fossil fuels and produces sustainable energy

Waste-to-Energy plants put the energy content of remaining waste, not suitable for sustainable recycling, to good use: producing electricity and heat from a locally available energy source.

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 that would otherwise be used to produce the energy.

Waste-to-Energy Plants in Europe can supply 15 million inhabitants with electricity and 14 million inhabitants with heat. This is based on 81 million tonnes of remaining household and similar waste that was treated in 2013 in Europe. Then between 9 and 44 million tonnes of fossil fuels (gas, oil, hard coal and lignite) can be substituted annually, which would emit 22 - 44 million tonnes of CO₂. Waste-to-Energy helps to achieve **low-carbon policy** objectives and to ensure **security of energy supply**.



Efficiently Transforming Waste into Energy

The 3rd edition of CEWEP's Energy Efficiency report² demonstrated that the energy efficiency criterion (R1 formula), which was introduced in the Waste Framework Directive (2008/98/ EC), has proved to be an incentive to increase the performance of Waste-to-Energy plants. Improvements in energy efficiency have been achieved due to optimization efforts carried out by the operators of Waste-to-Energy Plants.

The Waste-to-Energy sector is the first for which efficiency criteria have been introduced in the Waste Framework Directive, and it has proved to be an effective instrument for achieving quality (energy) recovery.

Waste-to-Energy generates reliable (base-load) Renewable Energy

² CEWEP Energy Efficiency Report (Status 2007-2010)

http://www.cewep.eu/information/energyclimate/cewepenergyefficiencyreports/976.CEWEP_Energy_Efficiency_Report_Status-.html

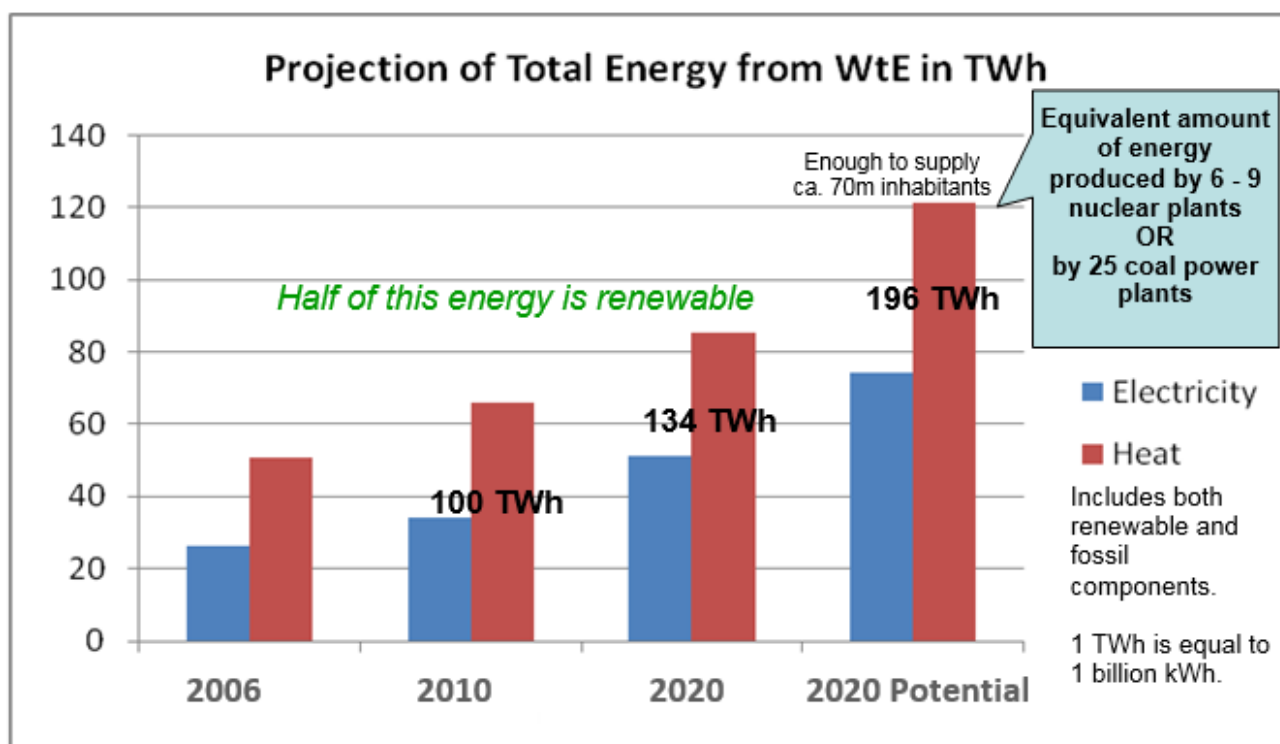
Waste-to-Energy (WtE) also helps to achieve the EU's policy for **renewable energy sources** to cover 20% of the whole energy consumption by 2020.

About 50% of the energy produced by WtE Plants comes from biodegradable biomass.

In 2010 WtE Plants supplied about 50 TWh (50 billion kWh) of **renewable energy** in Europe. This will grow by 2020 to a level of at least 67 TWh (67 billion kWh), and **potentially to 98 TWh** (98 billion kWh).

The total amount of energy (renewable + carbon components) produced by WtE plants would be double this and could potentially reach 196 TWh by 2020 - enough to supply 45 million inhabitants with electricity and 24 million inhabitants with heat³.

This would be the equivalent amount of energy that is generated by 6-9 nuclear power plants or 25 coal power plants.



- ▶ **This potential can only be realized if waste is diverted from landfilling and what is not suitable/feasible for recycling is processed by efficient Waste-to-Energy Plants.**
- ▶ **For Waste-to-Energy Plants' energy efficiency access to the grid and local infrastructure for heating and cooling is of tremendous importance.**

Waste-to-Energy is a cost-effective energy source

The recently published [UNEP report "District Energy in Cities states: Unlocking the Potential of Energy Efficiency and Renewable Energy"](#)⁴ identifies modern district energy as the most effective approach for many cities in transition to sustainable heating and cooling, by improving energy efficiency and enabling higher shares of renewables. Energy from waste is presented as one of the ways to produce very low-cost heat and often initiate development of a city's district heating network, utilizing the energy content in non-recyclable, combustible waste.

³ This is based on the assumption that electricity demand per capita equals 1.62 MWh/capita/yr and heat demand per capita equals 5.03 MWh/capita/yr.

⁴ District Energy in cities: Unlocking the Potential of Energy Efficiency and Renewable Energy", a report by United Nations Environment Programme http://unep.org/energy/portals/50177/DES_District_Energy_Report_full_02_d.pdf

► Policy recommendations

Waste-to-Energy can make a significant contribution to sustainable energy, reducing Europe's high dependency on fossil fuel imports as well as treating waste that is otherwise not recyclable in an environmentally sound way. In order to improve the contribution WtE can make towards climate protection, we recommend the following to decision makers:

► **Diverting waste from landfills** - *burying waste means wasting precious resources*

The EU Landfill Directive with its requirement to divert waste from landfills is a good tool to protect the climate, but it must be properly implemented. It is worth noting that some countries have gone further and reduced dependence on landfills dramatically (1% or less) using a combination of Recycling and WtE (Germany, the Netherlands, Belgium and Sweden).

The Circular Economy package is an opportunity to further minimise landfilling and maximise the use of waste as a resource. It should take an ambitious approach and tackle all waste, not only municipal waste.

The most effective way to unleash the full potential of waste as a resource would be to stop the landfilling of recyclable and combustible waste in order to produce secondary raw materials or energy.

*A more ambitious EU policy on diverting waste from landfills would potentially reduce 92 m t CO_{2equ} /year by 2030⁵
= 8 % of the amount to be reduced by 2030 (1137 m t CO_{2equ})⁶*

► **Boost Quality Recycling**

In a clean circular economy quality recycling (rather than just quantity) should play the fundamental role. Waste that is too polluted should not be returned to the resources cycle and from waste that is degraded after several times of recycling it is not possible to produce a quality product that will meet consumers' demand. Waste-to-Energy is the most sustainable way to treat this kind of waste. Producing energy from waste not suitable for recycling is part of a responsible circular economy.

► **Policies to foster Energy Efficiency**

European policy focuses on the generation of renewable energy. However, distribution is also a key element in order to improve energy efficiency, reduce CO₂ emissions and ensure security of energy supply. There is a major opportunity to use even more energy from waste in the form of heat, if the appropriate linking of heat (or process steam) customers to WtE plants would be encouraged. Therefore we need drivers for improving **infrastructure for district heating and cooling** in addition to **incentives to maximize electricity production from waste**.

Replacing individual boiler heating (fuelled by fossil fuels) with District Heating, supplied inter alia by energy from waste⁷, would also **improve air quality** and help cities to comply with clean air standards.

⁵ The Climate Change Mitigation Potential of the Waste Sector, Institute for Applied Ecology (Öko-Institut) and the Institute for Energy and Environmental Research (IFEU) on behalf of German Federal Environment Agency (UBA), <http://www.umweltbundesamt.de/publikationen/the-climate-change-mitigation-potential-of-the>

⁶ Calculation based on 2013 CO₂ emissions data provided by the [European Environment Agency](http://www.europeanenvironmentagency.eu)

⁷ See also „Warmth from Waste”

http://www.cewep.eu/information/energyclimate/warmthfromwaste/1115.Warmth_from_Waste_A_Win-Win_Synergy.html

► **Access to the grid/infrastructure**

Waste-to-Energy Plants should not be put at a disadvantage in comparison to other renewable energy sources.

► **Waste-to-Energy Success Stories**

Dutch Waste-to-Energy Plant received the Global District Energy Climate Award 2013, for innovative heat and steam supply

Twence has been awarded this prestigious international prize for its supply of heat to a local district-heating network and its supply of steam to AkzoNobel's salt-production, both of which are produced in its Waste-to-Energy Plant. The International Energy Agency was part of the selection committee that evaluated the various entries from all over the world.



Since 2011, the Waste-to-Energy Plant at Twence has not only been producing electricity, but also supplying heat to Essent and steam to AkzoNobel. This was made possible by the construction of a pipeline of over 5 km for the supply of heat and a 1.5 km pipeline for the supply of steam. Thanks to these pipelines, Essent and AkzoNobel managed to reduce their consumption of natural gas by a total of 125 million cubic metres in 2011 and 2012.

The combined supply of both heat and steam makes this a unique initiative.

50% of Paris' district heating network, including the famous Louvre museum, is supplied by 3 Waste-to-Energy Plants.

These WtE Plants are: St Ouen, Issy-les-Moulineaux and Ivry/Seine.

The Plants treat the household waste, which is not suitable for recycling, of the 5.7 million inhabitants of the Parisian Metropolitan area. By treating this waste they prevent the consumption of 300,000 tonnes of oil equivalents and the release of some 900,000 tonnes of CO₂ into the atmosphere each year.



The **WtE plant in Malmö** (Sweden) supplies 60% of the heat demand of the city

and the **Brescia WtE plant** (Italy) provides 75% of the city's heat demand.



Danish success factors

- Extensive Landfill ban
- Waste-to-Energy = Combined heat and power plants
- Wide spread district heating systems - Tradition of creating collective heating systems

High utilization of energy

High energy efficiency

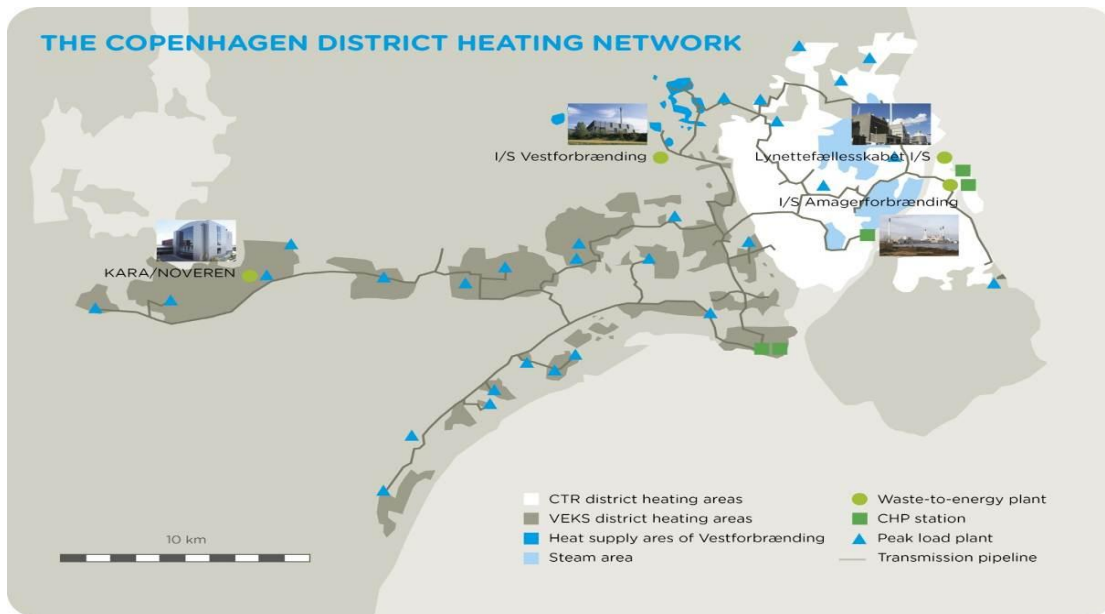
High public acceptance



Since the oil crisis in the 1970's great efforts have been made in Denmark to establish large district heating transmission networks in order to reduce dependence on oil. WtE is a part of this policy as waste

is a locally sourced fuel that in addition to reducing the use of fossil fuels, contributes to increasing fuel independence.

One of the world's largest district heating networks is the Copenhagen network, stretching more than 50km from east to west. Three WtE Plants supply heat to the same network and **more than 30% of the total district heating in the Greater Copenhagen area is generated by waste.**



► And Waste-to-Energy is COOL...

A district **cooling** system has been set up in the centre of Copenhagen, as well as at other WtE Plants in Denmark, to supply cooling to nearby shopping centres, hospitals or other buildings with a high cooling demand.



Also the **Spittelau WtE Plant in Vienna** provides cooling and heating to the Vienna General hospital.

This is in addition to providing heating for over 60,000 households in the city each year.

The plant processes around 200,000 t/year of household waste from Vienna.

Some other cities are harnessing waste for cooling
... coming to a city near you?

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CEWEP is the umbrella association of the operators of Waste-to-Energy Plants across Europe. They 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. At the same time Waste-to-Energy Plants help to reduce Greenhouse gas emissions by diverting waste from landfills.