Waste-to-Energy Plants (waste incineration with energy recovery) thermally treat household and similar waste that remains after waste prevention and recycling – generating energy from it.
Municipal waste treatment in 2017 in EU28

Waste is a Resource.

However 24% of municipal waste across the EU28 is still landfilled although landfill gases (methane) contribute significantly to global warming.
Where does Waste-to-Energy stand?

Circular Economy
- diverting waste from landfills
- quality recycling
- sink for pollutants

Waste to Energy
- Energy Union
- local, cost-effective, secure energy
- replacing fossil fuels with renewables
- energy efficiency

Energy Union
Circular Economy

“In a circular economy the value of products and materials is maintained for as long as possible; waste and resource use are minimised, and resources are kept within the economy when a product has reached the end of its life, to be used again and again to create further value.” (European Commission, 2015)

Waste Hierarchy

Set in the EU Waste Framework Directive it helps to achieve sustainable waste management.
Circular Economy

There are many ways to keep the waste higher up the waste hierarchy:

- Repair
- Swap
- Donate
- Share
- Lend
- Borrow
- Recycle
- Compost

And of course make things better in the first place...
But what do we do with residual waste?

While some things that there is no further use for can be at least recycled:

What about:
- Dirty, contaminated materials?
- Mixed materials?
- Degraded materials after multiple times of recycling?
- Materials containing substances of high concern?

The only options are...

- Recovery e.g. Waste-to-Energy
- Disposal e.g. Landfilling
Not everything should be recycled...

“In the recycling processes, articles (and the materials they consist of) that contain toxic substances contaminate the respective waste streams and are diluted in materials that do not contain toxic substances.” *

“According to modelling studies, it may take centuries to decontaminate a recycled waste stream, even if preventive measures are implemented”*

*Study for the strategy for a non-toxic environment of the 7th Environment Action Programme, European Commission 2017
But landfilling should be avoided

We need to divert waste from landfills in order to:

- protect soil and groundwater from contamination
- prevent microplastics from being blown into the seas and rivers
- avoid the creation of methane - a potent greenhouse gas (equal to 25 times \( \text{CO}_2 \) in mass)
- harness the material and energy content of residual waste
Waste-to-Energy provides local energy from our residual waste

While helping to divert waste from landfills

- Helps to reduce dependence on fossil fuels imports
- Saves millions of tonnes of CO₂
- Contributes to security of energy supply
- Provides sustainable, local, low carbon, cost-effective and reliable energy

“Diversion from landfill is the main contributor to GHG mitigation in the waste management sector”*

*The Climate Change Mitigation Potential of the Waste Sector, Öko-Institut and IFEU on behalf of German Federal Environment Agency (UBA), 2015
Health studies

Lisbon University's Institute of Preventive Medicine: waste incineration "does not impact on dioxin blood levels of nearby residents" of Waste-to-Energy plants. [Link](http://www.sciencedirect.com/science/article/pii/S0045653506016158)

UK Committee of Carcinogenity: “any potential risk of cancer due to residency near to municipal solid waste incinerators was exceedingly low, and probably not measurable by the most modern epidemiological techniques” [Link](http://www.advisorybodies.doh.gov.uk/Coc/munipwst.htm)

A Spanish study concluded that the Tarragona Waste-to-Energy plant “does not produce additional health risks for the population living nearby.” It presents results from monitoring of the Tarragona (Catalonia, Spain) Waste-to-Energy plant regarding dioxins and furans (PCDD/Fs) levels in soil, vegetation, and air samples collected in the period 2009–2010. The concentrations of PCDD/Fs in the surroundings of the Tarragona plant were monitored over the last 15 years. [Link](http://wmr.sagepub.com/content/30/9/908.full.pdf+html)
Sophisticated flue-gas cleaning devices guarantee low emissions

Waste-to-Energy Plant
Recycling & WtE complementary to divert waste from landfills
EU 28 + Switzerland, Norway and Iceland, 2017

Legend:
- Landfill
- Waste-to-Energy
- Recycling
- +Composting

Graph by CEWEP, Source: EUROSTAT
Last update January 2019
Recycling & WtE complementary to divert waste from landfills

Lessons to be learnt from the countries in the EU28

Landfilling 4% of municipal waste or less:

Germany, the Netherlands, Austria, Belgium, Denmark, Sweden & Finland

Most of them have introduced landfill bans

And have proven that Waste-to-Energy & Recycling are complementary to divert waste from landfills
Recycling & WtE complementary to divert waste from landfills

EU 28 + Switzerland, Norway and Iceland

Municipal waste treatment trends 2001-2017 EU 28

Legend:
- Landfill -32% points
- Waste-to-Energy +12% points
- Recycling +19% points

Graph by CEWEP, Source: EUROSTAT 2019
Waste to Products: Bottom Ash recycling

1 tonne of bottom ash contains between 10-12% metals

1 tonne of recycled metals from bottom ash saves 2 tonnes of CO₂equiv emissions

Minerals can be used as secondary aggregates (road construction or in building products)
Waste-to-Energy Cycle

This energy can be in the form of **steam, electricity or hot water**:

- **Electricity** is fed into the grid and distributed to the end-users,
- **Hot water** can be sent to a nearby district heating (or cooling) network to heat (or cool) homes, hospitals, offices etc.
  And **steam** can be used by nearby industry in production processes.
Waste-to-energy in daily life:

With 10 kg of residual waste:
- You can shower 7 times, 5 minutes each.
- You can power your laptop for 3 hours per day, for 2 months.
- Enough heat can be produced to warm your home for at least 8 hours.
Waste-to-Energy: examples of innovative sustainable energy use

Twence Waste-to-Energy plant in the Netherlands captures CO₂ and transforms it into sodium bicarbonate. It is used in the plant’s flue gas cleaning system thereby saving precious raw materials while reducing its carbon emissions.

SUEZ Waste-to-Energy plant in Toulouse, France, provides heating for nearby greenhouses growing 6,000 tonnes of tomatoes each year.

In Linköping, Sweden, Waste-to-Energy produces cooling for the district cooling network in a process that avoids the use of hydrofluorocarbons gases, that are thousands of times more destructive to the climate than CO₂.
Waste-to-Energy in Europe in 2016

- **WtE Plants operating in Europe** (not including hazardous waste incineration plants)

- **Waste thermally treated in WtE plants** (in million tonnes)

Data supplied by CEWEP members and national sources

* Includes plant in Andorra
CEWEP - Confederation of European Waste-to-Energy Plants

CEWEP is the umbrella association of the operators of Waste-to-Energy Plants across Europe.

They thermally treat **household and similar commercial & industrial waste** that remains after waste prevention, reuse and recycling by generating energy from it.
Thank you for your attention

Confederation of European Waste-to-Energy Plants

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