



Energy Efficiency Business Support



Energy from waste

Energy from waste helps divert waste from landfill to provide electricity and heat

Producing energy from waste (EfW) is one way of dealing with household and commercial waste that would otherwise end up in landfill. The main use for heat generated in such a manner is electricity production for the grid. However, this only converts around 20-30 per cent of the potential energy available. The remainder is lost as waste heat. The Waste Framework Directive (WFD) states that EfW facilities can only be classified as an R1, or recovery facility, if the energy conversion rate is over 60-65 per cent.

To reach this rate of conversion, the heat generated needs to be harnessed as part of a heating network or combined heat and power system. At the recent Amager Bakke facility in Copenhagen, for example, 100 per cent of the energy from waste is converted. It's used to supply 50,000 households with electricity and 120,000 households with district heating.

In Scotland, a new EfW facility is being constructed in Midlothian. The Millerhill Recycling and Energy Recovery Centre will divert up to 195,000 tonnes of waste from landfill and provide electricity to 32,000 homes. Plans are also underway to include a district heat network to a housing development of 4,000 homes in the new town of Shawfair.

EfW only makes sense when the only alternative is to landfill waste. It isn't a renewable energy source. It does use a little less carbon than the electricity grid but this won't hold true as the grid de-carbonises. EfW takes

resources out of circulation so they can't be re-used. Valuable materials such as rare earth metals can get lost in the process. For those reasons, waste prevention followed by re-use and recycling are the priority actions for Scotland's circular economy ambitions. However, EfW is a helpful stopgap to meet the 2021 landfill ban on biodegradable material. It can also help the transition to a zero landfill, high-recycling future.

There are a few different ways to convert waste to energy:

- Mass burn incineration – this burns the waste using oxygen at high temperatures (over 850°C) with the heat converting water to steam. The steam drives a turbine, which generates electricity.
- Gasification – this uses oxygen, air or steam and high temperatures to produce syngas. This can be burned to produce steam, or converted in a gas engine or turbine and used to produce electricity and heat.
- Pyrolysis – in this process, the waste undergoes thermal degradation at temperatures between 300°C to 850°C. The process typically produces a hydrogen rich syngas. It's not yet developed at commercial scale in UK but is under development.

The technology used depends on the types of waste the facility deals with. In general, EfW plants are separated into those that deal with hazardous, and those that deal with non-hazardous, waste. As well as producing heat, EfW produces some residual waste in the form of ashes, aggregates and particles. Some of this can be recovered and recycled but some needs to be disposed of in landfill. ●

AT A GLANCE

- Energy from waste diverts municipal and commercial waste from landfill
- Heat energy from the process can be captured and used to supply heat and electricity
- Isn't a renewable energy source and only makes sense when the only alternative is to landfill waste
- Can provide an interim solution in transition to fully circular economy

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