The Future of Energy-from-Waste Technology

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1. About ESWET
2. Legislative overview and insight: Technology characteristics to fulfil Circular Economy, BREF and Energy Union demands
3. What are the most interesting technologies coming to the Energy-from-Waste sector?
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1. About ESWET

- ESWET is the association grouping the European Suppliers of Waste-to-Energy Technology
- ESWET’s Members supplied over 95% of the European Waste-to-Energy (WtE) plants, also called Energy-from-Waste (EfW)
- Aims:
  - Developing & disseminating Waste Incineration technologies
  - Raising awareness of the positive aspects of waste incineration for the environment, energy production and recovery of resources
- ESWET represents the Members on technical, communication and strategic issues, primarily towards the European Institutions, and also EU-level Stakeholders (other institutions, NGOs, industries)
1. About ESWET Members
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2. Legislation demands technology for: Circular Economy compliance

- Circular Economy vision: re-use and recycling of materials, closed materials loops
- Reality: not all materials can be recycled forever (fibres in paper, plastic, etc.)
- EU legislation will eventually phase out landfilling = role for thermal treatment for residual waste
- Need a technology that:
  - guarantees durable landfilling minimisation
  - works > 8,000 hours per year
  - accepts all residual waste, not cherry-picking clean wastes
2. Legislation demands technology for: Circular Economy compliance

- Material recovery requirements call for a technology that can yield recyclable metals, not embedded in another product or vitrified in a matrix

⇒ Technology of choice: Incineration that takes all residual wastes, maximum reliability. Maximised metal recovery

Metal sole of a safety shoe extracted from French bottom ash for recycling
2. Legislation demands technology for: BREF compliance

- Best Available Techniques (BATs) or proven equivalent are mandated by EU legislation
- Associated Emission Levels (BATAELs) are under revision in the Waste Incineration BAT Reference Document (WI BREF)
- BATAELs are being elaborated from data provided by existing BREF-compliant plants, almost all Grate Incinerators, showing very good emission results
2. Legislation demands technology for: BREF compliance

- New BATAELs will be the basis for potentially new Emission Limit Values to be met by any Energy-from-Waste Technology, 4 years after the new BAT Conclusions Document is published.

⇒ Technology of choice: Incineration with efficient Flue Gas Cleaning systems. No permits for sub-standard technologies.
2. Legislation demands technology for: Energy Union Contribution

- Energy Union, proposed in 2015, aims at secure, sustainable and affordable energy for the EU
- Waste is recognised as a helpful source of energy for security of supply while reducing Greenhouse Gas Emissions
- Need a technology that will treat all waste, not leave combustible waste for landfilling (loss of energy)
- Needs to work 24/7 and provide dispatchable electricity and heat for district heating networks or industries
2. Legislation demands technology for:
Energy Union Contribution

- Technology needs to produce affordable, EU-sourced energy, without any fuels added that would undermine the Security of Supply

⇒ Technology of choice: Incineration with maximum energy efficiency, with electricity production and connected to district heating networks or industries if possible

Klaipeda, Lithuania, EfW plant supplies the city’s District Heating network, saving natural gas
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3. Modern Energy-from-Waste technology

- Incineration, steam generating
- Waste delivery and storage
- Energy Recovery
- Flue Gas Cleaning
3. Modern Energy-from-Waste technology

1. Feed Hopper

2. Grate

3. Combustion Chamber

4. Boiler

Energy Recovery (steam, hot water or electricity)

Bottom Ash Collection for recovery (metals and construction material)
3. Modern Energy-from-Waste technology

- **Fabric Filter** (for particles, dioxins, heavy metals)
- **Scrubber** (for acid gases, such as HCl and SO$_2$)
- **Cleaned Gas** (mostly water vapour and CO$_2$)
- **Fly ash storage** (for disposal)
3. Most interesting technologies

Combustion grate

- Continuous improvement of this proven technology
- Enables reliable treatment of residual waste
- First step towards “recycling unrecyclable waste”

*Incineration grate at a Austrian EfW plant*
3. Most interesting technologies
Enhanced residues recovery

- Circular economy puts emphasis on recycling. Minerals from bottom ash have been recovered and used for decades
- EfW plants are betting on enhanced recovery of ferrous and non-ferrous metals
- Metals provide a revenue stream for plants while minimising material loss, a plus for the EU as a whole
- Metals from bottom ash may now count towards EU recycling targets

*Minerals recovered from Danish Bottom Ash for use in road construction*
3. Most interesting technologies
Enhanced residues recovery

- Example: Dry bottom ash discharge is becoming more common in some countries, boosting metal recycling prospects.
- Example: New sophisticated ash processing plants enable recovery of increasingly small metals (e.g. copper thread in an electronics wire). One plant in Switzerland even extracted 10 kg of gold from 40,000 tonnes of bottom ash!
- In Belgium, 40% of metal packaging was recycled from EfW bottom ash. This metal would be unrecyclable if vitrified.

Zinc extracted from Swiss fly ash, turned into ingots for sale

Everyday metal products extracted from French bottom ash for recycling
3. Most interesting technologies

Enhanced Flue Gas Cleaning

- Air emissions from Energy-from-Waste plants are already at very low levels, thanks to a varied combination of Flue Gas Cleaning (FGC) Systems.
- Prospects are for cheaper or more efficient FGC, making EfW more performing, more affordable, and more likely to be built in new countries.

*Flue Gas Cleaning System in a French EfW plant*
3. Most interesting technologies

Enhanced energy efficiency

- Waste Framework Directive’s R1 Formula incentivises high energy recovery efficiency
- EfW plants operating as CHP have highest R1 results. But CHP usage is function of the local climate, and more often found in colder areas. Advantage for North/Eastern Europe over UK
- An EU Climate Correction Directive was published in 2015 to help EfW plants in Green and Blue zones meeting R1
- EfW plants in green areas (including most of UK) get a partial correction multiplying their R1 result according to local climatic conditions
- This should help develop EfW plants even if no District Heating exists locally
3. Most interesting technologies

Enhanced energy efficiency

- Example: Plants being built in Eastern Europe and Scandinavia are connected to District Heating networks = High efficiency and secure heating
- Example: Electricity-only plants are being built “CHP-ready” by preparing turbine bleeds if heat clients become available
- Example: Pre-treating waste to enable its shipping and avoid landfilling makes sense. But if pre-treatment aims at cherry-picking only some combustible waste for very delicate processes, there is a loss
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4. What can the UK learn from other EU countries on technology?

2013 MSW Treatment in EU28
4. What can the UK learn from other EU countries on technology?

- By law, Landfilling must be phased out. Many countries have already minimised landfilling of untreated municipal waste
- These countries have installed efficient recycling systems, in which the UK also is very skilled
- EU Member States that have the highest recycling rates and the lowest landfilling rates have all succeeded through the use of a key EfW technology: grate incineration

*Runcorn EfW plant supplying heat for the neighbouring industrial cluster*
4. What can the UK learn from other EU countries on technology?

• With its oceanic climate, the UK can only benefit from a partial Climate Correction, so spreading District Heating networks also means supporting EfW plants.

• Other option is smart re-industrialisation, where heat consumers are installed near existing EfW plants, or new plants are smartly located near heat consumers.

• Residues recovery promises to be an increasing revenue stream, while helping towards the Circular Economy aims.

British expertise in bottom ash recovery and use is growing.
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5. The Future of the Energy-from-Waste Technology sector

In Europe, ESWET is confident that smart regulation will come on:

• Circular Economy, favouring energy recovery and recognising the recycling of metals from bottom ash, which would otherwise be lost in landfills

• Landfilling will be progressively phased-out by more recycling and more EfW. Both are needed to minimise landfilling

• Ambitious but workable WI BREF, enabling existing plants to continue their good work, keeping newly-built ones affordable

• Energy landscape in Europe will change, requiring indigenous, dispatchable, sustainable and affordable energy

⇒ Grate Incineration Energy-from-Waste can fill all these roles
5. The Future of the Energy-from-Waste Technology sector

Beyond Europe...

- Many locations will need EfW. They will ask for proven and reliable, affordable Energy-from-Waste technology.
- ESWET members can deliver such plants.
- EfW operators can also cooperate to improve technology or to help sharing best practices.
- By analogy, a well-built and well-maintained Plane + well-trained Pilot are all necessary to fly safe. Native English-speaking EfW operators from the UK would make great EfW ambassadors worldwide!

⇒ European Technology sold abroad also means jobs in Europe
Thank you for your attention!

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