

## INTRODUCTION

Whenever environmental issues are being discussed today, it is increasingly 'normal' for discourse to turn to the issue of climate change. Whatever the issue being discussed, the potential contribution of the relevant activities to changes in climate through the emission of so-called greenhouse gases (GHGs) has become a critical determinant of how the environmental performance of those activities is perceived. As existing fossil fuel reserves have become unviable or unreliable, the challenge of providing a secure energy supply for power generation within Europe has increased significantly in terms of both financial and environmental cost.

In contrast, domestic waste volumes are increasing and landfill capacity is limited. The priority is always to reduce, re-use or recycle waste, but after these options have been exhausted, extracting energy from the residual (non-recyclable) waste now makes a valuable contribution towards providing a balanced and secure energy portfolio for Europe.



edc has gained vast experience in the EFW sector as a natural follow on from years of pharmaceutical and industrial experience. The following is a brief introduction to how EFW plants operate.

## ENERGY FROM WASTE (EFW)

Energy from waste (EFW) facilities combust waste under controlled conditions, to reduce its volume and hazardousness, and to generate electricity and/or heat. Electricity generated from a typical 100,000tpa facility would be roughly equivalent to the electricity usage of 10,000 houses and would be exported to the national grid. Any heat produced by the plant could be used in industrial or district heating schemes if appropriate to the need and the infrastructure can be developed. Plant capacities are regarded as small scale (~150,000 tpa or less), medium scale (~150 - 250,000 tpa) or large scale (> 250,000 tpa)

based on available throughputs. CHP schemes are particularly suitable in urban locations where there is likely to be a heat demand within a reasonable distance of the CHP plant.

Incinerators require control measures for stack emissions, flue gas cleaning equipment e.g. acid scrubbing plant, carbon injection system, electrostatic precipitators or fabric 'type' filters must be provided, depending on the type of control system employed. The equipment employed for the control of stack emissions can occupy much of the space required by the plant and these cleaning processes are now well established and form a significant proportion of the overall capital costs of the plant (30 – 60%).

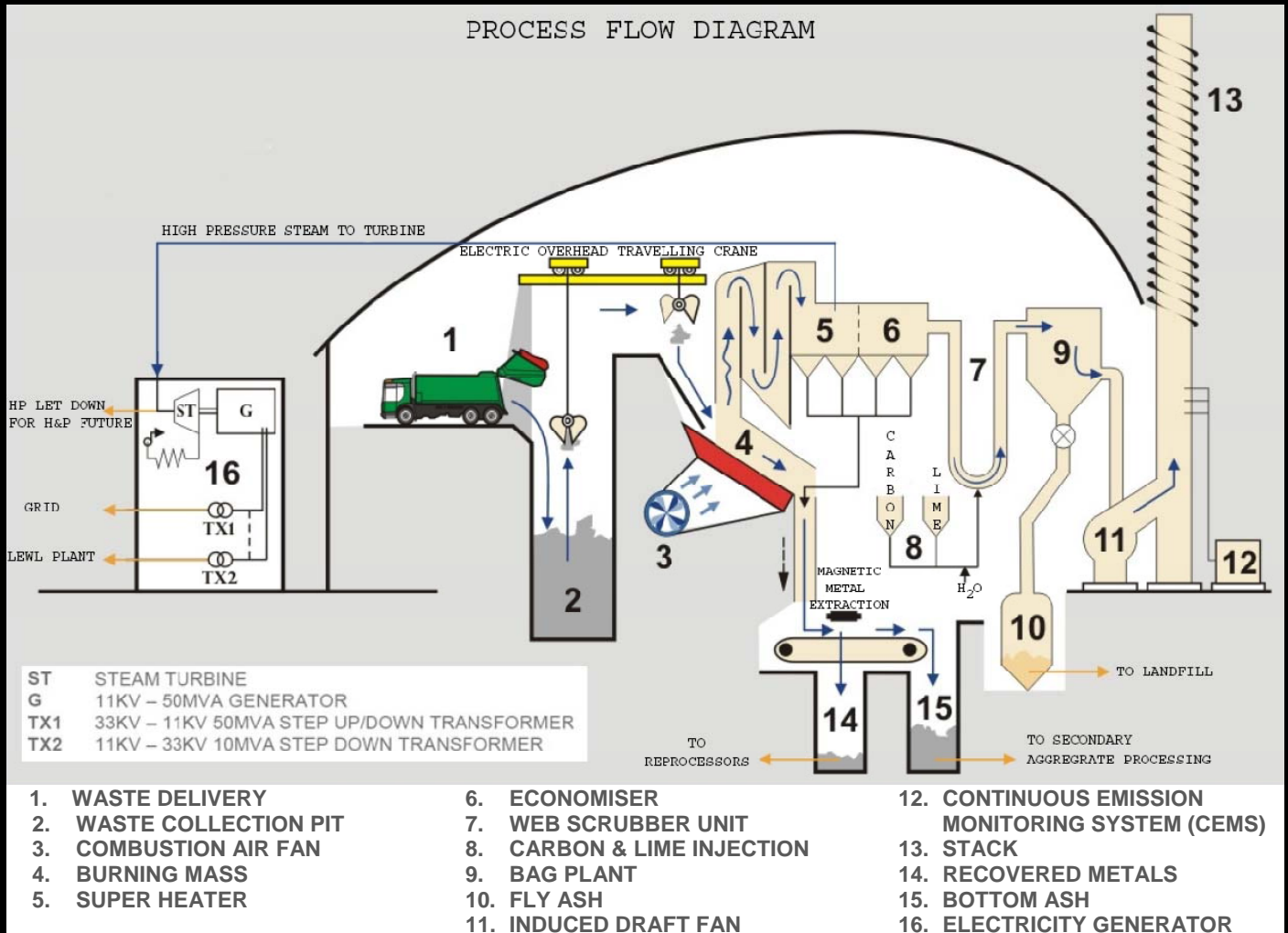
There is also a requirement to deal with the residues of the combustion process. There are two principal solid residues from thermal treatment systems: the bottom ash, which is the solid remainder of the waste feedstock after processing; and the Flue Gas Treatment (or Air Pollution Control) residues from the air pollution control process.

## HOW DOES ENERGY FROM WASTE WORK?

Household and commercial/industrial residual waste is delivered into EFW plants by waste disposal trucks, skip vehicles and articulated lorries. The delivery vehicles are weighed on entry into the site, after which they tip their load into a large bunker. They weigh again on exit to calculate the amount of waste delivered to the site.



Grab cranes mix the waste in the bunker to obtain a more controlled calorific value, then loads the waste into a hopper from where it is pushed into the incinerator by hydraulic rams.



The initial firing of the boiler is achieved using an approved low sulphur diesel. Once the waste is burning inside the incinerator, the diesel burners are switched off and the waste becomes the fuel. The hot gases produced by the incineration process are used to heat water in a boiler until it becomes superheated, dry steam at circa 45 bar pressure and 400 °C.

The products of combustion or bottom ash that are left from the waste incineration process are transported by moving belts into dedicated bunkers. Ferrous metals are removed from the bottom ash and then recycled. The bottom ash is removed from site and can be processed into an approved aggregate material for road building and construction.

The hot gases from the incineration process that were used to heat the water now contain various compounds and chemicals that need to be treated. These gases and chemicals are cleaned using a process called Flue Gas Treatment.

The Flue Gas Treatment process uses slaked lime to absorb Sulphur gases and HCL. Activated carbon is used to absorb dioxins and heavy metals, and Ammonia to reduce NOx gases. Finally, the air is passed through a bag filter before it is released from the stacks. The emissions are monitored in real time using state of the art calibrated measuring instrumentation to ensure compliance with permitted emissions limits.

The superheated, dry steam that was created from the boiler process now travels to the steam turbine where its energy is used to drive the turbine, which in turn drives a generator set. The generator produces enough electricity to power the EFW facility and export substantially onto the National Grid.

The spent steam is condensed and pumped back to the boiler making a closed-loop steam / water circuit. Facility can also been designed so that off-site district heating ('Combined Heat & Power - CHP') can be provided to local consumers in the future.

## THE FUTURE

A number of EFW technologies generate heat or electricity from municipal, commercial and industrial wastes. Together, these types of waste constitute some 66 per cent of the 335 million tonnes of waste the UK produces each year. Energy from waste is expected to account for 25 per cent of municipal waste by 2020, compared to 10 per cent today.

The climate for investment is very encouraging, with widespread confidence in the market.

**edc** is committed to producing smart economical designs for the EFW sector and working with partners in the successful delivery of EFW projects.

For further information please email us on [info@edclondon.co.uk](mailto:info@edclondon.co.uk).

*Images contributed by Lakeside EFW.*

