

Sheffield's Energy Recovery Facility



TRANSFORMING OUR RUBBISH INTO ENERGY

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Sheffield *where everyone matters*



SHEFFIELD'S ENERGY RECOVERY FACILITY

The **city of Sheffield** and the rest of the UK are striving to manage and dispose of rubbish in a more environmentally friendly and cost-effective manner. Legislation from Government and Europe means that the UK can no longer continue to send the majority of its household rubbish to landfill. Along with waste reduction and recycling, energy recovery is part of the solution.

Sheffield's Energy Recovery Facility turns local rubbish into electricity and heat for the city. This facility is making the most of the rubbish that is thrown away. It provides a way to generate energy for the local area that reduces carbon emissions and minimises the need for landfill sites.



ABOUT THE ENERGY RECOVERY FACILITY

The mixture of waste awareness campaigns, recycling services and the efficient Energy Recovery Facility (ERF) helps Sheffield to ensure it only sends a small amount of rubbish to landfill sites.

The heat generated at the ERF, by burning rubbish in a specially controlled environment, is turned into steam and used to make thermal energy for buildings across Sheffield city centre. It also generates electricity for the National Grid.

This is not a new innovation. Sheffield has been recovering energy from rubbish for many years. In the 1970s the waste incinerator was connected to a small network of underground pipes to deliver heat to local homes. In the 1980s, the network was expanded and the ERF developed to generate electricity.

A new ERF was opened in 2007 designed to cope with the amount of rubbish created in the city today and to meet new stricter environmental legislation regarding emissions. Along with the waste reduction and recycling initiatives in place, it is a crucial part of the waste management system in Sheffield.

Some facts and figures:

- /// The ERF is designed to handle up to 225,000 tonnes of household rubbish a year
- /// The ERF also generates up to 21MW of electricity to the National Grid. That is enough to power more than 25,000 homes
- /// Up to 45MW of heat is supplied to over 140 buildings connected to the District Energy Network
- /// Homes, leisure centres, offices, theatres and university buildings are just some of the different types of buildings that use the energy created by the ERF

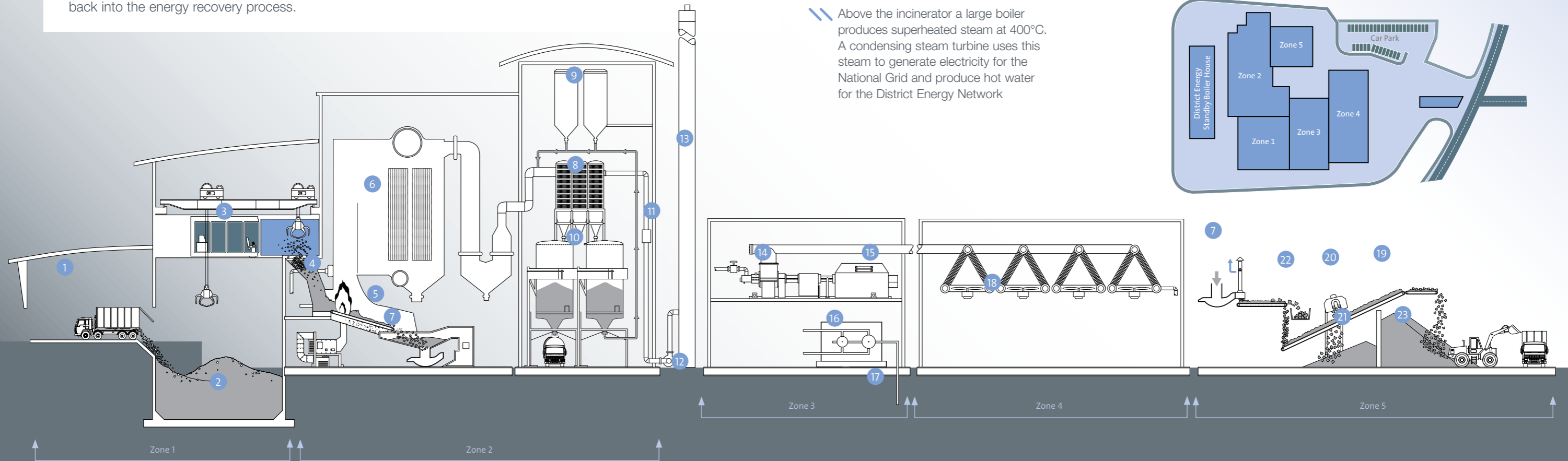
HOW DOES IT WORK?

Sheffield's energy recovery facility (ERF) is built using the latest technology and is designed to maximise the efficient generation of combined heat and power.

A condensing steam turbine takes 40bar steam to produce the electricity. The facility has been designed to allow us to adjust the amount of heat and electricity we generate according to demand.

Some power generation processes use a lot of water to cool the steam. To minimise our environmental impact we use air cooled condensers to cool the steam and turn it back into water so it can be recycled back into the energy recovery process.

- ▬ Rubbish from households, Local Authority services and some local businesses is brought to the ERF. It is tipped into the waste storage bunker which can hold up to 2,700 tonnes of rubbish – that is the same weight as 2,250 average family cars
- ▬ From the bunker the waste is lifted into a feed hopper by an overhead crane at a rate of 28 tonnes per hour
- ▬ The hopper feeds the waste into a single incineration unit where it is burned at temperatures in excess of 850°C
- ▬ Gas fired burners ensure that the correct temperature of 850°C is reached before any rubbish can be fed into the unit
- ▬ Above the incinerator a large boiler produces superheated steam at 400°C. A condensing steam turbine uses this steam to generate electricity for the National Grid and produce hot water for the District Energy Network
- ▬ Urea is introduced to the furnace to treat NOx (Oxides of Nitrogen) emissions
- ▬ Lime and activated carbon is introduced to neutralise the acidity of the flue gas and absorb other pollutants
- ▬ The cooled flue gases pass through a filter house where the particulate (dust) is captured by 1,760 filters. Particulate collected in this process is then stored in a silo for separate disposal later
- ▬ Cleaned gases are then released through the 75m chimney. These gases are continuously monitored to ensure they meet strict environmental regulations
- ▬ An electromagnetic overband separator removes metal from the ash. The metal is recycled by a local company
- ▬ Ash from the incineration process goes into a bunker before it is taken away for recycling into aggregate for the construction industry
- ▬ Particulates removed from the filtering process are taken to a process plant for treatment and then safe disposal



Key to the plant diagram

- | | | | | | | | |
|----------------|---------------|------------------|-------------------------|------------------|----------------------------|-----------------------|-------------------|
| 1 Tipping hall | 4 Feed hopper | 7 Ash discharger | 10 Residue silos | 13 Chimney | 16 Heat exchangers | 19 Ash conveyor | 22 Oversize items |
| 2 Refuse pit | 5 Grate | 8 Bag filters | 11 Emissions monitoring | 14 Steam turbine | 17 District Energy Network | 20 Magnetic separator | 23 Bottom ash |
| 3 Control room | 6 Boiler | 9 Reagents silos | 12 ID fan | 15 Generator | 18 Air cooled condensers | 21 Ferrous scrap | |

EMISSIONS AND MONITORING

Sheffield's Energy Recovery Facility must meet stringent emission limits set out in EU regulations and legislation. We monitor our performance 24 hours a day.

We provide information about our performance to the Environment Agency who verify our monitoring data. They also carry out their own monitoring and checks to ensure we are operating responsibly.

- Our aim is to ensure pollution released by the plant approaches zero emissions
- The ERF uses the latest technologies to clean the flue gas produced by the energy recovery process
- Pollutant levels are always 10% to 60% below the maximum permitted values



The following table shows our daily average emission limits. We must ensure that we do not emit more than these permitted amounts. You can take a look at how we are performing on our website: www.veolia.co.uk/sheffield

Dust (Particulates)	10mg/m ³
Total Organic Carbon	10mg/m ³
Hydrogen Chloride	10mg/m ³
Carbon Monoxide	50mg/m ³
Sulphur Dioxide	50mg/m ³
Oxides of Nitrogen	180mg/m ³

WORKING FOR A GREENER SHEFFIELD

On average, every UK household produces over one tonne of rubbish each year. That is a lot of rubbish to deal with!

Sheffield's Energy Recovery Facility helps to manage the rubbish created in the city in a way that provides many environmental benefits:

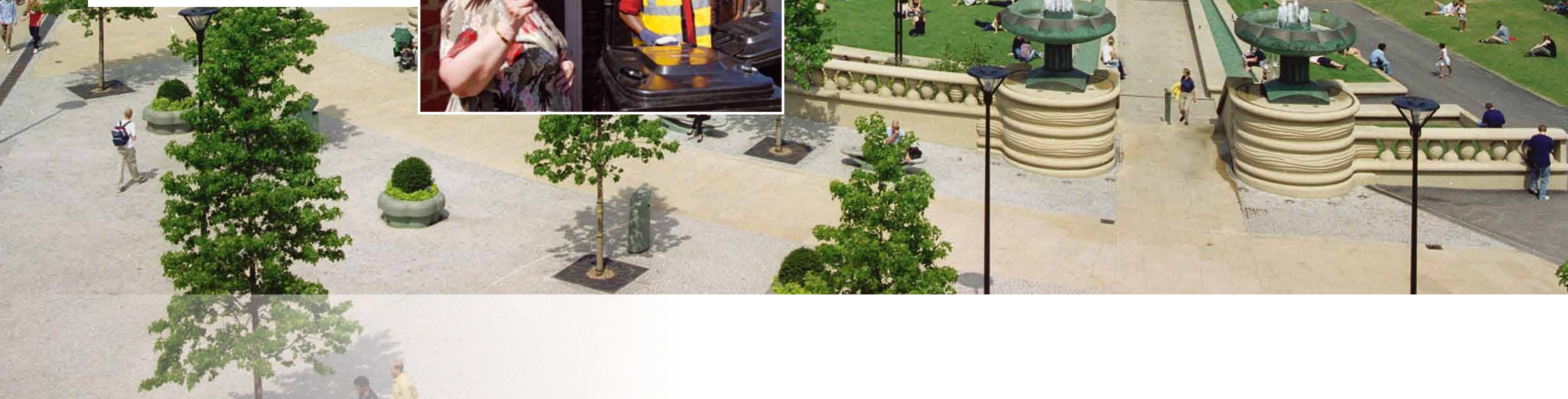
- More than 140 buildings, including leisure centres, hotels, houses, schools and colleges and offices use the energy recovered from waste generated in the city
- Heat provided by the District Energy Network saves up to 21,000 tonnes of carbon emissions from being released into the atmosphere every year
- Using District Energy helps local businesses and organisations to reduce their use of fossil fuels
- Rubbish doesn't end up in landfill. This helps the city to meet environmental targets
- The ERF is centrally located which cuts down the miles that the refuse collection vehicles have to travel, minimising congestion and pollution
- On average this facility generates enough electricity to boil 14,000 kettles every hour
- This ERF helps to save 2.5 tonnes of CO₂ every hour



WORKING TOGETHER

As part of our job working with Sheffield City Council to manage the city's rubbish it is vital that we work with communities to raise awareness about waste reduction, recycling and other waste issues. Here are a few examples of how we do that:

- Education – we have a team of waste awareness officers who visit schools and community groups with an exciting programme of activities
- Roadshows – you will often see us in the city centre and in your local community with our mobile information unit promoting services to help you to reduce the amount of rubbish you create or recycle more
- Getting involved – we support local charities and organisations by providing certain recycling services and our employees help by raising money and volunteering their services



VEOLIA ENVIRONMENTAL SERVICES IN SHEFFIELD

We are working with Sheffield city council to find the best way to deal with the rubbish created in the city.

As part of our 35 year contract we will use up-to-date technology and modern infrastructure to deliver reliable and appropriate services to the local community. We will also encourage people to reduce, reuse and recycle.

In Sheffield we are responsible for efficient refuse collection services, encouraging waste reduction and providing recycling services to increase recycling rates. We operate a Materials Recovery Facility which sorts 20,000 tonnes of paper and card for recycling as well as the Energy Recovery Facility and District Energy Network.

Added to the local knowledge we have in our Sheffield team, we utilise our experience of managing waste and energy recovery across the UK and abroad to ensure we deliver best practice.



For further information, please

Visit: www.veolia.co.uk/sheffield

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