Follow your waste as it is converted into heat and electricity.

MälarEnergi

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Illustration: Tobias Flygar

We turn your waste into heat and electricity.

There are a total of 34 energy recovery plants in Sweden.

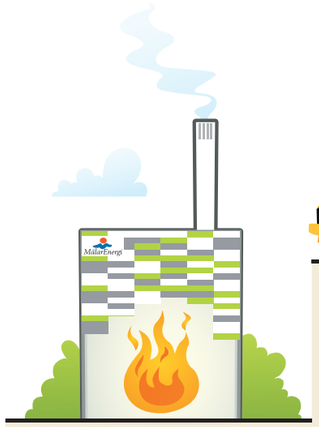
Mälarenergi began supplying Västerås residents with district heating as early as 1954. Today, the district heating grid covers 810 kilometres and the cogeneration plant supplies 97 per cent of properties in the centre of the city with district heating. In addition, the plant supplies Hallstahammar, and soon also Surahammar, with district heating.

District heating is good for the environment
Instead of each household firing up a boiler for heating, we light one big fire. In order to be able to guarantee a secure supply and relatively low prices we have refurbished the cogeneration plant, adding a new system known as Unit 6. Work on tuning in the new system began in spring 2014 in connection with the introduction of a new fuel type, namely waste.

Your rubbish becomes fuel
The waste that Mälarenergi uses comes from households, businesses, schools and industries in Västerås and elsewhere in Sweden, collected both from the green residual waste bins and from the recycling centres' combustible waste containers. We also import waste from other European countries.

Waste – a valuable by-product
Waste is generated wherever there is human life. Sweden is good at recycling and reusing waste. Sweden is also at the forefront of energy recovery thanks to efficient and advanced district heating systems fuelled by waste. Many European countries are lagging behind in this field, forcing them to dispose of waste at landfill sites.

When we import this waste and process it in our cogeneration plant to generate energy we help lessen this negative environmental impact.



4. Recover energy

In Sweden only 0.8 % of household waste ends up in landfills.

5. Landfill

3. Recycle

2. Reuse

1. Reduce

The waste hierarchy
- a strategy for handling waste.

All EU countries shall handle waste based on a shared principle known as the waste hierarchy.

First we need to reduce the amount of waste generated, and then we need to reuse and recycle what we do generate. When this is no longer possible, energy should be recovered from the waste meaning that it is processed in the cogeneration plant's Unit 6 to generate heat and electricity. Whatever is left that cannot be used as fuel is sent to landfill – the final step in the waste hierarchy.

Sweden is good at recycling and reusing as much of our waste as possible. Only a very small share of waste ends up in landfills.

Keep up the good work - keep on recycling!
We have every reason to be proud of the way that waste is processed and recycled in Sweden. The aim is that as little as possible should be sent to landfill and that we should continue to focus on responsible consumption and reducing the amount of waste that we generate.

Source: Profu, Avfall Sverige.

Fuel timeline for Västerås combined heat and power plant.

Oil 1963.

Today there is just one oil-fuelled boiler left in the cogeneration plant, and it is used solely for back-up. When it was built it represented state-of-the-art technology and a green alternative to all the home boilers that it replaced.

Energy content: 10-11 MWh/tonne

Coal 1981.

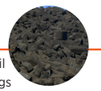
Coal was introduced as a fuel in connection with the oil crisis. The low price of coal was a powerful argument in the energy policy context of the time. We are currently working to phase out this fossil fuel.

Energy content: 7-8 MWh/tonne

Biofuel 2000.

Biofuel will remain one of Mälarenergi's key fuels in the future. It is generated from forestry operation by-products such as branches, tree tops, stumps, bark and energy crops.

Energy content: 2-3,5 MWh/tonne

Peat 2002.

Peat is currently classed as a fossil fuel. It is harvested from peat bogs and currently imported primarily from Russia. Mälarenergi are currently reducing the proportion of peat in its fuel mix.

Energy content: 3-5 MWh/tonne

Waste 2014.

Waste is sourced from the local, regional and international market whereby Mälarenergi is paid to receive the waste and process it for energy recovery. Waste becomes one of Mälarenergi's most important fuel types.

Energy content: 3-4 MWh/tonne

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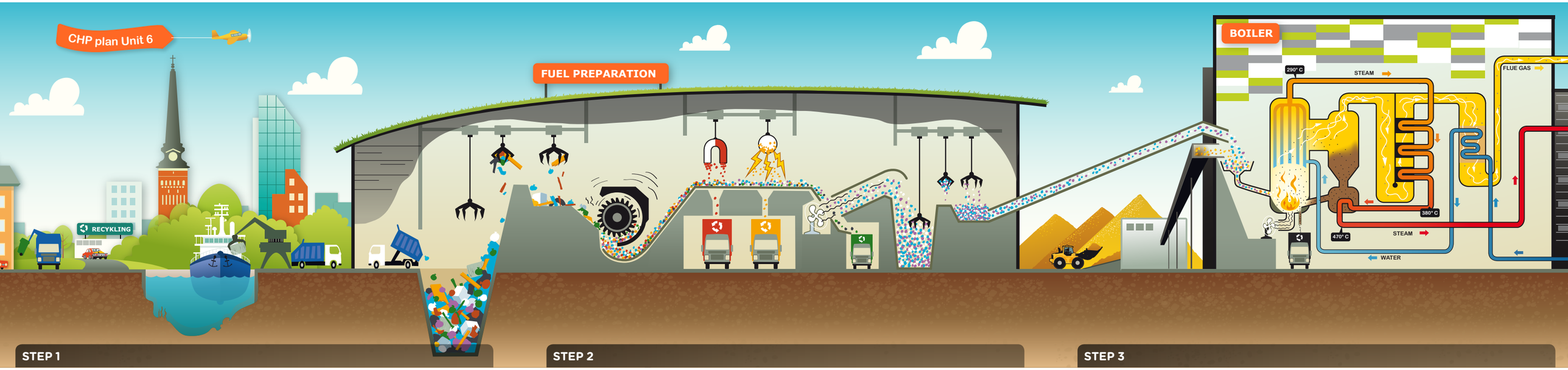

Your waste is transformed into heat.

Our new cogeneration plant is fuelled by residual waste. This includes rubbish generated by households, businesses, schools and industry as well as bio fuel. The latter consists of by-products from forestry operations such as stumps, branches and tree tops. All EU countries shall handle their waste based on a shared principle known as the waste hierarchy, illustrated overleaf. First we need to reduce the amount of waste generated, and then we need to reuse and recycle what we do generate. When recycling is no longer possible the waste is sent to our plant for energy recovery, thus becoming heat and electricity.

Here, waste becomes fuel.

Combustible waste from households and industries arrives at the plant's fuel reception point. The shipments are weighed and checked before the waste is tipped into the first holding bunker. Above the bunker are two large lifting grapples that mix and sort the waste. The lifting grapples transfer the waste to the shredder, known as Tyrannosaurus, which uses enormous force to cut the waste into credit card-sized pieces. Metal is separated from the waste and sent for recycling. The waste is then transported past a large fan where light, combustible waste is transported into a bunker while materials such as stone, glass and ceramic are left behind to be sent for recycling or landfill disposal. Left in the bunker is the finished fuel.

Nothing is wasted here.

Here biofuel and waste is introduced into the boiler. The fuel lands in a silo, from which it is transported into the boiler. The boiler uses circulating fluidised bed technology (CFB), resulting in more even and more effective combustion. Up to 90% of the fuel is used. The inside of the boiler becomes very hot, at least 850 °C. This is the temperature required in order to be able to combust environmentally hazardous substances. Water is piped into the boiler and heated by the flue gases. The water vapour that forms is lead to the turbine while the flue gas is sent for treatment.

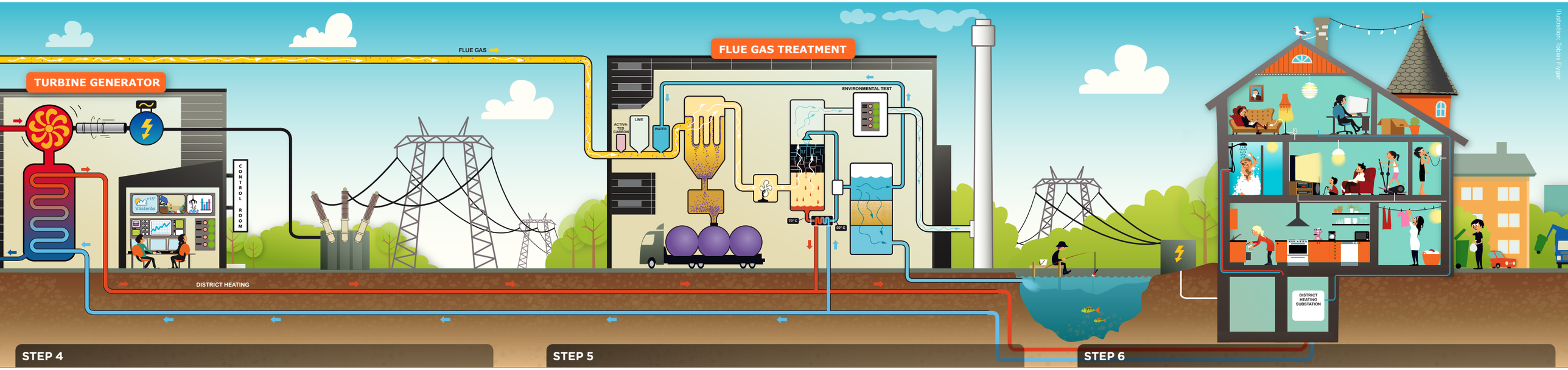

Illustration: Tobias Flygar

The vapour generates heat and electricity.

The hot vapour turns the turbine rotor. The turbine activates the generator and the electricity produced is lead through the transformer and out into the national power grid. The energy remaining in the water vapour transforms into district heating which supplies the system as well as households, industries and businesses. As the vapour cools it transforms back into water that is piped back into the boiler. This means that we can use 90% of the energy initially added to the boiler. Our control room is staffed 24/7 and allows us to monitor production and adjust it depending on the season.

The flue gases are purified.

Flue gas treatment transforms environmentally hazardous substances into fixed compounds that are easier to process. In order to achieve this, activated carbon, lime and water are added. Together with the acid flue gases and heavy metals, these form particles that become trapped in a huge bag filter and are disposed of as hazardous waste. The remaining flue gas is purified using water to bind contaminants. The water is recycled at the start of the flue gas treatment process and a small amount of purified water is piped into Lake Mälaren. The remaining flue gas is tested for environmentally hazardous substances before being allowed to escape through the smokestack.

The heat and electricity reach your home.

The electricity is lead, via substations, to homes, schools, businesses and industries. The same applies to the district heating which is supplied via underground pipelines to a district heating substation which in turn heats radiators and water for washing dishes and showering. In other words, your waste has found its way back to you in the form of heat and electricity. It lets you turn lights on, talk on the phone, cook or simply cosy up in front of the TV.