Working to benefit Shetland's Environment and Economy

Energy Recovery Plant

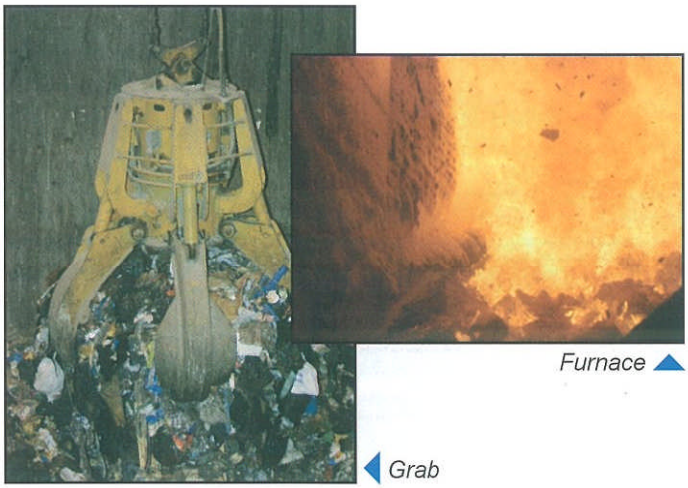
Shetland lies approximately 100 miles north of the Scottish coast in the centre of the North Sea and Atlantic Ocean oilfields. The Energy Recovery Plant facility provides a high standard of reuse for all municipal waste including the Orkney Islands waste and offshore waste. It is the centre of excellence in its management and processing of waste.

The facility further develops the strong connections which exist between the offshore industry and local community and complements the significant investment by local industry in enhanced port facilities and specialised waste processing.

The furnace treats approximately 22,000 tonnes of waste per year. This includes all Shetland's combustible domestic, commercial, fish, clinical and industrial waste but not hazardous waste. Pre selected municipal waste from Orkney and offshore is delivered weekly to the plant in containers and compactors. Large items are removed from the waste stream and are shredded prior to incineration.

The process burns mainly municipal waste in a moving grate incinerator with waste heat boiler. The hot water produced in the waste heat boiler is used to supply the Lerwick District Heating Scheme operated by Shetland Heat Energy and Power (SHEAP) with an average of 6.5 MW being exported. The plant is designed to operate for 7,800 hours per year on a 24 hour per day, 7 day per week basis.

Once the waste has been tipped into the bunker it is mixed using a grab to become a homogenous fuel for the furnace, enhancing the operation and performance of the plant.



Furnace ▲

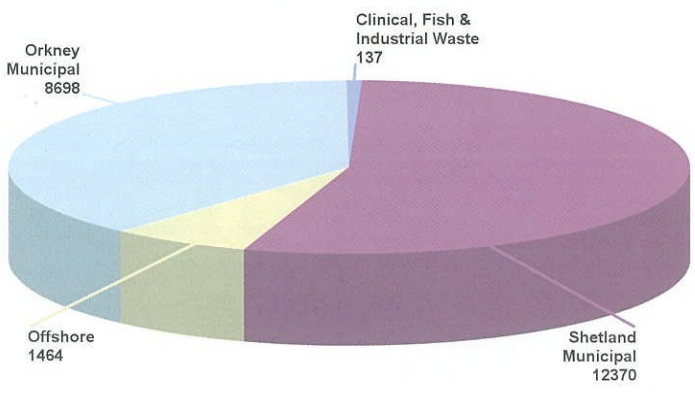
◀ *Grab*

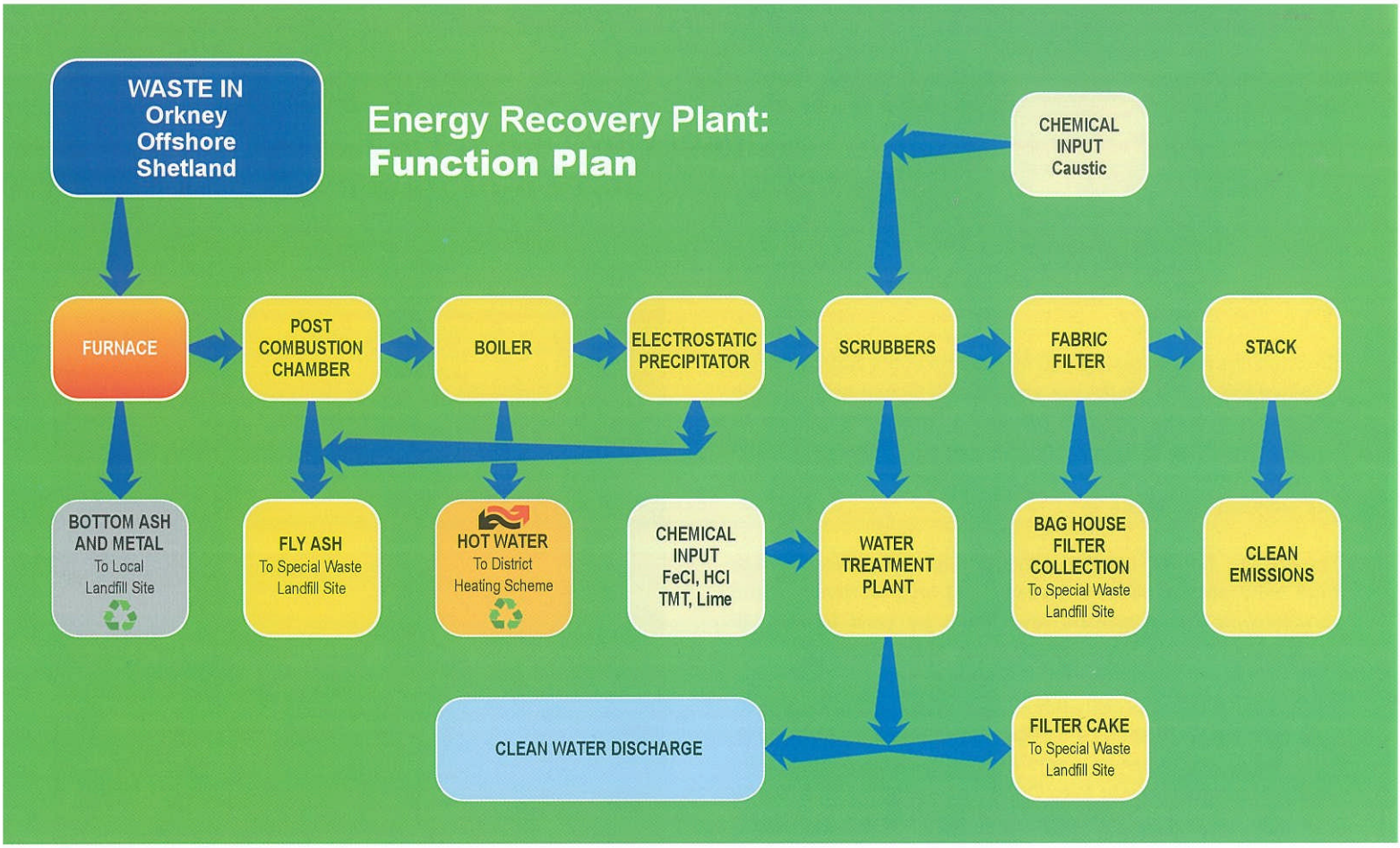
The furnace operates at a temperature of approximately 1100°c burning the waste on a three sectioned movable grate system which provides complete combustion of the waste. Once the waste has been burnt the bottom ash and any metal objects from the waste is quenched and conveyed into skips. The bottom ash is sold on for landfill cover and the ferrous metals are separated off with a magnetic separator and then recycled.

Photograph by John Coutts

Fly ash and gases from the furnace are then passed into the post combustion chamber where it is held in residence for at least 2 seconds above a temperature of 850°c to ensure the removal of dioxins. An induced cyclone in the post combustion chamber removes 90% or the larger particulate generated by the furnace. The gases are then passed through a three pass boiler which heats the district heating water to 115°c. When the heat from the water has been used it returns from the town at 55°c to be reheated. Having passed through the boiler the furnace gases are reduced to 180°c before they pass through further vigorous gas cleaning processes.

Input Tonnage for Year to October 2005





The first stage in the cleaning is done using an electrostatic precipitator that operates at a high voltage to ionise and remove small particulate. Acid gases are then reduced using a wet scrubber to meet the regulatory requirements. The wet scrubber is specialised apparatus that reduces the acid gases in a system of water and alkali sprays. This produces a high concentrate acid effluent which is then treated in a water treatment plant before being discharged as a salty water. The neutralisation process uses lime milk to counterbalance the high acidic effluent and this generates a filter cake for disposal. Additional compounds are added in the water treatment process to remove metals.

The final stage of gas cleaning is performed in the bag house filter. This is a final removal of acid gases and dioxins. Activated carbon and lime is blown into a reactor just in front of the bag filter - the carbon molecules are porous and absorb any dioxins in this stage. The carbon and lime powder coats the filter bags meaning that the gases have to pass through them.

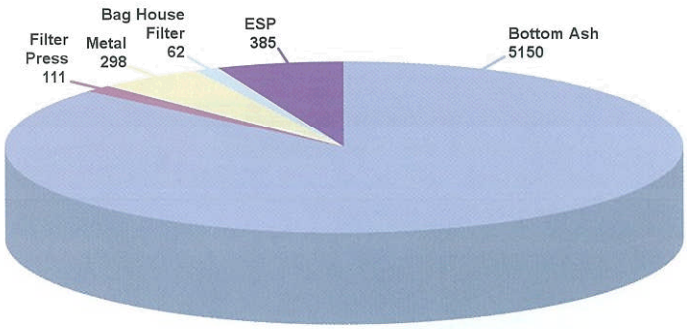
Deposits from the post combustion chamber, electrostatic precipitator, bag filter and water treatment are classified as special waste and have to be disposed of in a special waste landfill site.

The cleaned flue gases are then released to the atmosphere at a temperature near 100°c through a 46 metre high stack. All gases are continuously monitored to meet the Waste Incineration Directive regulation.

The main advantages of burning waste to get energy are:

- ✔ **an effective method of waste management**
- ✔ **the conservation of fossil fuels**
- ✔ **the use of a readily available sustainable fuel source (waste products)**
- ✔ **less waste to landfill resulting in reduction of greenhouse gases**
- ✔ **the generation of clean energy**
- ✔ **less pollution from an efficient plant - 80% thermal efficiency**

Output Tonnage for Year to October 2005



Shetland Islands Council

Energy Recovery Plant

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