

# DALDOWIE FUEL PLANT SITE INFORMATION



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## OVERVIEW

The Daldowie Fuel Plant, operated by ScottishPower subsidiary SMW Ltd, is one of the largest sludge drying centres in Europe. It converts sewage sludge into

dry, low-odour fuel pellets.

At present, the fuel is co-fired with coal to produce electricity at Longannet Power Station in Fife.

A new biomass power

station is planned within the Longannet boundary which would have the capacity to burn the fuel granules, along with waste wood, to generate 20-25 MW. Our low-odour

pellets represent an ideal fuel for the combustion sector and, as such, new markets are emerging that could provide further potential outlets for the fuel.

## INTRODUCTION TO DALDOWIE FUEL PLANT

Daldowie Fuel Plant, near Glasgow, processes sludge from hundreds of wastewater treatment plants in the West of Scotland into waste derived fuel (WDF).

Daldowie was commissioned in 2002 and is one of the largest sludge drying centres in Europe.

The dry, low-odour pellets produced at Daldowie are a type of biomass – biological material that is deemed to be a sustainable form of fuel.

A thousand tonnes of sludge can produce 23.5 tonnes of pellets that are burned to produce electricity.

The processes employed at Daldowie also provide a safe and practical route to the disposal of large volumes of sludge, instead of committing the waste to landfill or spreading it on farmland.

The fuel is transported to Longannet Power Station in Fife, 27 miles from Daldowie, in secure tankers, where it currently plays an important role in offsetting the use of coal – every 23.5 tonnes of pellets offsets the use of 16.6 tonnes of coal. Daldowie Fuel Plant operates an Environmental Management System that is certified to the international standard, ISO 14001.



■ Daldowie Fuel Plant (above) and, right, silos to store the WDF and, below, one of the site's drum driers



## REDUCING OUR ENVIRONMENTAL IMPACT

Daldowie uses advanced process technology to monitor and control all aspects of operation and to ensure stringent safety, quality control and environmental requirements are met.

The plant operates subject to conditions contained in a permit issued and enforced by the Scottish Environment Protection Agency (SEPA).

The plant recovers the useful solids from liquid sludge by physical separation and drying. The processes are designed to produce a substance that has:

- Optimum calorific or energy value
- Thermal stability
- Very low levels of pathogens, or germs
- Granules that have low odour levels
- Granules that have the correct physical characteristics for use as a fuel.

The very high temperatures used in the drying process, around 450 degrees Centigrade, is designed to kill any germs present in the raw material. Samples of the WDF produced are tested daily to ensure they meet the criteria listed above.

The plant is required to meet strict regulations on the emissions of odours, as set down by SEPA and Glasgow City Council's planning conditions. Daldowie employs two forms of odour abatement.

Sulphurous gases are collected from the sludge arriving on site and mixed with sodium hydroxide, sodium hypochlorite and a catalyst, nickel oxide.

A reaction takes place that reduces the "rotten egg" gas, hydrogen sulphide, to



■ Monitoring production in the control room

common salt, water and sodium sulphate.

The use of the nickel compound reduces the concentration of sodium hypochlorite required in the process.

SMW Ltd have also fitted Regenerative Thermal Oxidisers (RTO) on each of its three exhaust stacks to abate odour and volatile organic compounds (VOCs).

RTOs heat the gases released during the drying process so that the VOCs are broken down and burnt.

A Continuous Emissions Monitoring (CEM) system has been installed on each stack to demonstrate to SEPA that emissions limits have not been exceeded.

In 2009, new NO<sub>x</sub> analysers were fitted to Daldowie's stacks to improve monitoring and reporting of emissions.

Another key consideration is water use. Daldowie's treated and filtered effluent is recycled for use in its manufacturing processes, saving 100 cubic metres of townswater each day.

## CONTACT US

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## HOW IT WORKS

Daldowie Fuel Plant processes the treated sewage sludge from Greater Glasgow's population of around one million people.

① Around 90% of the sludge concentrate arrives at Daldowie through a pipeline while a small amount from outlying areas is delivered by sealed tankers.

② Debris is screened out before the sludge is pumped to Daldowie's 12 centrifuges.

The centrifuges work like massive spin dryers, extracting much of the liquid to produce a stream of wastewater and a concentrated sludge cake.

③ The wastewater is filtered and a portion recycled for use as process water. The remainder is sent to the River Clyde.

④ The semi-solid sludgecake is pre-mixed with some fuel granules and dropped in to one of six large drying drums where the mix is dried by the evaporative action of a hot air stream passing over it at a temperature of 450°C.

The drum's moving surface prevents the mixture sticking, while its rolling action helps the formation of granules through a process known as "Sticky Phase Granule Growth". This is similar to the way hailstones form – a small particle is coated with sludge, dries and further layers develop.

⑤ The hot drying air is sustained by a natural gas burner, to ensure the granules are dried and treated to the levels required for use as a fuel.

⑥ The fully dried granules can be heard rattling as



■ A lorry loads up with pellets

the fuel is carried on an airstream to a filter, where it is separated from the drying air.

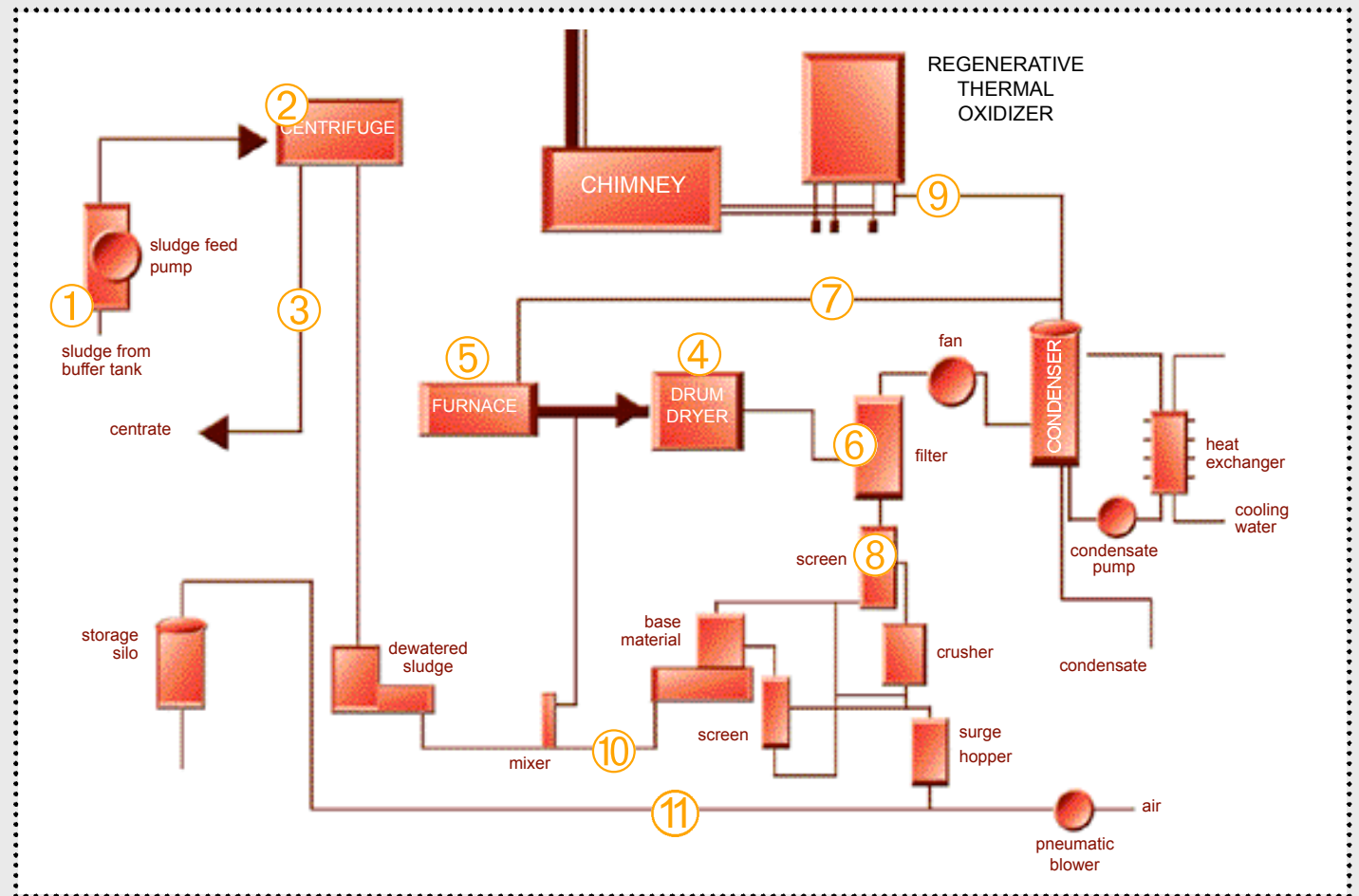
⑦ Drying air is conditioned and re-circulated.

⑧ The dried granules are then cooled to make the fuel safe before it goes through quality control.

⑨ Exhaust gases from the process travel through a condenser then to Regenerative Thermal Oxidisers abatement equipment before they are released to the atmosphere through the plant's stacks. The inert waste product at the start of the process has now been transformed into a fuel with a good energy content.

⑩ At the end of the production cycle, the fuel is graded. Any material that has been heated inadequately, or is the wrong size, is returned to the system for reprocessing.

⑪ Fuel that meets the quality control standards is cooled for a second time, to ensure it is safe for storage and transportation and passed via a stream of air to the SMW storage silos.



■ Sludge arrives by tanker

## ENVIRONMENTAL PERFORMANCE HIGHLIGHTS 2009

In 2009, Daldowie Fuel Plant processed 1,941,835 m<sup>3</sup> of sludge, creating 42,121 tonnes of WDF to be burned as a fuel at Longannet Power Station.

The total of WDF produced generated 67,130 MW/hr of electricity and offset the use of 30,000 tonnes of coal.

Daldowie received two justified complaints from local people during the year, both relating to odour. We strive to minimise odour – for more

details please see our **Odour Management** information sheet.

All complaints were investigated fully and remedial action carried out, as necessary.

There was a breach of limit conditions relating to a failure of the site's ammonia concentration limit in the final effluent sent to the river.

An incident that occurred during 2009 involved an issue with the feric dosing of sludge at a waste water treatment plant which affected the

biology of Daldowie's Liquor Treatment Plant. Production was stopped for a number of days until the issue was rectified.

Station staff reduce and recycle oil, scrap metal, wood, cardboard, paper, batteries, fluorescent tubes and electrical equipment.

Around 100 tonnes per month of WDF granules that failed to reach quality standards, which used to be sent to landfill, were used in 2009 as an agricultural fertiliser.