

DALDOWIE FUEL PLANT: SITE INFORMATION

Key facts:

- Commissioned in 2002
- One of the largest sludge drying centres in Europe
- Located in Uddingston, near Glasgow
- Converts sewage sludge into dry, low-odour fuel pellets



An 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, producing dry, low-odour pellets deemed to be a sustainable form of fuel.

A thousand tonnes of sludge can produce 23.5 tonnes of pellets. The pellets are a type of biomass – biological material which is an ideal sustainable fuel for the current combustion sector and the new markets that are emerging which could provide further potential outlets.

A further environmental advantage is that the processes employed at Daldowie also provide a safe and practical route to the disposal of large volumes of sludge, instead of having to commit the waste to landfill or spread it on farmland.

The resultant fuel is transported to our customers' sites where it is burned as a fuel, replacing traditional fossil fuels.

Daldowie Fuel Plant operates an Environmental Management System that is certified to the international standard, ISO 14001.



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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 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 temperature used in the drying process, around 450°C, is designed to kill any germs present in the raw material and samples of the WDF produced are tested daily to ensure they meet the criteria listed above.

The plant operates subject to conditions contained in a permit issued and enforced by the Scottish Environment Protection Agency (SEPA) and 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, which reduces the concentration of sodium hypochlorite required in the process. This causes a chemical reaction that reduces the 'rotten egg' gas, hydrogen sulphide, to common salt, water and sodium sulphate. SMW Ltd, a wholly owned subsidiary of ScottishPower, have also fitted Regenerative Thermal Oxidisers (RTO) on each of its three exhaust stacks to abate odour and volatile organic compounds (VOCs). The 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.

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



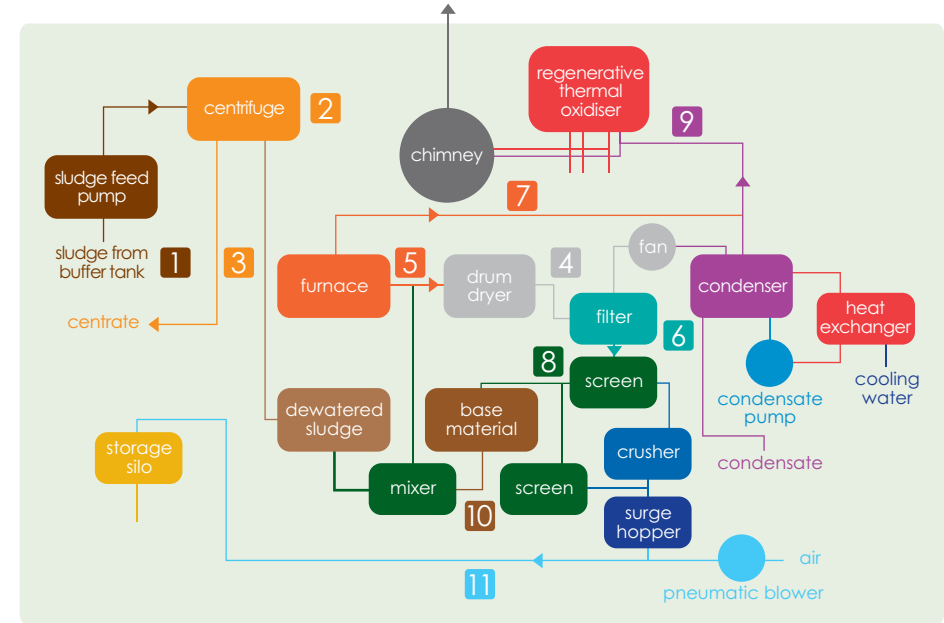
Daldowie has Regenerative Thermal Oxidisers (RTO) on each of its three exhaust stacks to abate odour

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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 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



Bagging the pellets



Loading the pellets