

BLACKBURN MILL CHP & EMBEDDED GENERATION: SITE INFORMATION

Key facts:

- Commissioned in 2002
- Located in Blackburn, Lancashire
- One of four Combined Heat and Power (CHPs) plants
- CHP is twice as efficient as conventional power stations and produce significantly less emissions



An Introduction to our stations

Recognised by the Environment Agency as clean energy technology, Combined Heat and Power (CHPs) capture heat created as a byproduct of the generation process for domestic or industrial heating purposes located near to the plant.

ScottishPower operates four CHP plants in England, each serving specific customer needs.

Blackburn Mill

Commissioned in 2002, the CHP plant in Blackburn, Lancashire, was built to serve a papermill operated by Sappi. The Mill features a gas turbine and a steam turbine that work together as a Combined Cycle Gas Turbine (CCGT) plant and used to supply up to 28 tonnes per hour of process steam for the papermill while trading any additional electricity output. Since Sappi's closure in November 2008, Blackburn Mill has been operating at full load, supplying 60 MW of electricity to the National Grid.

Pilkington

Pilkington in St Helens, Merseyside, is one of the world's largest manufacturers of glass and glazing products. To service their needs, ScottishPower provides operation, maintenance and repair of three units – Watson Street, Greengate and Cowley Hill. Each unit consists of three embedded generator packages with a rating of 3.3MW.

Watson Street, a CHP package connected to a heat recovery generator, is the control centre for the sites. The CHP generating plant has a total capacity of 30MW along with two waste heat boilers rated at 6.8 tonnes of steam per hour. Up to 17MW of electricity is supplied to Pilkington and the surplus capacity is exported.

ScottishPower operates two further facilities – an embedded 1MW generating unit that supplies Basingstoke Hospital for North Hampshire NHS Trust, and a 1.7MW CHP plant at A Pearson & Sons, a tomato growers in Alderly, Cheshire. The CHP provides all the energy needs of Pearson's vast greenhouses, while its CO₂ emissions are recycled to provide an enhanced atmosphere that improves the yield and quality of the tomatoes.

Reducing our Environmental Impact

CHPs typically have a thermal efficiency rating of between 80% and 85% which means they are highly effective at turning fuel to power and hot water/steam. This efficiency results in greatly reduced to-air emissions such as carbon dioxide (CO₂) which can be less than half that of other forms of thermal generation per GWh.

Oxides of nitrogen (NO_x) and sulphur dioxide (SO₂) emissions are also significantly lower and at Blackburn Mill, Low-NO_x burners help to further reduce its formation by optimising the fuel to air mix during the combustion process.

All of ScottishPower's CHPs operate subject to conditions contained in permits issued and enforced by the Environment Agency (EA).

Blackburn Mill and Pilkington also operate Environmental Management Systems (EMS) accredited to the international standard ISO 14001.

Blackburn Mill recycles waste paper, cardboard, oil and scrap metal as part of its EMS.

Helping Biodiversity

Blackburn Mill CHP launched its biodiversity action plan (BAP) in 2005, liaising with the Royal Society for the Protection of Birds (RSPB) and Lancashire Wildlife Trust (LWT) to develop a series of wildlife-friendly measures.

With the help of the scout troop from Feniscowles, staff have carried out initial work to create a wildlife corridor and provide nestboxes for birds, like the Blue Tit, and bats.

Long-term actions will include managing a copse of trees to the south of the site to improve its structure for animals and plants. Blackburn Mill is also a 'silver' corporate member of LWT.

The BAP was reviewed and updated in 2010.

A family of swans have made Blackburn their home



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How it Works

Blackburn Mill - a 60 MW combined cycle gas turbine plant - is the largest of four CHP co-generation units operated by ScottishPower Generation. Each of ScottishPower's four CHPs work in a similar way.

- 1** At Blackburn Mill, natural gas is imported from the Transco National Transmission System via a purpose-built 4.6km pipeline.
- 2** The fuel is combusted in a 43MW Siemens SGT800 turbine and, as the hot gases expand through the gas turbine, they drive a generator that produces electrical power.
- 3** Waste heat from the gas turbine is used to produce steam in an Alstom ENS heat recovery boiler.
- 4** Waste gases - carbon dioxide and oxides of nitrogen - from this part of the process are released to the atmosphere through the station's 50m high chimney.
- 5** The steam produced drives a steam turbine generator to produce more electricity.
- 6** Until November 2008, steam was extracted from the steam turbine and delivered to the Sappi papermill for their paper-making process.
- 7** The demineralised water for the steam cycle is produced in a Vattentechnik ion exchange water treatment plant and stored in a 400m² tank. Strictly-controlled amounts of chemicals are used to control pH levels and prevent scaling.
- 8** Surplus steam is condensed in a watercooled condenser and the heat is dissipated in the Balcke Duerr hybrid cooling towers. The cooling water required is extracted from a reservoir at the former Sappi papermill and pumped to the CHP plant for storage in a 900m² tank.

Sappi's peak demand used to be about 10MW - however, since the closure of the papermill, Blackburn Mill's full output of around 60MW is traded by Generation. The electricity generated is exported via an 11/132kV transformer into the local 132kV electricity distribution network.

Environmental Performance Highlights 2010

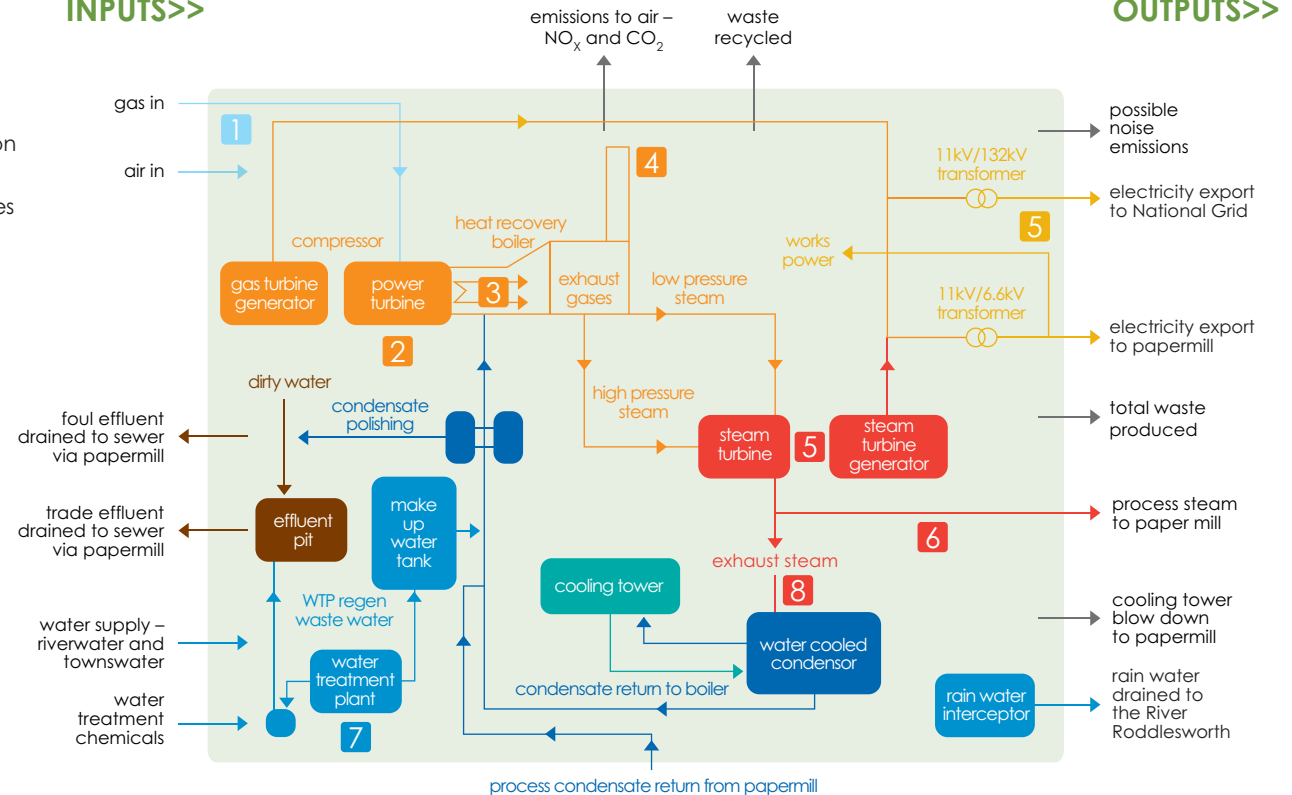
Blackburn Mill generated a total of 378 GWh of electricity in 2010 – down slightly from 382 GWh in 2009.

Since the closure of the Sappi papermill in 2008, Blackburn has operated as a small CCGT station.

Blackburn Power Station is a highly flexible generator. In 2010 the plant carried out 143 two-shifts - shutting down when electricity prices are low and starting up again to take advantage of higher peak prices. The plant also operated at baseload (or continuously) and at minimal load, according to prevailing market conditions.

There were no breaches of consent, incidents or complaints from the community in 2010.

INPUTS>>



OUTPUTS>>

During the year station staff and contractors completed two outages - one for a major GT inspection and one for routine maintenance - to ensure continued high levels of efficiency, reliability and environmental performance.

Blackburn EMS is certified to the ISO 14001 standard and the station's EMS underwent a surveillance audit in October 2010. This was recertified in March 2011.

Recent Environmental reduction projects included installation of Solar Lighting Tubes within the Water Treatment Plant and renewal of all Air Conditioning units.



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