



OVERVIEW

ScottishPower operates four Combined Heat and Power (CHPs) plants in England – each serving a customer with specific energy needs.

CHP plants are recognised by the Environment Agency as clean energy technology. Typically, they are twice as efficient as conventional

power stations and produce significantly less emissions of the exhaust gases linked to global warming. CHPs capture heat

created as a byproduct of the generation process for domestic or industrial heating purposes located near to the plant.

INTRODUCTION TO OUR SITES

BLACKBURN MILL

ScottishPower's CHP plant in Blackburn, Lancashire, was commissioned in 2002 to serve a papermill operated by Sappi.

Blackburn Mill features a gas turbine and a steam turbine that work together as a Combined Cycle Gas Turbine (CCGT) plant.

The site used to supply up to 28 tonnes per hour of process steam for the papermill and trade any additional electricity output.

However, since Sappi's closure in November 2008, Blackburn Mill has been operating at full load, supplying 60 MW of electricity to the National Grid.



three embedded generator packages with a rating of 3.3 MW. Watson Street is the control centre for the sites and is a CHP package connected to a heat recovery generator.

The CHP generating plant has a total capacity of 30 MW along with two waste heat boilers rated at 6.8 tonnes of steam per hour.

Up to 17 MW of electricity is supplied to Pilkington and the surplus of capacity is exported.

ScottishPower operates two further facilities – an embedded 1 MW generating unit that supplies **Basingstoke Hospital**, North Hampshire NHS Trust, and a 1.7 MW 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.

PILKINGTON

ScottishPower operates three units serving Pilkington in St Helens, Merseyside, one of the world's largest manufacturers of glass and glazing products.

ScottishPower provides operation, maintenance and repair of each of the plants – Watson Street, Greengate and Cowley Hill. Each unit consists of

CONTACT US

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■ Blackburn Mill CHP plant was commissioned in 2002 to provide steam to the Sappi papermill



HELPING BIODIVERSITY

Blackburn Mill CHP launched its biodiversity action plan (BAP) in 2005. The station liaised 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 Blue Tit (left), 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 will be reviewed and updated in 2010.

REDUCING OUR ENVIRONMENTAL IMPACT

CHPs typically have a thermal efficiency rating of between 80% and 85% – meaning they are highly effective at turning fuel to power and hot water/steam.

This high level of efficiency results in greatly reduced emissions to air per GWh.

Emissions of carbon dioxide (CO₂) can be more than half that of other forms of thermal generation.

Oxides of nitrogen (NO_x) and sulphur dioxide (SO₂) emissions are also significantly lower.

At Blackburn Mill, Low-NO_x burners help to further reduce the formation of NO_x during the combustion process by optimising the fuel to air mix.

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.

BLACKBURN MILL CHP AND EMBEDDED GENERATION SITE INFORMATION

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 Energy Wholesale.

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 4.6 kilometre pipeline.

② The fuel is combusted in an 43 MW 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 50-metre high chimney.

⑤ The steam produced drives a steam turbine generator to produce more



■ Blackburn Mill's cooling towers

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 Vattenteknik ion exchange water treatment plant and stored in a 400m² tank.

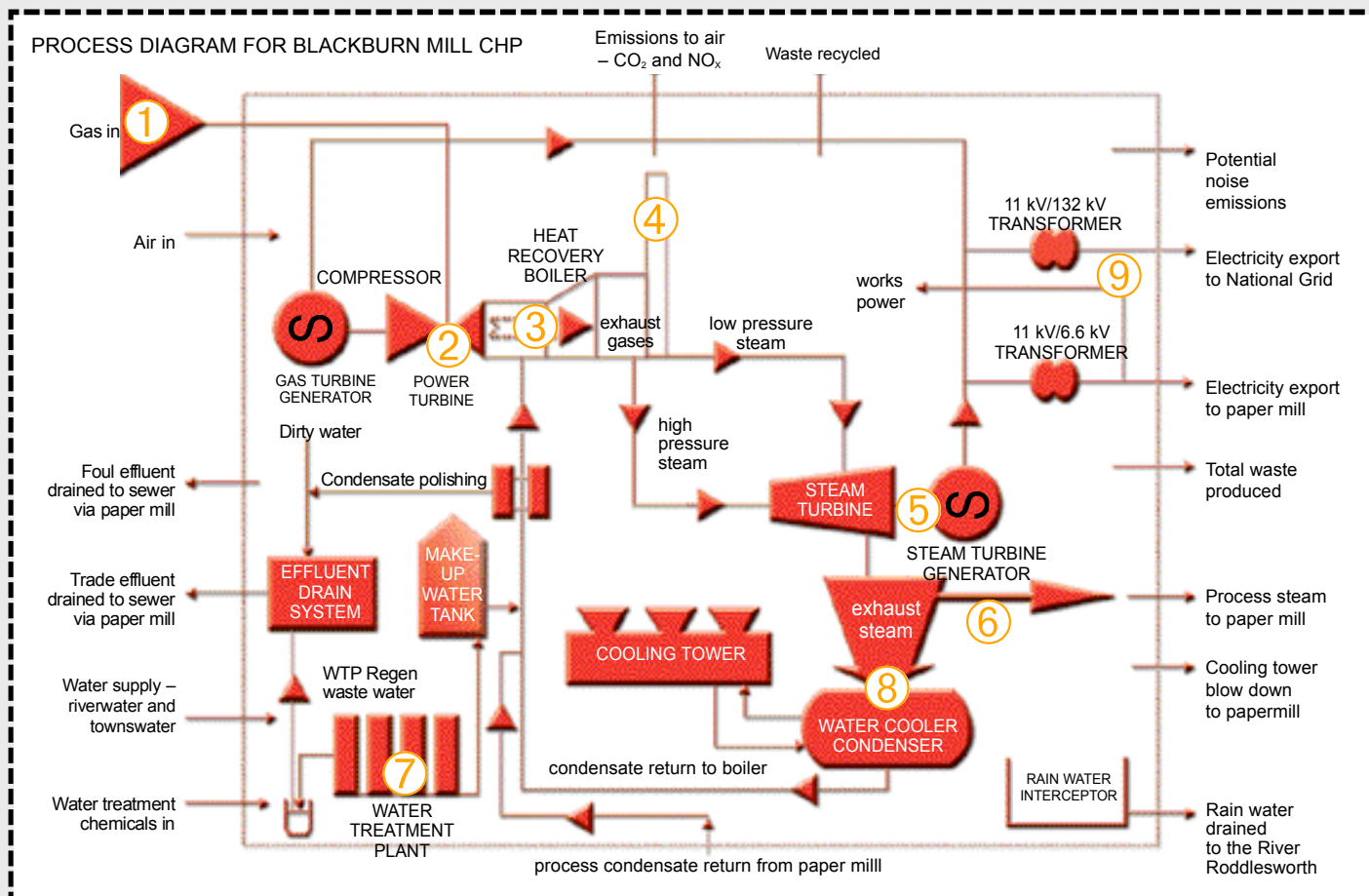
Strictly-controlled amounts of chemicals are used to control pH levels and prevent scaling.

⑧ Surplus steam is condensed in a water-cooled 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.

⑨ Sappi's peak demand used to be about 10 MW – however, since the closure of the papermill, Blackburn Mill's full output of around 60 MW is traded by Energy Wholesale.

The electricity generated is exported via an 11/132kV transformer into the local 132kV electricity distribution network.



■ 50m stack at Blackburn Mill



■ The raw water filtering system

BLACKBURN MILL ENVIRONMENTAL PERFORMANCE 2009

Blackburn Mill generated a total of 382 GWh of electricity in 2009 – down slightly from 391 GWh in 2008.

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

Blackburn Mill is a highly flexible generator.

In 2009 the plant carried out 137 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 2009.

During the year station staff and contractors completed two outages – a GT inspection and for routine maintenance – to ensure continued high levels of efficiency, reliability and

environmental performance.

Blackburn Mill's EMS is certified to the ISO 14001 standard and the station's EMS underwent a surveillance audit in February 2009.

One minor non-conformance and one area for improvement were identified and these have since been closed out.

Blackburn Mill has taken one package boiler out of service since the closure of Sappi, with significant reductions in energy and water use and use of chemicals.