

SHOREHAM POWER STATION: SITE INFORMATION

Key facts:

- Opened in 2000
- 420MW capacity, Combined Cycle Gas Turbine station (CCGT)
- Located at Shoreham Harbour in West Sussex
- CCGT is an efficient form of electricity generation with fewer emissions per unit produced



An Introduction to Shoreham Power Station

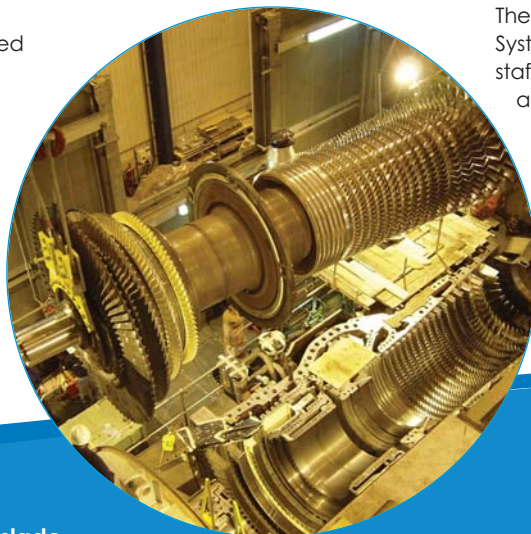
One of ScottishPower's four combined cycle gas turbine (CCGT) stations Shoreham operates at various loads in order to meet energy needs of 400,000 homes on the south coast.

The station uses a gas turbine, and a steam turbine and generator to provide one of the more efficient forms of thermal generation.

Opened in summer 2000 and operated as a 50-50 joint venture between ScottishPower and AEP, the plant was fully acquired by ScottishPower in the autumn of 2004. Its location, at Shoreham Harbour, has a history of electricity production and the site was formerly occupied by the Brighton 'B' Power Station. Construction of the modern station has utilised several features from the old plant, such as a cable tunnel under the harbour and cooling water outfall, and Shoreham's 106-metre chimney – the tallest structure in West Sussex – is on the same spot as the old brick-built stack that was demolished in 1998.

Environmental issues were closely considered during the station's development and construction. For instance, architects designed the profile of the seaside station to resemble a ship while the grounds were landscaped with shingle banks to help rare coastal plants.

Shoreham's Environmental Management System is certified to the international standard, ISO 14001 and the plant is also implementing a site biodiversity action plan (BAP).



Overhauling the gas turbine rotors

Reducing our Environmental Impact

A key advantage of modern CCGTs like Shoreham is their efficiency at converting fuel into electrical energy – typically around 55%. This results in less fuel consumption and lower levels of emissions per unit of electricity generated compared with conventional thermal stations and the station was originally highlighted by the University of Sussex as 'probably the most environmentally-friendly fossil-fuel power station in the UK'.

Burning natural gas gives rise to minimal emissions of dust, ash or sulphur dioxide (SO₂) which has been linked with 'acid rain' damage to ecosystems and respiratory irritation in humans. Shoreham also produces approximately half the emissions of CO₂ of conventional plants while its highly efficient dual combination system produces minimal oxides of nitrogen (NO_x).

The station operates subject to conditions contained in a permit issued and enforced by the Environment Agency (EA).

The station also employs an Environmental Management System that is accredited to the standard, ISO 14001 and staff continually strive to minimise waste from the site and actively recycle paper, card, oil, scrap metal, wooden pallets and printer cartridges.

Shoreham, as part of the community, is dedicated to being a good and trusted neighbour and to ensuring its environmental performance is of the highest possible standard.



Shoreham's 106m chimney

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How it Works

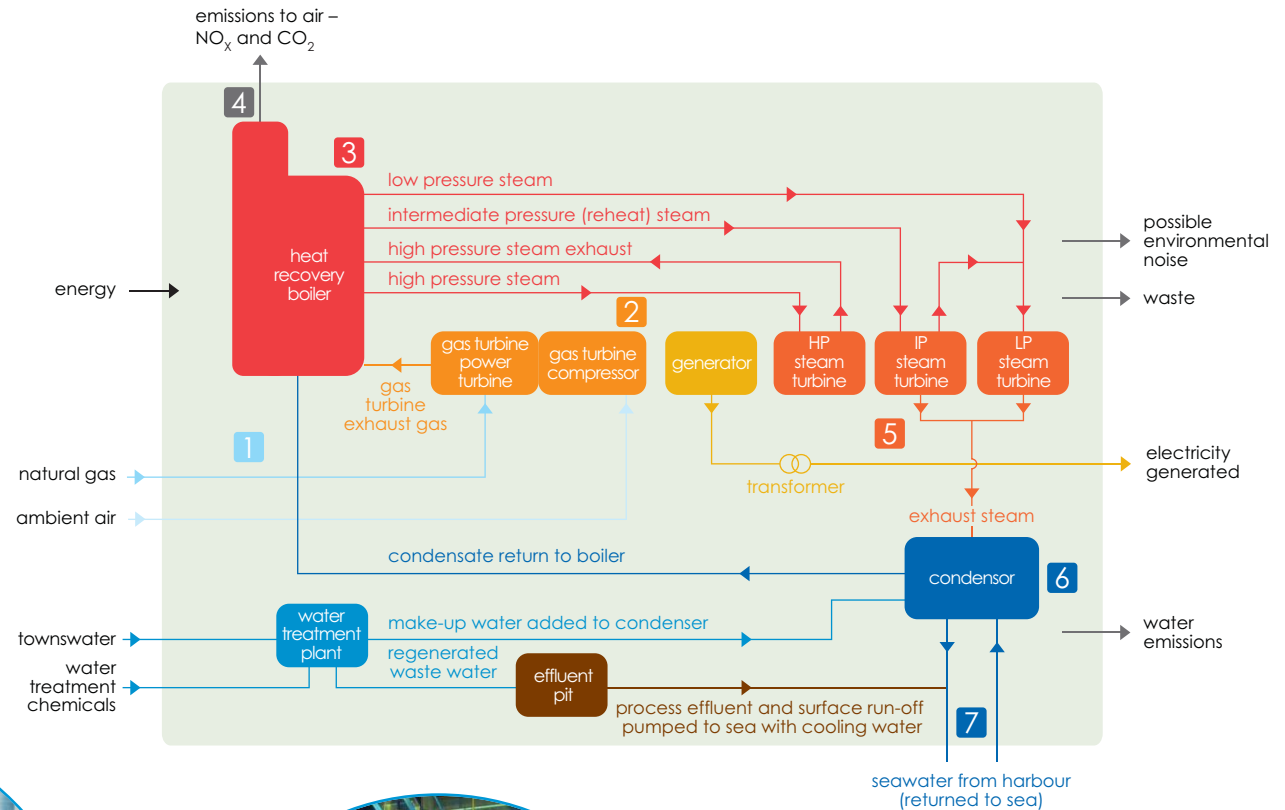
Shoreham uses a gas turbine and a steam turbine and generator that together provide one of the more efficient forms of thermal electricity generation.

- 1** Natural gas is brought to the site by a purpose-built underground pipeline from the Transco compound at Devil's Dyke on the Sussex Downs.
- 2** The gas is ignited within the Alstom GT26B gas turbine, which works in a similar way to a car engine. Air is compressed and heat is added by burning fuel. The hot combustion gases are directed through the turbine, where the hot gases expand through blades, causing the turbine shaft to rotate at 3,000 revolutions per minute. This drives the generator to produce electricity.
- 3** In conventionally-fired power stations, hot exhaust gases from the turbine are lost to the atmosphere, resulting in wasted heat energy. At Shoreham, however, the exhaust gases at a temperature of 600°C, are passed through a heat recovery boiler that contains a large number of tubes, filled with purified town's water. The water in the tubing is heated by the hot exhaust gases to produce steam.
- 4** Waste gases from this part of the process are then released through the station's 106-metre chimney.
- 5** The steam created in the heat recovery boiler is used to drive a steam turbine. The gas turbine shaft and the steam turbine shaft are coupled together to drive the generator, which produces the 420 MW output.
- 6** As the steam leaves the steam turbine it is condensed using sea water extracted from the tidal area of Shoreham harbour. This condensate is then returned to the heat recovery steam generator (boiler) to be reheated.
- 7** The cooling water is discharged back into the English Channel through the refurbished outfall at Southwick Beach. This avoids the need for cooling towers. All of the steps in the process are highly automated and controlled and monitored constantly by operators from Shoreham's central control room.



Shoreham from the air

INPUTS>>



OUTPUTS>>



The Heat Recovery Steam Generator



A boiler feed pump