



HATFIELD MOOR GAS STORAGE FACILITY SITE INFORMATION



OVERVIEW

ScottishPower Energy Wholesale operates a gas storage facility at Hatfield Moor near Doncaster. The facility, which was

commissioned in February 2000, can store up to 4.1 billion cubic feet of gas in a depleted underground gas reservoir – sufficient to

meet the peak demands of 450,000 households. ScottishPower has been given planning permission to utilise a second gasfield,

at nearby Hatfield West, to increase the amount of gas that can be stored. We will work with our stakeholders to advance this project.

INTRODUCTION TO HATFIELD MOOR

Hatfield Moor Gas Storage Facility utilises a depleted gasfield located 1,450 feet below the Yorkshire countryside.

Operations to extract the natural gas began in 1986 but, as the field became depleted, an opportunity was identified to use it for gas storage.

The reservoir is a layer of porous sandstone that works like a solid sponge to “soak up” the injected gas and which is sealed by solid rock that prevents the gas from dissipating.

The gas storage facility consists of four separate areas – the Lindholme Compression Site, the Beltoft Gas Off-take, the Hatfield Moor Gaswell and a purpose-built pipe network.

The storage facility enables ScottishPower to manage swings in demand and to buy additional gas to store for peak periods.

The facility helps the company meet its obligations under the Network Code, which demands that gas suppliers must balance the amount of gas they put in and take out of the national transmission system on a daily basis.

Some of the stored gas is used to generate electricity at ScottishPower’s gas-fired power stations in England.

CONTACT US

Lindholme Compressor Site
Vulcan Way, Bowtry Road, Hatfield Woodhouse, Doncaster
telephone: 01302 352128
web: www.spenergywholesale.com



■ An aerial photograph of Hatfield Moor Gas Storage Facility’s gas compression site at Lindholme

EXPANSION PLAN GETS PLANNING CONSENT

ScottishPower’s proposal to expand its gas storage operation at Hatfield Moor has been given planning approval by Doncaster Metropolitan Borough Council.

The company intend making use of a second empty natural gasfield to store additional natural gas supplies.

The depleted reservoir, at Hatfield West, is close to the existing Hatfield Moor

reservoir. The Lindholme Compressor Site will import and export the additional gas via its existing NTS pipeline connection.

Planning consent was obtained on February 2, 2010 and ScottishPower will now continue to prepare the other consents required to develop the gas storage facility.

The company is committed to ongoing engagement with local stakeholders.

Hatfield Moor Gas Storage Facility operates subject to conditions contained in a permit issued and enforced by the Environment Agency (EA).

The facility’s key emissions to air are carbon monoxide (CO) and oxides of nitrogen (NO_x) produced at Lindholme’s gas turbine compressor package.

Staff strive to reduce levels of emissions by ensuring optimum combustion performance.

A small quantity of Volatile Organic Compounds is released to air from Lindholme’s glycol dehydration unit while natural gas may be vented via a flare at Hatfield Well.

The facility’s Environmental Management System (EMS) is accredited to the international standard ISO 14001. During the year, the EMS was successfully reaccredited.

Hatfield Moor’s EMS drives improvements across areas such as the use of energy, raw materials and resources, and the management of waste.

In recent years, the site has been actively working to reduce its resource use, achieving savings of 50% in townwater consumption, 30% in both gas and electricity use and a 25% in the amount of diesel used.

A water collection system has been installed to drain rainwater

REDUCING OUR ENVIRONMENTAL IMPACTS



■ Construction of Hatfield Well

from the roof at Lindholme into a fire pond, reducing the need for townwater.

Staff also actively recycle waste materials including wood, scrap metal, paper, electrical equipment, cans and plastics.

Oily water is collected by a specialist contractor who separates the oil for reuse.

The site has operated a Biodiversity Action Plan (BAP) since 2005 to help improve conditions for wildlife.

There were no justified complaints from the local community in 2009.

HATFIELD MOOR GAS STORAGE FACILITY SITE INFORMATION

ENVIRONMENTAL PERFORMANCE 2009

Hatfield Moor's gas turbine compressor package at Lindholme operated for 2,716 hours in 2009 during the export of natural gas from the storage facility.

A total of 162.4 m³ of gas was imported by the site with 157.4 m³ exported to homes and business. Both figures show a modest increase on the two previous years.

Ongoing monitoring throughout the year found that emissions are within limits set by the EA. However, a spot check in March 2009 noted a breach of carbon monoxide (CO) emissions which was reported to the EA.

This occurred during routine maintenance of the gas turbine (GT) and, in response, a system of checks was established to reduce the likelihood of a breach happening again.

No other non-conformances were recorded during the period and there were no



■ Lindholme's compression unit

community complaints.

Site staff aim to continually improve efficiency of the gas turbines (GT) and reduce the use of raw materials.

The regime of cleaning the GT compressor blades has been stepped up from twice a year to once every two months, improving GT performance by increasing the flow of air through the blades.

Lindholme is installing a water purification plan that will

end the need to buy-in bottled distilled water for cleaning the blades.

Meanwhile, Lindholme's water bath heater, that warms up imported gas arriving on site prior to its storage, was recommissioned in July 2009.

During the 12 months that the package was out of service, it was recognised that the reservoir could handle gas being injected at a lower temperature.

The new heater now activates at a reduced set point temperature – resulting in 25% less fuel gas being used compared with the same six-month period in 2008 despite increased volumes of gas being injected.

Nevertheless, figures for total gas and energy used at the site are slightly up on 2008 as a result of the increase in imports/exports.

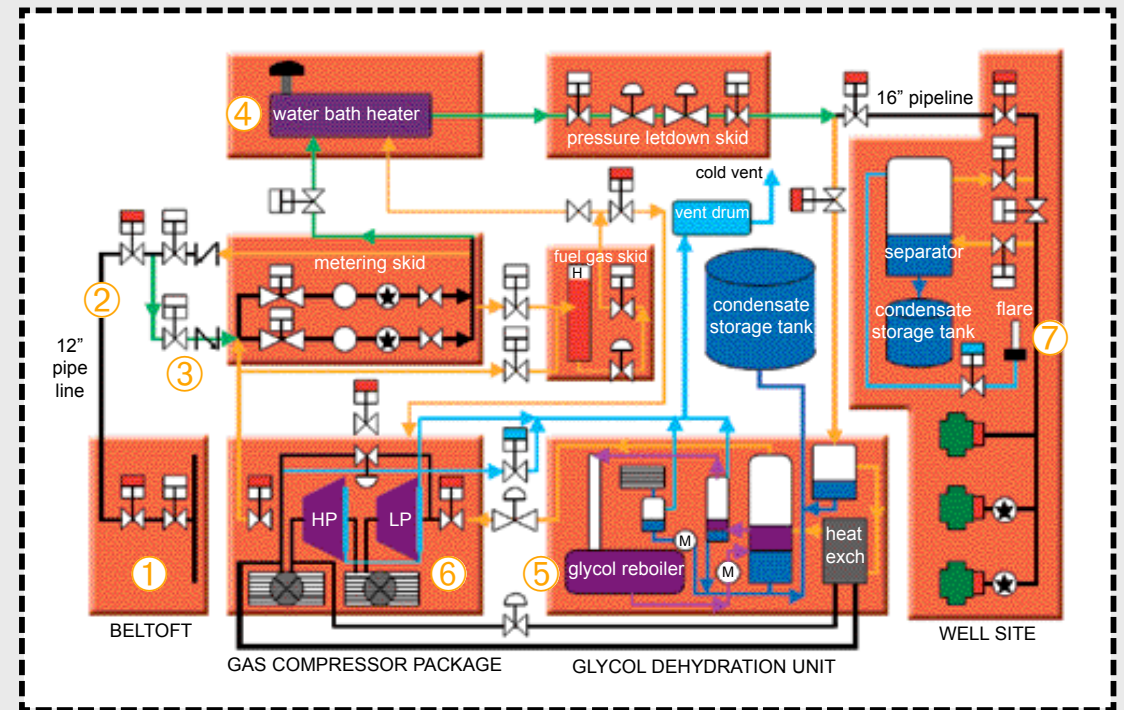
Further improvements to the glycol heat exchanger will reduce the amount of triethylene glycol used for replenishing the dehydration system.

REDUCING WATER USAGE

Domestic water usage continues to reduce as a result of site efficiency measures.

Water use was slashed by more than half (53%) in the year to 128m³, compared with 277m³ in 2008. These savings were achieved by ceasing the use of water to cool the gas during operations and the removal of a sprinkler system. Monitors fitted in November 2009 at the administration block will help identify further ways to reduce domestic water usage.

Other actions are expected to reduce significantly the amount of waste water in 2010. This is being achieved by diverting uncontaminated bund water to a local brook via the oil interceptor pit. Stringent checks are carried out to ensure the purity of this water – any water found to be contaminated will continue to be taken off site by tanker for safe disposal.



HOW THE GAS STORAGE FACILITY WORKS

The technique of using depleted gas fields for storage is widely employed overseas, in countries such as Germany and the USA, but Hatfield Moor was the first onshore UK facility of its kind.

Gas storage is one of the most effective ways in which the swings between supply and demand can be matched.

Gas goes into storage during low demand periods and out of storage when demand is high.

① Natural gas from the National Transmission System (NTS) is imported at the Beltoft Gas Off-take in North Lincolnshire.

② A purpose-built 15 kilometre pipeline starts at Beltoft and runs through the Lindholme Compression Site to connect with



■ Lindholme from the air

the depleted Hatfield Moors gasfield, which is a further 1.5 kilometres away.

③ Gas imported from Beltoft is compressed at Lindholme before being injected into the porous layers of sandstone for storage.

④ A gas-filled water bath heater pre-heats the incoming gas

prior to its injection into the reservoir, which can store up to 4.1 billion cubic feet of gas at any one time.

⑤ A glycol dehydration plant removes any entrained liquid from the gas imported from the reservoir prior to its return to the NTS.

The glycol dehydration plant includes a re-boiler that regenerates the glycol to be used in a continuous cycle.

⑥ Lindholme's gas turbine compressor increases the pressure of the gas to meet NTS requirements before it is exported via the pipeline.

⑦ A natural gas vent at Hatfield Moor Gaswell can safely vent natural gas, if required.