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KING STREET ENERGY GAS STORAGE SCHEME IN THE UK

Evan Passaris[1], Alex Dornan[2] and Mark O'Brien[2]
[1] Atkins Limited, United Kingdom
[2] King Street Energy Limited, United Kingdom

Abstract

Until 2004, the UK was a net exporter of gas with plentiful deposits in the North Sea, but with North Sea supplies dwindling by 7% a year, the UK has become a net importer. It is estimated that by 2015, the UK may need as much as three-quarters of its supply from abroad. The development of the new underground storage by King Street Energy Ltd is expected to contribute to the improvement of the security of gas supplies for the British market, which happens to be the largest in Europe.

The commercial and strategic reasons that justify the development of underground gas storage facilities in the UK are well understood and have been widely reported. In particular, the King Street Energy Ltd's underground gas storage facility is expected to contribute in regulatory terms, to the development of the UK gas market, while in quantitative terms; the creation of such a new storage facility will provide an answer to the natural gas demand in the UK.

The King Street Energy site is situated to the east of the town of Northwich and just to the northwest of the village of Lach Dennis in Cheshire. The geology of Cheshire is characterised by salt deposits that form part of the Triassic sediments and the major salt strata are found in two well defined formations sandwiched between mudstone beds. The lower salt beds are known as the Northwich Halite and the upper salt beds as the Wylkesley Halite. It is in the thick layer of salt in the Northwich Halite that King Street Energy Ltd will be solution mining ten new caverns. The top of the salt layer is typically in the range of 290 m - 360 m deep with a total thickness of approximately 220 m and it is capped by superficial Quaternary Deposits generally comprising glacial tills, overlying the Sidmouth Mudstone Member. This stratigraphic sequence provides ideal geological conditions for the creation of gas storage caverns.

Preliminary geomechanics studies, incorporating finite element analyses, have indicated that it would be possible to leach caverns with a maximum diameter of 110 m and a maximum height of 170 m. The maximum pressure in the caverns will be ranging between 60 bar – 66 bar and the approximate working gas volume for the cluster of the ten caverns is expected to be 348 mcm.

King Street Energy Ltd will be constructing a twin pipeline system between the Mersey Estuary and the King Street site to satisfy the requirements for the leaching of the salt caverns. Water will be extracted from the Mersey and transported to the site through the pipeline and brine will be transported via the parallel pipeline to the Mersey for disposal. Due to the limited capacity of the local chemical industries to absorb more brine, partly resulting from similar gas storage activities, it would not been possible to utilize the brine won from the leaching of the caverns, hence the need for its disposal to the Mersey Estuary.

The twin pipelines will be laid together in a single easement and will each comprise a 2×600 mm internal diameter pipe of approximately 61 km in length. Estuary water will be used as all available fresh water in the area is already abstracted for other uses. Intake and outfall pipes would be set into the bed of the Mersey Estuary.

Key words: Bedded Salt Deposits, Brine Disposal, Cavern Design, Caverns for Gas Storage, Computer Modelling, Geology, Rock Mechanics, United Kingdom.

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