



Programme Area: Energy Storage and Distribution

Project: Heat Storage

Title: Final Report

Abstract:

The total annual energy demand for heating buildings and water in the UK is approximately 600 TW.hr. currently 86% of this demand is met by gas heating systems. This system is very robust and cost effective today but it faces two main challenges for the future: a) The depletion of North Sea reserves increasing dependence on imports and b) The decarbonisation of the energy system required to meet the governments stated targets of 80% CO₂ reduction by 2050

Context:

Heat is the biggest end use of energy in the UK - most of it is used for heating homes and providing hot water. This research project examined the feasibility of capturing large quantities of waste heat from power stations and industrial processes and then storing it underground for later use in homes and offices. It investigated the cost effectiveness and practicalities of storing large quantities of heat for long periods of time to meet a significant proportion of the UK's winter heat demand. It evaluated the practical limits for this type of storage, the technology development needs and where in the country large-scale heat storage could be most effectively exploited. International consulting engineers Buro Happold completed the research project in 2011.

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ETI Programme:	Energy Storage and Distribution
Project Name:	Heat Storage (FRP)
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Contractor/Consortium:	Buro Happold

Context

The total annual energy demand for heating buildings and water in the UK is approximately 600 TW.hr. currently 86% of this demand is met by gas heating systems. This system is very robust and cost effective today but it faces two main challenges for the future:

- The depletion of North Sea reserves increasing dependence on imports
- The decarbonisation of the energy system required to meet the governments stated targets of 80% CO2 reduction by 2050

Project

The project investigated the feasibility of storing large quantities of heat for long periods to meet a significant proportion of UK winter heating load, greater than 10%, from heat stored during the summer. It investigated the cost effectiveness and practicalities of storing very large amounts of heat for long periods in UK geological formations such as saline aquifers. Many of these formations are accessible to populated areas and could be used to support district heating schemes, but there are many uncertainties regarding the effectiveness, environmental impact and ultimate capacity of such systems in the UK, and regarding the required technical innovations.

This project within the Energy Storage and Distribution programme has been delivered by Buro Happold Ltd, consultancy supported by the British Geological Survey, Cambridge University Technical Services Ltd, IF Tech Ltd and the European Geothermal Energy Council.

Key Project Findings

The project has provided the ETI with valuable information regarding the potential for Geological Heat Storage in the UK.

The project identifies the most likely temperatures, aquifer types and depths that could provide large scale seasonal heat storage as well as considering the heat systems and engineering that would need to be employed to provide the connections between powers stations, heat stores and district heating schemes.

In addition the project recommended next steps that would be required to validate and develop large scale seasonal stores including potential demonstration sites.