

Repurposing Hydrocarbon Wells for Geothermal Use in the United Kingdom

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Abstract

Despite the potential of geothermal energy, the technical and economic risk at the exploration stage limits geothermal development. One way to reduce this risk is to repurpose hydrocarbon wells for the production and storage of geothermal energy. This approach can substantially reduce drilling costs and delay the decommissioning of existing energy infrastructure. The geothermal potential of hydrocarbon wells has been investigated by several authors, with pilot projects already implemented worldwide and pre-feasibility studies carried out. In the UK, unless the operator can identify a viable reuse option, once hydrocarbon production ceases, wells must be plugged and abandoned. This paper offers a critical assessment of ways in which existing onshore and offshore hydrocarbon wells could be repurposed in the UK for different end-uses, highlighting technical, financial and regulatory barriers. For onshore wells, the key findings of an EPSRC National Centre for Energy Systems Integration research project are presented. This nationwide analysis was based on integrated data sets comprising well locations, depths, operational status, measured and estimated bottom hole temperature data, and the extent, depth and thickness of aquifers across the UK. Screening criteria were then applied to over two thousand onshore hydrocarbon wells in the UK, leading to the identification of potential candidates. Regarding offshore wells, the UK's Oil and Gas Authority (OGA) forecasts that around 1500 wells will be decommissioned in the UKCS over the next decade with an estimated ABEX of £22 billion. There is an obvious urgency to identify viable repurposing options for those wells earmarked for abandonment. This paper discusses the results of a screening of North Sea fields that have previously been reported in the literature (somewhat optimistically) as having a high

potential for geothermal energy co-production. By applying Decline Curve Analysis techniques to the latest UKCS field production data and checking the OGA online archives for Cessation of Production and Decommissioning Program applications, this paper presents a more realistic outlook. The paper concludes that there are a significant number of onshore wells in the UK that can be re-used for geothermal purposes, but the same cannot be said for the offshore candidates.