Environment Agency

Evidence

Ground source heating and cooling pumps in England & Wales – state of play and future trends

Report summary

The Environment Agency is committed to supporting the development of renewable and low carbon energy technologies. We commissioned this report as part of an internal review of regulatory processes that effect the development and use of these technologies.

This report describes the state of the ground source heating and cooling pump (GSP) market in the UK and how this might develop from now until 2020. The report identifies where, and how, our regulatory responsibilities effect the market and its potential development.

The report's findings will be used to:

- Ensure we have suitable in-house to support the widespread deployment of GSP systems and,
- Develop guidance for staff when considering applications for open loop ground source pumps.

The report is based on a literature review and interviews with key members of the UK GSP industry.

The report identifies GSPs as sustainable technologies with the potential to make very significant contributions to the UK's renewable energy and greenhouse gas reduction targets. The UK market for GSPs is currently small, but is growing rapidly (100% market growth in 2008).

The authors provide a comprehensive description of the current UK market for open and closed loop GSPs. They describe how, in other European countries, GSP systems contribute a significant proportion of the total heating/cooling energy market. They cite this as evidence of the maturity of the technologies and the markets (in these early adopting countries), and the size of the opportunity for the GSP industry, energy customers and UK Government.

The authors report that feedback on our current process for permitting open loop GSPs was generally positive. However, they recommend that our procedures and processes be streamlined, and the responsible departments properly resourced, to deal with the increase in GSP installations forecast in this report. This means that sufficient resources are needed to issue abstraction licences and discharge consents for open loop systems. The authors estimate these will range from 1,000 to 9,200 systems per annum (in 2019) – see below.

In the future we also face the challenge of assessing and regulating the potential thermal impacts of both individual schemes and multiple schemes in close proximity, which will increasingly arise as installed numbers increase.

The authors highlight concern about some aspects of the permitting process, including perceived regional variations in our staffs' interpretation of regulations, the uncertainty introduced by time-limited abstraction and discharge consents, and a perceived lack of clarity over when we are, and are not, involved in closed-loop schemes.

The authors identify good regulation as critical to market growth and stress the importance of regulatory systems that are fit-for-purpose to avoid impeding market growth.

Methodology

This report is a desk study based on a literature review and interviews with key members of the GSP industry.

The authors describe the current UK market for open loop and closed GSPs. They review the technologies, their relative advantages and disadvantages, the present and future policy context, and the experiences of early-adopting European markets.

The authors identify eight main barriers to GSP market expansion in the UK. These are:

- The UK electricity distribution network
- Competition with the gas distribution network
- The thermal efficiency of UK housing stock
- Capital and maintenance costs
- Insufficient installer network to cope with increased demand
- Customer awareness and acceptance of the technology
- Accessing the existing homes market
- The carbon intensity of the UK grid.

The first three barriers are expected to persist until 2020 and to limit the total number of systems installed in the UK. The other five barriers can, in principle, be overcome.

The authors discuss the effect of these barriers on market development, from now until 2020, and model two possible scenarios, 'growth' and 'high growth'. They sense check the figures from their scenarios against data from other sources and by comparison with European markets.

The authors suggest that the GSP market will expand (at least) until 2020, with no periods of stagnation. Their figures for the GSP market in 2020 under these two scenarios are:

	'Growth'	'High growth'
Total number of installations	320,000	1,200,000
Installation rate in 2019 (per annum)	40,000	400,000
Thermal capacity (MWth)	6,700	25,150
Energy produced (TWh)	21	78
Number of open loop systems	7,800	29,000
Installation rate in 2019 for open loop systems (per annum)	1,000	9,200

The figures from the growth scenario are physically achievable as they represent only a small proportion of the potential total market. The figures for high growth scenario are at the limit of what is physically achievable, but not impossible. To reach this level, GSPs would have to account for 86% of the UK's renewable heat generation in 2020. The growth scenario figures could be achieved solely by GSP installation into new buildings. To achieve the figures in the high growth scenario it will be necessary to penetrate the much more challenging retrofit market.

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Project manager: Harry Huyton, Evidence Directorate

Research Contractor: AEA Technology Plc., 329 Harwell, Didcot, Oxfordshire, OX11 0QJ
T: 0870 190 6114

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T: 08708 506506
E: enquiries@environment-agency.gov.uk.