Regulation of GSHP Systems – Heating and Cooling

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Our Position

We encourage responsible, well-designed, GSHC schemes, unless:

- *there is a potential unacceptable thermal or chemical pollution risk*

  or:

- *the density of heat discharges and temperature change threatens the **sustainability** of the aquifer or subsurface as*
  - *a water resource*
  - *an ecological or structural substrate*
  - *a resource for heating and cooling for future users*

Well-designed (sustainable) GSHC schemes

- Minimal impact on the environment
  - thermally balanced; or
  - partner with a user of the surplus energy

  especially for large schemes or those in areas where there is a high density of schemes
- Such schemes will also be more energy efficient

The following is very much Work in Progress

Regulation

- **We wish to simplify regulation**
  - not onerous for applicants; EA can process applications quickly
- **Good practice guidance to achieve this**
- **We do not regulate closed loop systems**
  - although heat can cause pollution, we have no powers to regulate its discharge; we can only control discharge of hot water
  - we have concerns about creation of pathways and pollution from carrier fluids
- **Open loop systems require formal agreement**
  - groundwater investigation consent, followed by an abstraction licence, and a discharge consent (environmental permit from April)
  - normally non-consumptive abstraction with water returned to the same aquifer

Voluntary notification system for closed loop systems

BGS/GSHPA/Ofgen?

Environment Agency

Proposed Risk-Based Approach

4 scenarios (any variants need to be justified by applicants):

- No risk receptors/no thermal sustainability issues
  - no max temperature or net maximum heat specified
- Possible risk receptors within a prescribed radius/no thermal sustainability issues
  - apply temp increase limit of 10°c
- Density of schemes is threatening thermal sustainability of aquifer
  - apply net annual heat discharge limit
  - proposed maximum net heat discharge over 6 years
  - only applied in limited urban settings, eg. London
- Specific potential risk to one or more risk receptors
  - site specific risk assessment which might include
    - Tier 1 – identification of risk receptors
    - Tier 2 – analytical models
    - Tier 3 – numerical modelling

Proposed Risk-Based Approach cont.

- No monitoring requirements for small schemes
- In many areas we can be confident that the thermal plume will be limited provided we put an upper limit on temperature change
- In some locations, such as Central London we may have a high density of proposals and need a simple tool to enable a fair and rapid assessment of acceptability based on a thermal budget approach

Research needs

- Quantify exploitable ground source heat energy
  - Sustainability
  - Scale, energy budget
- Baseline temperature of aquifers and monitoring
- Heat propagation and heat capacity in different aquifers – London Chalk, Sandstone
- Derive more precise temperature standards and delta T
- Impacts of heat on chemistry
  - Geochemical equilibria
  - Dissolution in the Chalk
- Feasibility of zero impact systems – Planning Controls
- Case studies
  - post-project appraisal of a few sites, working with industry