

MEMO: Vastern Road revised energy strategy review

Introduction

The following memo provides a review of Hodkinson's revised energy strategy (dated 10/12/2020) for the Vastern Road development in Reading.

This revised strategy was produced in response to Element Energy's previous review (September 2020). Since this last review, the Applicant has adopted the requirement from Reading Borough Council (RBC) for a decentralised heat supply solution, employing heat pumps as the primary source of space heating and hot water.

The key outstanding issue for the development in relation to RBC energy and carbon policy is the selection of air source heat pump (ASHP) heat supply, and the omission of more efficient ground source heat pump (GSHP) and water source heat pump (WSHP) technologies.

Selected heat supply strategy

The proposed heat supply strategy for the Vastern Road development is defined as:

- 2no. ASHPs with total capacity of 365kWth for primary heat supply
- 1MWth natural gas boilers for top-up and back-up heat supply
- ASHPs = 67% of annual heat supply, gas boilers make up the remaining heat consumption (33%)

Hodkinson state that the employment of ASHPs necessitates the reliance on gas boilers for top-up heat, due to ASHP technology inefficiencies during winter months.

Whilst gas boiler heating to supplement heat pumps on new developments is not explicitly discouraged in RBC planning policy, the fact that there are alternative technological solutions yet to be fully discounted through further technical assessment (see next sections on GSHP and WSHP) means gas boilers for top-up heat should not be considered compliant at this design stage. Gas boilers for back-up heat (i.e. in case of heat pump failure) may be considered acceptable to ensure uninterrupted heat supply.

It is noted by Hodkinson that an ASHP + gas boiler approach provides residents with the least-cost method of heat supply. However, relative to pure ASHP supply the difference is marginal (~£900/yr for ASHP + gas boiler vs ~£940/yr for ASHP-only), or £3/month more on average per residential unit. This does not feel significant enough to discount a pure ASHP approach. The reliance on gas boilers therefore does not appear justified on a carbon or cost basis.

Should the alternative heat supply solutions not be technically viable for the development (see below), a full ASHP approach should be taken for the development (i.e. no gas boiler top-up). Gas boilers for back-up supply is an acceptable approach.

Alternative heat supply solutions

Closed-loop GSHP

Hodkinson state that 1,939m² of area has been identified as suitable for closed-loop boreholes on the development. This is stated as insufficient to serve the full heat demand. It is assumed that Hodkinson has estimated the closed-loop GSHP borehole requirements such that they would provide the full heat demand (i.e. no top-up gas boilers as per the ASHP approach).

A simple analysis by Element Energy suggests that this assessment of closed-loop GSHP is accurate, given the spatial constraints of the development. Assuming 3-5kWth of capacity per borehole (spaced 5m x 5m apart), this suggests the average borehole = 0.16 kWth/m². With 1,939m² available, total available heat capacity = 388kWth, which is not sufficient to cover the full peak heat demand (assumed as 1MWth, i.e. the capacity of the back-up boilers in the ASHP solution).

The exclusion of closed-loop GSHP from the development as a heat supply solution is therefore valid.

Open-loop GSHP

Whilst there are no known boreholes deeper than 30m in the immediate vicinity of the proposed Vastern Road development, this does not necessarily signify that deeper open-loop boreholes are not possible in the area. There are a number of boreholes in and around Reading town centre (e.g. Forbury Retail Park) that are ~100m deep, therefore there is scope for deeper boreholes to access aquifer water.

Hodkinson state that as brownfield site, the land on which the Vastern Road development sits may be contaminated due to its previous use, but no evidence is provided to support this. Without further evidence, open-loop GSHP cannot be discounted at this design stage.

It is recommended that open-loop GSHP not be discounted until further technical assessments have been undertaken at detailed design stage:

- Commission desktop study by hydrogeological consultants to establish depth of aquifer water on development.
- Commission ground investigations to understand the potential barrier to deployment due to contaminated land.

WSHP

Hodkinson state:

“For the proposed development, the River Thames is the most likely heat source. This, like the open loop GSHP would require complying with several regulatory requirements laid down by the Environment Agency, which could ultimately prevent heat provision to the development.”

The potential non-compliance with Environment Agency regulation should not discount WSHP at this stage of design, but engagement with the Environment Agency should be undertaken as soon as possible to confirm whether a river source heat pump approach is not viable for the development.

Further:

“Further to this, the plant required to collect the water from the Thames would be required to be as close as possible to the water source. This would place the plant outside the redline of this development.”

Hodkinson must liaise with RBC to understand the barrier to infrastructure deployment due to land ownership and easement issues. WSHP cannot be discounted on this basis as this has not yet been confirmed as a barrier.