elementenergy

Vastern Road Development

Energy Strategy

Review

Final report

for

Reading Borough Council

16/06/2020

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Executive Summary

Reading Borough Council (RBC) has commissioned Element Energy to provide a critical review of Hodkinson's proposed energy strategy for the Vastern Road redevelopment by Berkeley Homes. The intention of the review is to ensure the energy strategy meets council energy and carbon policy.

The current energy strategy proposal can be summarised as:

- A fully electrified thermal heating supply system;
- Direct electric resistive panel heaters within dwellings for space heating provision, with direct immersion heater cylinders per dwelling for domestic hot water (DHW) provision;
- Building fabric and services that exceed Part L minimum requirements to reduce space heating consumption within dwellings, including mechanical ventilation and heat recovery (MVHR) to improve efficiency further (except in Block A, which has centralised mechanical extract ventilation, cMEV);
- Solar PV arrays installed on rooftops for renewable power supply (~70kWp).

Our finding is that the proposed Vastern Road energy strategy is not fully compliant with RBC's policy and wider aspirations for new developments in and around Reading. The strategy does not comply with policies as follows:

- The thermal energy systems are not decentralised and do not use GSHP or ASHP as a primary heating source;
- There is no decentralised hydraulic heating system proposed, therefore the development is not "connection-ready" for any future DH networks that may be deployed in the area around the development.

It is recommended that the items in the table below be fully evidenced by Hodkinson prior to planning consent being granted for the Vastern Road development.

Recommended items to be evidenced by Hodkinson

#	Evidence required prior to planning consent being granted
1	To justify the claim that a centralised heat pump strategy would be higher cost for occupants than the current direct electric strategy, Hodkinson will provide a comparative analysis between the two for the Vastern Road development. This comparison will include: • A detailed breakdown of estimated central heat pump plant and distribution network costs, including capex, opex and repex. This should be provided as a calculation spreadsheet for review by Element Energy; • Consideration for underfloor heating to reduce system temperatures and therefore reduce distribution losses, which have been stated previously by Hodkinson as high for communal heating systems due to assumed higher temperature regimes; • Provision of evidence that feedback on underfloor heating systems in new developments have not been positive due to lower temperatures of heat delivered to dwelling spaces, as has been noted by Hodkinson previously; • Justification for expected O&M and billing costs, which may be provided in the form of a network operator's contracted costs for a previous development (or equivalent information);

	• If dwelling occupancy is a factor in the cost of heat assessment then evidence needs to be provided to support the claim that some dwellings will be less occupied than others, within the context of the type of development and expected homebuyers and occupants; • Repeat the above analysis for each dwelling type within the Vastern Road development (note there are 7no. dwelling types as per Hodkinson's Energy Statement).
2	Hodkinson should demonstrate why a communal closed-loop GSHP strategy is not feasible from a technical and cost perspective with an in-depth analysis of the opportunity for the technology. This analysis should include the following: • Consideration for vertical arrays (i.e. boreholes), demonstrating whether this is technically unviable to do so (e.g. due to utility clashes or spatial limitations); • Repurpose the analysis from recommendation #1 to understand the cost implications of such a system versus the communal ASHP case and current direct electric strategy from a cost of heat perspective.
3	Hodkinson should demonstrate why a communal open-loop GSHP strategy is not feasible from a technical and cost perspective with an in-depth analysis of the opportunity for the technology. This analysis should include the following: • Potential for open-loop GSHP should be assessed using as a first port of call the British Geological Survey's assessment tool: https://shop.bgs.ac.uk/Shop/Product/GRC_C108; • Should the area be demonstrated as possible for open-loop GSHP, further consideration should be made for the technical viability of the technology, including utility clashes and spatial limitations within the development; • Where this is shown as a viable technology, undertake a comparative analysis between a communal heating system and direct electric supply as per recommendation #1.
4	Given the proximity of the development to the River Thames, Hodkinson should repeat the comparative analysis between a WSHP-led communal heating system and the current direct electric supply strategy, as per recommendation #1.
5	Hodkinson should liaise with RBC regarding details of the proposed Reading DH network's vicinity to the development, such that allowance for a capped-off connection pipe from a communal heating system can be made within the development in preparation for connection to the DH network.
6	Hodkinson should provide more detail on the justifications for the selection of specific roof areas available for PV installs, beyond that which is given in the Energy Statement. This should include detail of rooftop mechanical plant and other ancillary equipment that may exclude installation of PV panels.
7	If SAP10.1 carbon emission factors are to be used for carbon analysis, which are expected to be adopted as part of the proposed Building Regulations (Part L) updates, Hodkinson should also demonstrate how the development's energy strategy compares with the other KPIs required as part of the proposed Part L updates[1], summarised as follows: • Primary energy target as the principal energy performance metric;

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/852605/Future_Homes_Standard_2019_Consultation.pdf

	• CO_2 emissions target as a secondary performance metric; • Householder affordability rating; • Future-proofing new dwellings to be ready for low-carbon heating systems; • Updated minimum standards for fabric and fixed building services. Given specific details of each update are not provided in the consultation, it will be deemed acceptable that completion of recommendations #1-4 is an initial "householder affordability rating" assessment. It is expected that the current energy strategy would achieve the minimum fabric and fixed services efficiency standards (see consultation document for details), however this must also be demonstrated clearly by Hodkinson. Calculation of the primary energy target against the notional building of the current energy strategy versus the recommended communal heating system strategy should also be provided. As a minimum the primary energy factor should not be higher than the notional building.
8	Provide justification for use of centralised mechanical extract ventilation (cMEV) in place of mechanical ventilation heat recovery (MVHR) in Block A – this is currently not explained in the Energy Statement and could have an impact on the energy/cost performance of dwellings in Block A.
9	Should the energy strategy change given the above recommendations, Hodkinson must revisit the carbon offset payment calculation to ensure the offset is sufficient for the zero-carbon homes policy H5.

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Acknowledgments

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Disclaimer

Acronyms

ASHP	Air source heat pump
CWS	Cold water service
DH	District heating
GSHP	Ground source heat pump
MEV	Mechanical extract ventilation
MVHR	Mechanical ventilation and heat recovery
RBC	Reading Borough Council
SPD	Supplementary Planning Document
WSHP	Water source heat pump

1 Introduction

Reading Borough Council (RBC) has commissioned Element Energy to provide critical review of Hodkinson's proposed energy strategy for the Vastern Road redevelopment. The intention of the review is to ensure the energy strategy meets council energy and carbon policy. This report has been written in response to Hodkinson's "Vastern Road – Energy Statement – HC Final v3 – December 2019".

1.1 Vastern Road development

The Vastern Road development is located in the centre of Reading on the site of an old power station, north of the rail station and just south of the River Thames. The proposed development proposal comprises 208no. residential dwellings.

A heat mapping and energy masterplanning study was undertaken by Element Energy in 2017 for RBC. This study demonstrated potential for a number of DH networks in Reading town centre (Figure 1).

It was demonstrated in this study that there was commercial potential for a public sector led water source heat pump (WSHP) based heat network serving the Vastern Road residential development.

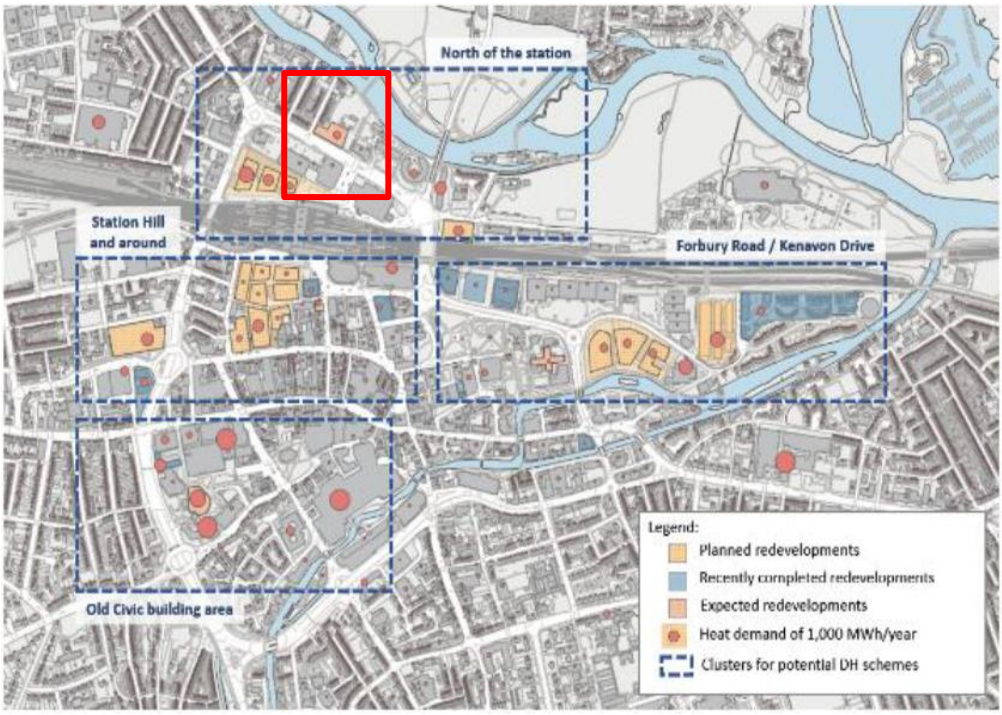


Figure 1 Vastern Road development area (highlighted red) in relation to wider Reading town centre development areas

2 Energy and carbon policy

Key policies relating to energy and carbon within RBC's latest Local Plan (adopted November 2019) and Supplementary Planning Document (SPD, adopted December 2019) are summarised in Appendix A. Comments and recommendations on what should be expected from Hodkinson's Vastern Road energy strategy based on these policies are also provided.

2.1 Development policy summary

Based on RBC's Local Plan and SPD the following would be expected of any energy strategy for the Vastern Road development to comply with energy and carbon policies:

- Decentralised and electrified thermal energy system for the supply of heating to the residential and commercial development, using high-efficiency thermal generation equipment such as air source heat pump (ASHP) or ground source heat pump (GSHP) technology;
- Decentralised heat supply systems must be ready for connection to proposed heat networks within the vicinity of the development (note proposed "online" date for the networks is currently unknown);
- On-site renewable energy generation maximised within the constraints of the development – this is likely to be limited to solar photovoltaic (PV) or solar thermal panels on rooftops for the generation of power or hot water respectively;
- All energy consumption associated with residential development must be zero carbon, with a minimum of 35% reduction in regulated carbon emissions over Part L of the Building Regulations (2013);
- Any residual carbon emissions (regulated) from residential development must be offset via contributions to RBC at £60/tonne/a for 30 years or alternative solutions to be agreed with RBC, to comply with the zero-carbon homes policy;
- Non-residential development must achieve BREEAM 'Excellent', which requires energy-related credits ENE01 and ENE02 to be achieved as a minimum (more on this provided in Appendix A).

2.2 SAP10.1 and expected changes to Part L of the Building Regulations

Consultation on the future of Part L of the Building Regulations was released in October 2019, known as "The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings". The consultation covers energy efficiency in new homes from 2020, in preparation for low-carbon heating technologies to become standard by 2025.

The consultation is the "*first stage of a two-part consultation about proposed changes to the Building Regulations. It also covers the wider impacts of Part L for new homes, including changes to Part F (ventilation), its associated Approved Document guidance, airtightness, and improving as-built performance of the constructed home*".

Two options to tighten the standards on energy efficiency are proposed in the consultation:

- Option 1: 20% reduction in carbon emissions over the current standard for an average home. It is anticipated by government that this could entail very high fabric standards (e.g. triple glazing and very high thermal performance of walls, ceilings and roofs)

- Option 2: 31% reduction in carbon emissions over the current standard for an average home. It is anticipated by government that this may require installation of renewable technologies such as solar photovoltaic (PV) panels and better fabric standards, though lower than option 1 (e.g. double glazing rather than triple).

These options are a step toward the long-term aim for new homes to have 75-80% carbon emissions reductions by 2025, and net-zero by 2050.

The government's preferred option is option 2, due to the potential to "deliver more carbon savings and result in lower bills for the householder but has higher build costs". They also "expect that it would help to prepare supply chains for heat pumps and increase the number of trained installers". It should be noted that, whilst there is a large focus on low-carbon heating longer-term, it is expected that option 2 will include gas boilers in the interim.

The move away from fabric efficiency standards toward a carbon reduction-based approach is expected to lead to higher costs of energy for dwelling occupants. The government is planning an "affordability KPI", which would need to be reported alongside emissions and primary energy use, so that ongoing costs to consumers will be considered together with emissions reductions.

Part L of the Building Regulations is yet to be updated from its 2013 revision to adopt the SAP10.1 methodology (the SAP 2012 methodology is the current requirement). Hodkinson's use of the SAP10.1 carbon emission factors for gas and electricity is discussed in more detail in section 3.2.4.

3 Proposed energy strategy

3.1 Overview

Hodkinson's energy strategy can be summarised as follows:

- A fully electrified thermal heating supply system;
- Direct electric resistive panel heaters within dwellings for space heating provision, with direct immersion heater cylinders per dwelling for domestic hot water (DHW) provision;
- Building fabric and services that exceed Part L minimum requirements to reduce space heating consumption within dwellings, including mechanical ventilation and heat recovery (MVHR) to improve efficiency further (except in Block A, which has centralised mechanical extract ventilation, cMEV);
- Solar PV arrays installed on rooftops for renewable power supply (~70kWp).

The residential space heating supply strategy has been flagged as a concern by RBC due to use of direct electric panel heaters in dwellings. Whilst the panel units take advantage of low-carbon grid electricity supply, they are also inefficient relative to alternative heat supply methods and thus potentially increase space heating costs for dwelling occupants. A simple illustration of the proposed heat supply strategy per typical residential dwelling on the development is provided in Figure 2.

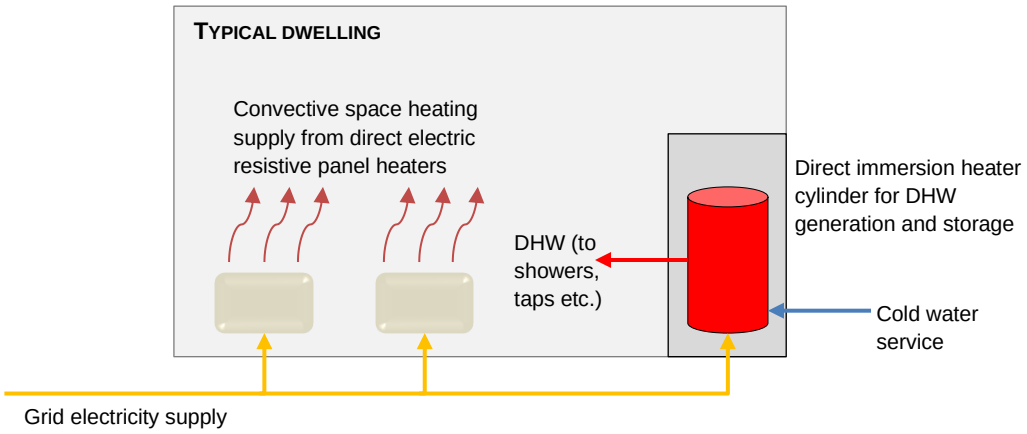


Figure 2 Illustration for proposed heat supply strategy per dwelling

3.2 Adherence to policy and wider council aspirations

The Vastern Road development's energy strategy complies with some but not all RBC policies and council aspirations listed in section 2.1. The strategy complies with policies as follows:

- On-site renewable generation – the information provided at this stage is not sufficient to understand whether rooftop solar PV arrays are maximised within the constraints of the development, however a total of ~70kWp of PV capacity is proposed;
- A minimum 35% reduction in regulated carbon emissions for residential development over Part L of the Building Regulations (2013) is achieved (a 54%

reduction). Note that compliance with this policy dependent on the use of SAP10.1 carbon emission factors (see section 3.2.4);

- Provision is made for zero-carbon homes via a carbon offset payment, totalling ~£170k.

The strategy does not comply with policies as follows:

- The thermal energy systems are not decentralised and do not use GSHP or ASHP as a primary heating source;
- There is no decentralised hydraulic heating system proposed, therefore the development is not "connection-ready" for any future DH networks that may be deployed in future around the development.

The following subsections provide further discussion on each of the above policy items.

3.2.1 Decentralised thermal energy system

Whilst the proposed heating supply strategy is fully electrified, a decentralised thermal supply system (i.e. a communal energy system that is decentralised from the national electricity and gas grids) has been discounted by Hodkinson. Given the significant residential development, consideration is made here for a communal heating system only (i.e. a decentralised cooling system is not considered).

The strategy states that an on-site heat network would lead to higher costs for residents than a direct electric heating system due to lack of scale, capital and operating costs of a network, distribution losses and so on, but this is not substantiated by any quantitative analysis.

It is recommended that Hodkinson provide a comparative analysis between a centralised heat pump supply system and direct electric heating for the Vastern Road development. The detail to be included must consider the following elements:

- Detailed breakdown of estimated central heat pump plant and distribution network costs, including capex, opex and repex, provided as a calculation spreadsheet for review by Element Energy;
- Consideration for underfloor heating to reduce system temperatures and therefore reduce distribution losses, which have been stated previously by Hodkinson as high for communal heating systems due to assumed higher temperature regimes;
- Hodkinson has previously noted that occupant feedback on underfloor heating in new developments has not been positive. Supporting evidence should be provided if this point is considered relevant to underfloor heating at Vastern Road.
- Justification for expected O&M and billing costs or a communal heating system, which may be provided in the form of a network operator's contracted costs for a previous development (or equivalent information);
- Any assumptions regarding dwelling occupancy should be supported by evidence, e.g. occupancy data from past developments of a similar nature that Berkley Homes / Hodkinson have access to.
- Repeated analysis for each dwelling type within the Vastern Road development (note there are 7no. dwelling types as per Hodkinson's Energy Statement).

Hodkinson has undertaken carbon compliance calculations using SAP10.1 carbon emission factors, therefore benefiting from the low electricity carbon emission factor, but with

potentially increased costs for consumers due to low-efficiency electrified heating. This is the key reason the government is considering an "affordability KPI" with the proposed updates to Part L of the Building Regulations (section 2.2) and is an element that should be factored by Hodkinson within the Vastern Road planning application. See section 3.2.4 for more discussion on use of SAP10.1 carbon emission factors.

Applicable heat pump technologies

A number of technologies are available to the Vastern Road development, as discussed in the following subsections. In all cases the carbon savings are expected to be higher than the current heat supply strategy.

Air source heat pump

ASHPs are the lowest efficiency technologies given the source of thermal energy is external air, which is low in temperature during the heating season and higher in the summer.

A centralised plant area could be installed on rooftops of each block. This may reduce some of the solar PV capacity however the improvements in heat supply efficiency may outweigh the lost renewable electricity generation. Additionally, provision of central thermal storage would reduce the cost of heat for occupants if some of the electricity for the heat pump(s) were provided from the PV panels. Rooftop mechanical services equipment is expected to be low on Vastern Road as it is fully residential, therefore there should be sufficient roof space for the heat pump equipment.

Ground source heat pump

GSHPs have higher efficiencies than ASHPs due to access to a higher grade of heat from groundwater (open-loop) or the thermal conductivity of the ground (closed-loop), as compared to external air.

Closed-loop GSHP systems have much larger land requirements as compared to open-loop, and the high peak demand and annual consumption of heat on Vastern Road is likely to require ~3-4,500m^2 based on an initial estimate by Element Energy. This may be challenging to deliver given the spatial constraints from the buildings on the site, **however it is recommended that Hodkinson demonstrate whether this is feasible from a technical perspective with a more in-depth analysis of the opportunity for closed-loop GSHP**.

Open-loop GSHP systems require at least two boreholes for abstraction and reinjection of groundwater from aquifers for generating heat. Reading is shown by the Environment Agency's "GSHP Screening Tool" as being favourable for open-loop systems (Figure 3). Open-loop GSHP should remain as an option to be investigated in more detail by Hodkinson; this will likely require a hydrogeological survey to test feasibility and permits from the Environment Agency. A relatively inexpensive preliminary assessment is available from the British Geological Survey that can determine potential for open-loop GSHP: https://shop.bgs.ac.uk/Shop/Product/GRC_C108. **It is recommended that Hodkinson assess the potential for open-loop GSHP using this resource**.

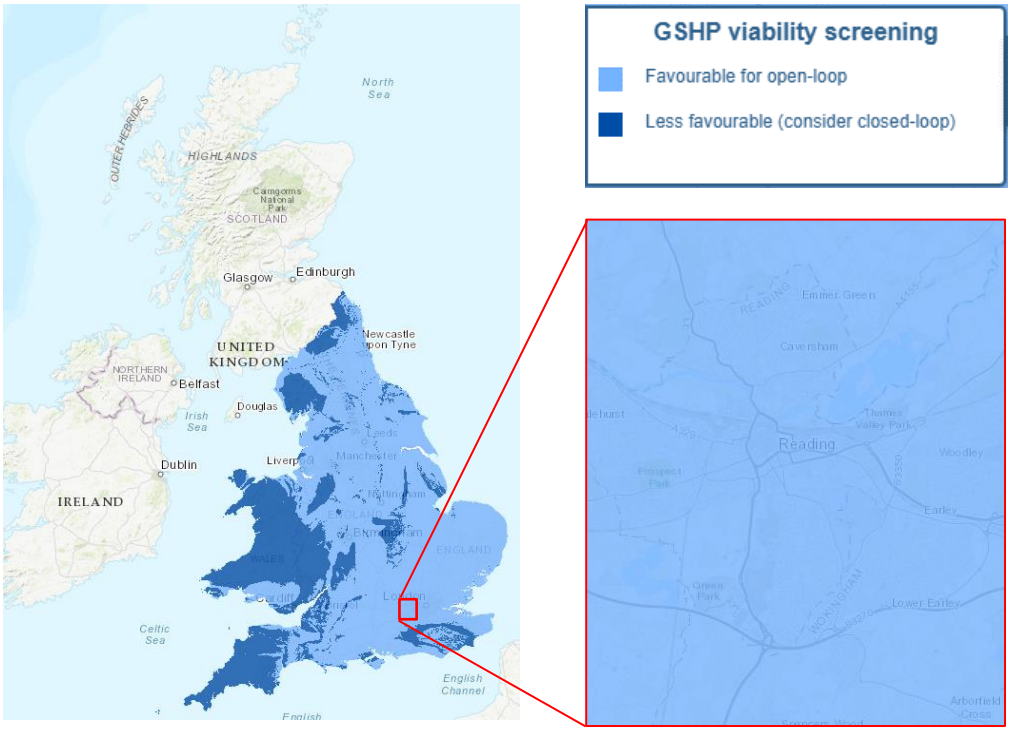


Figure 3 Screen grabs from the Environment Agency's "GSHP Screening Tool", showing Reading town centre is favourable for open-loop systems[2]

Water source heat pump

The proximity of the development to the River Thames makes Vastern Road a potentially suitable location for a WSHP communal system. WSHP systems are higher efficiency than ASHPs due to the higher temperatures and better thermal energy transfer available from river water as compared to air. The system would work much in the same way as the ASHP communal heating network.

It is recommended Hodkinson investigate WSHP as a heat supply source for a communal heating system on Vastern Road.

3.2.2 Preparedness for connection to proposed DH network

The Vastern Road energy strategy is not prepared for a connection to the proposed DH network in Reading town centre as there is no wet heat distribution within the proposed development. Paragraph 8.10 within the Supplementary Planning Document (December 2019) requires an on-site communal heating system that is prepared for connection to an existing or any proposed DH network in the vicinity (see Appendix A). Hodkinson state that "the absence of clear plans detailing when or where such a [DH] network may be delivered renders the risk that the Vastern Road development will remain on a site only heating strategy for a very long period too high". This is not compliant with RBC's policy as it is not preparing for a future DH connection.

If it is confirmed that a communal heating system is the preferred heat supply method for Vastern Road, **RBC should provide Hodkinson with details of the proposed DH network(s) in the vicinity of the development, such that allowance for a capped-off**

[2] https://www.bgs.ac.uk/research/energy/geothermal/gshp.html

connection pipe can be made within the development in preparation for connection to the DH network.

3.2.3 Maximised on-site renewable energy generation

The energy strategy for Vastern Road provides renewable energy supply via rooftop solar PV panels. The panels have been deployed where roof space is available and most appropriate, according to Hodkinson (see Appendix B for roof locations). It is stated that this considers "shading restrictions inherent on the lower roof spaces". Selected panels with outputs of 320Wp total a ~70kWp array for the development. It is unclear whether this has been "maximised" within the constraints of the development, as required by RBC policy, however Hodkinson state is should be noted that "this has been examined extensively by the Applicant to ensure this figure [i.e. the panel capacity] is realistic".

It is recommended that Hodkinson provide more detail on the justifications for the selection of specific roof areas available for PV installs, beyond that which is given in the Energy Statement.

An approximate assessment of carbon savings for the development from solar PV generation calculated by Hodkinson has been undertaken by Element Energy. The carbon savings calculated by Hodkinson from PV panels are 7.2 tonnes/a, which equates to an electrical generation of ~53MWh/a (with a grid emission factor of 0.136kg CO_2/kWh, as per SAP10.1 and which has been used by Hodkinson in their analysis, see section 3.2.4). For a 70kWp PV array, this suggests that the panels are capable of producing 750kWh electricity per kWp installed capacity. This is a relatively conservative generation efficiency for solar PV and therefore the expected carbon savings as calculated by Hodkinson are deemed acceptable.

3.2.4 Energy efficiency and zero-carbon homes

The carbon emissions reduction analysis for the Vastern Road development is largely predicated on the use of the SAP10.1 emission factor for electricity (0.136 kgCO_2/kWh compared to 0.519 kgCO_2/kWh in SAP 2012 and 0.216 kgCO2/kWh for gas (the counterfactual heating fuel).

The Future Homes Standard Part L consultation document proposes four performance metrics for new buildings to be assessed against, these are:

- Primary energy target as the key energy performance metric;
- CO_2 emission target as a secondary energy performance metric;
- Householder affordability rating;
- Updated minimum standards for fabric and fixed building services.

The energy strategy presented by Hodkinson does not consider either a comparison of the primary energy target nor householder affordability (a methodology for this is provided in section 3.2.1). The minimum standards for fabric and fixed building services are also expected to tighten with the updated Part L, however Hodkinson's design already considers high performance specifications therefore the development may be compliant with the proposed changes.

It is advised that if one part of the Future Homes Standard proposals is adopted in the energy strategy (i.e. the reduced electricity emissions factor, which has not yet been adopted as part of the building regulations) then the strategy should also demonstrate that the development will comply with these other performance metrics.

Otherwise, it could be seen as selectively adopting part of the proposed new regulations that support a particular strategy.

Hodkinson also describe that mechanical ventilation with heat recovery (MVHR) is used to ensure good indoor air quality in dwellings, given the high fabric performance specifications of the design. Block A, however, is provided instead with centralised mechanical extract ventilation (MEV). No reason is provided for this difference in strategy versus other blocks on the development; **Hodkinson must therefore provide justification for use of MEV in place of MVHR in Block A**.

Given this and the above subsections on further details required from Hodkinson, **the carbon offset payments calculated within the energy statement for Vastern Road may need to be revised**.

3.2.5 Further policy requirements

Beyond energy and carbon policy, Hodkinson's proposed energy strategy is highly likely to comply with any policy relating to reductions in building water consumption (in relation to energy generation and supply) that the council may stipulate. Heating and cooling generation is provided via "dry" systems (i.e. no water is consumed for heat rejection purposes), therefore water consumption relating to energy generation is zero.

4 Conclusions

The proposed Vastern Road energy strategy is not fully compliant with RBC's policy and wider aspirations for new developments in and around Reading. A number of questions around justification for the strategy must be addressed by Hodkinson, in particular around the proposed method of heat supply.

It is recommended that the items in Table 1 be evidenced by Hodkinson to provide justification for the non-compliant energy strategy, prior to planning consent being granted for the Vastern Road development.

Table 1 Recommended items to be evidenced by Hodkinson

#	Evidence required prior to planning consent being granted
1	To justify the claim that a centralised heat pump strategy would be higher cost for occupants than the current direct electric strategy, Hodkinson will provide a comparative analysis between the two for the Vastern Road development. This comparison will include: • A detailed breakdown of estimated central heat pump plant and distribution network costs, including capex, opex and repex. This should be provided as a calculation spreadsheet for review by Element Energy; • Consideration for underfloor heating to reduce system temperatures and therefore reduce distribution losses, which have been stated previously by Hodkinson as high for communal heating systems due to assumed higher temperature regimes; • Provision of evidence that feedback on underfloor heating systems in new developments have not been positive due to lower temperatures of heat delivered to dwelling spaces, as has been noted by Hodkinson previously; • Justification for expected O&M and billing costs, which may be provided in the form of a network operator's contracted costs for a previous development (or equivalent information); • If dwelling occupancy is a factor in the cost of heat assessment then evidence needs to be provided to support the claim that some dwellings will be less occupied than others, within the context of the type of development and expected homebuyers and occupants; • Repeat the above analysis for each dwelling type within the Vastern Road development (note there are 7no. dwelling types as per Hodkinson's Energy Statement).
2	Hodkinson should demonstrate why a communal closed-loop GSHP strategy is not feasible from a technical and cost perspective with an in-depth analysis of the opportunity for the technology. This analysis should include the following: • Consideration for vertical arrays (i.e. boreholes), demonstrating whether this is technically unviable to do so (e.g. due to utility clashes or spatial limitations); • Repurpose the analysis from recommendation #1 to understand the cost implications of such a system versus the communal ASHP case and current direct electric strategy from a cost of heat perspective.
3	Hodkinson should demonstrate why a communal open-loop GSHP strategy is not feasible from a technical and cost perspective with an in-depth analysis of the opportunity for the technology. This analysis should include the following:

	• Potential for open-loop GSHP should be assessed using as a first port of call the British Geological Survey's assessment tool: https://shop.bgs.ac.uk/Shop/Product/GRC_C108; • Should the area be demonstrated as possible for open-loop GSHP, further consideration should be made for the technical viability of the technology, including utility clashes and spatial limitations within the development; • Where this is shown as a viable technology, undertake a comparative analysis between a communal heating system and direct electric supply as per recommendation #1.
4	Given the proximity of the development to the River Thames, Hodkinson should repeat the comparative analysis between a WSHP-led communal heating system and the current direct electric supply strategy, as per recommendation #1.
5	Hodkinson should liaise with RBC regarding details of the proposed Reading DH network's vicinity to the development, such that allowance for a capped-off connection pipe from a communal heating system can be made within the development in preparation for connection to the DH network.
6	Hodkinson should provide more detail on the justifications for the selection of specific roof areas available for PV installs, beyond that which is given in the Energy Statement. This should include detail of rooftop mechanical plant and other ancillary equipment that may exclude installation of PV panels.
7	If SAP10.1 carbon emission factors are to be used for carbon analysis, which are expected to be adopted as part of the proposed Building Regulations (Part L) updates, Hodkinson should also demonstrate how the development's energy strategy compares with the other KPIs required as part of the proposed Part L updates[3], summarised as follows: • Primary energy target as the principal energy performance metric; • CO_2 emissions target as a secondary performance metric; • Householder affordability rating; • Future-proofing new dwellings to be ready for low-carbon heating systems; • Updated minimum standards for fabric and fixed building services. Given specific details of each update are not provided in the consultation, it will be deemed acceptable that completion of recommendations #1-4 is an initial "householder affordability rating" assessment. It is expected that the current energy strategy would achieve the minimum fabric and fixed services efficiency standards (see consultation document for details), however this must also be demonstrated clearly by Hodkinson. Calculation of the primary energy target against the notional building of the current energy strategy versus the recommended communal heating system strategy should also be provided. As a minimum the primary energy factor should not be higher than the notional building.
8	Provide justification for use of centralised mechanical extract ventilation (cMEV) in place of mechanical ventilation heat recovery (MVHR) in Block A – this is

3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/852605/Future_Homes_Standard_2019_Consultation.pdf

	currently not explained in the Energy Statement and could have an impact on the energy/cost performance of dwellings in Block A.
9	Should the energy strategy change given the above recommendations, Hodkinson must revisit the carbon offset payment calculation to ensure the offset is sufficient for the zero-carbon homes policy H5.

Appendix A

Key RBC energy and carbon policies from the Local Plan (November 2019) and accompanying Supplementary Planning Document

RBC Local Plan policy reference	Policy description (paraphrased)	Comments
CC4: Decentralised Energy	Developments of >20 dwellings and/or >1,000m^2 non-residential floor area shall consider provision of decentralised energy supply. This should consider connection to existing decentralised energy networks within the vicinity of the development.	Commercial units > 1,000m^2 non-residential development Residential units > 20 dwellings Vastern Road energy strategy must consider decentralised energy provision, including any existing decentralised networks in the vicinity of the development. Whilst not explicitly stated in the policy it is an aspiration by RBC for the decentralised solution to be designed ready for connection to any future DH networks that may come online within the vicinity of the development.
Sustainable Design and Construction Supplementary Planning Document Paragraph 8.10	It is acknowledged that full town centre-wide DH networks cannot necessarily be provided by a single development, however developments within DH priority areas should provide the following in the design of the building to prepare for connection: • Designing the development with wet (i.e. hydraulic) space heating and hot water distribution systems, so that the building	Vastern Road should provide a wet hydraulic heat distribution network to interact with the future proposed DH network in the area. Space should be reserved on the development for a heat exchanger plant room in preparation for any future connection to the DH network. Interconnection pipework should be buried and capped off in a suitable location, as agreed with RBC.

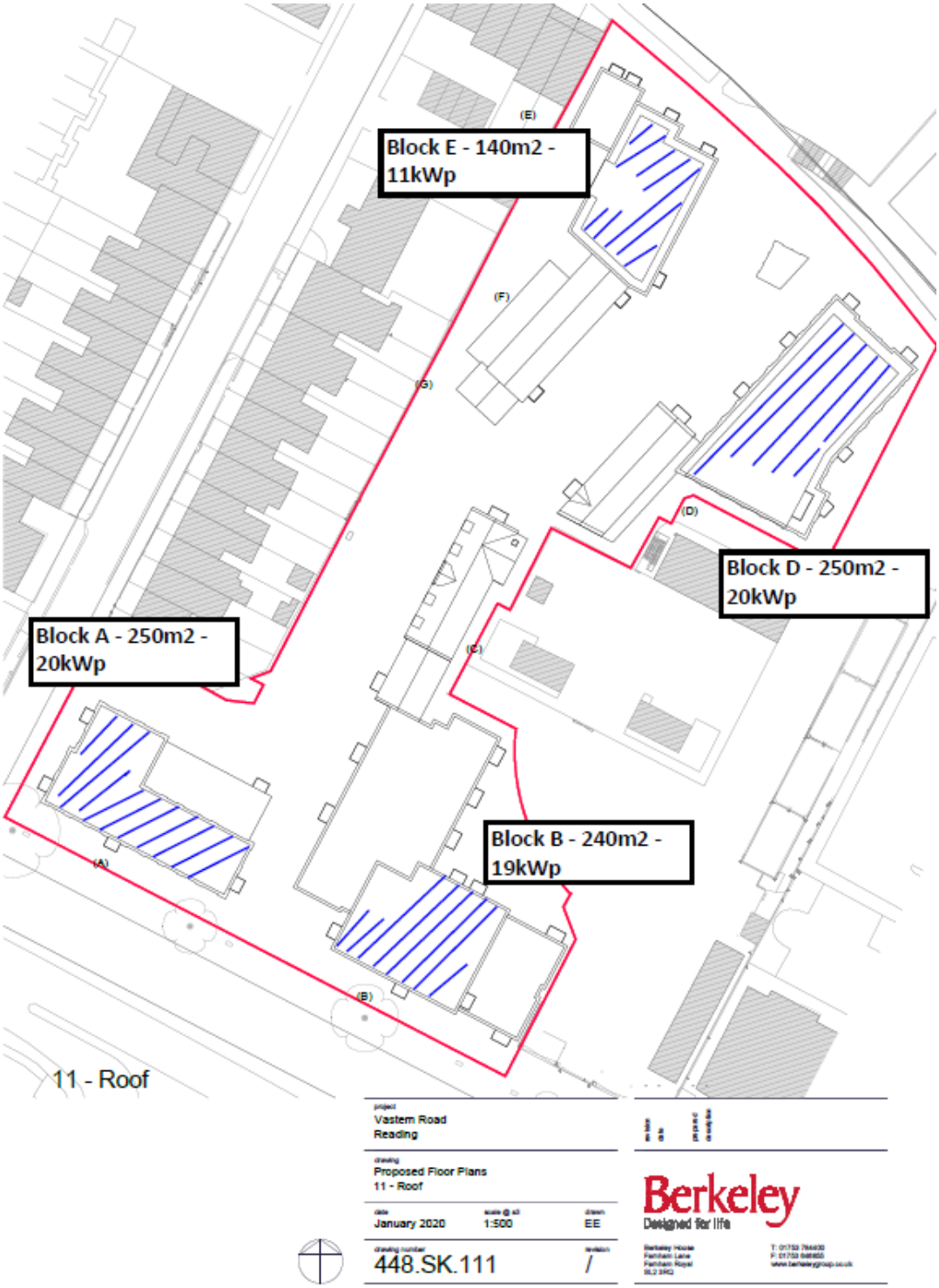
RBC Local Plan policy reference	Policy description (paraphrased)	Comments
	heat distribution network can interact with (i.e. supply heat to/extract heat from) a DH network; • Space provision in heating plant rooms for connection to a DH network – this may include (but is not limited to): wall penetrations for DH pipework into plant room; reserved plinths for plate heat exchangers (including redundant units) • Where necessary, provide buried and capped-off DH pipework from the development's plant room to a convenient location (to be agreed with RBC) in preparation for connection to the DH network.	
CC4: Decentralised Energy Paragraph 4.1.14	Biomass heat sources should be considered where decentralised energy networks are proposed.	Not recommended to use biomass fuel combustion due to impact on local air quality, as well as fuel delivery and storage complexities.
CC4: Decentralised Energy Paragraph 4.1.15	Air source heat pump (ASHP) and ground source heat pump (GSHP) should be prioritised over fossil fuel CHP for decentralised energy networks.	All forms of heat pumps (air, ground or water) should be prioritised over fossil fuel CHP plants. Fossil fuel CHP plants (e.g. reciprocating internal combustion engines) should not be considered for new developments due to local air quality impacts and poor future carbon performance.

RBC Local Plan policy reference	Policy description (paraphrased)	Comments
H5: Standards for New Housing	New build housing should be built to the following standards, unless it can be clearly demonstrated that this would render a development unviable: • All major new-build residential development should be designed to achieve zero carbon homes • All other new build housing will achieve at a minimum a 19% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations	Definition of "major new-build residential development" not provided, however is expected this refers to developments of 20 dwellings or more (as per CC4 policy). Vastern Road development therefore considered major and so zero carbon homes required. It is likely that carbon offset purchasing will be required (see policy paragraph 4.4.46 in Local Plan).
H5: Standards for New Housing Paragraph 4.4.45	New builds should incorporate on-site renewable energy where possible.	Level of on-site renewables generation to be achieved not defined. "Where possible" not well defined – this could refer to commercial, technical or spatial viability in relation to the wider development. Solar systems most likely to provide renewable generation given development location and constraints around the site.
H5: Standards for New Housing Paragraph 4.4.44	On the pathway to zero carbon homes a minimum of 35% carbon emission savings over Part L of the Building Regulations (2013) is required for residential units. The remaining emissions must	All homes to achieve 35% reduction in carbon over 2013 Building Regulations as a minimum. Note that it is not specified whether this is a 35% reduction on regulated emissions or all emissions. The London Plan states that the 35% reduction is

RBC Local Plan policy reference	Policy description (paraphrased)	Comments
	be offset via contributions of £60/tonne CO_2/a over 30 years. Where it is proposed to meet the zero carbon homes requirement in another way, clear evidence should be provided to demonstrate how it will be achieved at planning application stage	required for regulated emissions, therefore it is assumed this is the case for the RBC Local Plan. Likely that carbon offsetting will be required to achieve zero carbon homes.
CC2: Sustainable Design and Construction	All major non-residential developments or conversions to residential are required to meet the most up-to-date BREEAM 'Excellent' standards, where possible; All minor non-residential developments or conversions to residential are required to meet the most up-to-date BREEAM 'Very Good' standard as a minimum.	Expected that Vastern Road constitutes a "major development" (as per policy CC4), therefore non-residential buildings must achieve BREEAM 'Excellent', which from an energy/carbon perspective requires as a minimum the following credits: • ENE01: Reduction of energy use and carbon emissions (five credits required), which relates to a minimum Energy Performance Ration (EPR_{NC}) of at least 0.375[4] • ENE02: Energy monitoring (one credit required)

[4] The EPR_{NC} is calculated by comparing three metrics of actual building performance against the national building regulations compliant standard (i.e. a baseline) and each is expressed as a percentage improvement: (1) the building's heating and cooling energy demand; (2) the building's primary energy consumption, and; (3) the total resulting CO2 emissions. The three metric performances are then translated into an EPR_{NC}.

Appendix B



Rooftop solar PV provision for the Vastern Road development (~70kWp total)