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# Bury Interchange Phase 1 Energy Strategy

Document ref: 16012-FUT-BRY-XXX-T-BV-000009

Revision P03

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| <b>Issue</b>      | <b>P01</b>   | P02                                                                               | <b>P03</b>                                                                          |  |
|-------------------|--------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
| <b>Date</b>       | March 25     | March 25                                                                          | March 25                                                                            |  |
| <b>Purpose</b>    | For Comment  | Stage 3 issue                                                                     | Track changes omitted                                                               |  |
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| <b>Date of Issue</b> |  | 27/03/2025   | 31/03/2025   |  |
| <b>Version</b>       |  | P02          | P03          |  |

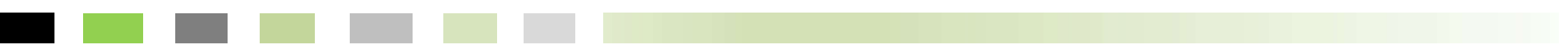
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# Contents

**Section 1 – Proposal ..... 4**

**Section 2 – Introduction..... 5**

**Section 3 – Energy Strategy ..... 6**

**Section 4 – Proposed PV Installation Serving Phase 1..... 13**

## Section 1 – Proposal

Futureserv have produced this energy strategy to support of the redevelopment of Bury Interchange, Phase 1 Bury Tram Stop. The Interchange Scheme consists of the refurbishment of the tram station, the introduction of a new passenger footbridge with lift, forming a new southern entrance to the station.

As the platform is a unoccupied and unheated space there is no requirement to provide a BRUKL. Therefore, this report has been written purely to identify how the design intends to support the platforms energy requirements vis LZC sources.

The construction of the Southern Entrance is key to enable Bury Tram Stop to continue operating during Phase 2 works which includes the demolition and replacement of the existing Interchange Building that currently provides the access onto the Tram Stop platforms.

As part of this scheme, the staff accommodation block, comprising of 2No. WC's and a kitchenette with storeroom will also be considered in this note. External is considered as regulated energy and therefore not considered in this assessment.

The project brief is to target net zero carbon in operation (NZCIO) based on the following assumptions which have been provided as part of the project scoping document.

- Operating hours Assumed 05:50hrs -23:00hrs pm 7 days per week
- electric vehicle charging and any commercial processes/ shop units are excluded
- Un-heated spaces such as the bus concourse or Metrolink platforms are excluded
- Tram/ vehicle related energy use is excluded

- Phase 2 residential scheme is covered under a separate report and does not form part of this brief.
- External landscaping and concrete apron are excluded
- As part of the detailed design a TM54 calculation will be produced to detail operational energy in use based on the final unregulated loads.
- Office areas outside of the platform areas are covered by a separate report

It is proposed to offset the unregulated carbon loads generated by the unregulated energy loads required by the operation of the platform by provision of a new PV system, the PV system will be provided as part of phase 2 of the development with the supporting LV infrastructure provided as part of phase 1 which will include a separate fused supply within the proposed distribution which will allow the future connection of a PV inverter.

The unregulated loads associated with phase 1 are located within the staff welfare facility and are anticipated to be circa 12kw, to ensure that a minimum of 12kW is provided to the southern entrance dedicated inverters are to be provided.

## Section 2 – Introduction

As the platform and southern entrance phases of the development are not heated spaces and have transient usage The unregulated energy loads are very limited and will change as future phases come into operation.

To allow for development of the overall site a PV system is proposed which will be located on the roof of the interchange.

This PV system will be designed to serve the overall site with an allowance to be provided to the Southern crossing which is defined as the foot bridge and the Metrolink platform.

The following newly provided rooms make up the southern crossing

1. Staff Welfare facility
2. Proposed LV switchroom
3. Proposed SER
4. Staff WC facilities

Following a review of the above areas the only unregulated supplies which are to be provided relate to the small power provision within the new staff welfare facility which has a maximum undiversified load of 12kw.

Other facilities which will benefit from the provision of PV but do not require connection to the system to demonstrate NZCIO are the platform and bridge lighting and the proposed lifts as these supplies are regulated and are required for the operational use of the platform.

Details of the proposed PV interface & Electrical distribution system are defined in section 4 of the report.

## Section 3 – Energy Strategy

### Planning Policy Requirements

The statutory development plan for Bury includes the Places for Everyone DPD (adopted March 2024). The PfE Plan includes policy **JP-S2 – Carbon and Energy** which sets out the express aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including (amongst others):

1. Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy, heating and cooling;
2. Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured;
3. Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities;
4. An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable;
  - a. Be net zero carbon, which applies:

from adoption – to regulated operational carbon emissions;

from 2028 - to all emissions 'in construction'.

From 2025 development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions.

Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which in order of importance

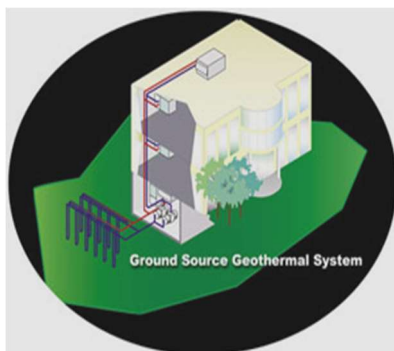
seeks to: (1) Minimise energy demand; (2) Maximise energy efficiency; (3) Use renewable energy; (4) Use low carbon energy; and (5) Utilise other energy sources.

## Renewable Energy Improvements

In order to comply with Greater Manchester' Local Plan, which aims to utilise renewable or low carbon technologies, there are a number of options to consider. All currently acknowledged and commercially available technologies have been considered and assessed with the conclusions summarised below.

### Ground Source Heat Pumps

The ground below buildings remains at a constant temperature of around 10°C to 12°C offering the ability to extract energy in the winter and discharge energy in the summer from cooling with the energy exchange being achieved via open or closed loop systems linked to heat pumps.



Ground Source Heat Pump Installation

The footprint of the Phase 1 development is confined and provides little scope to deliver an element of space available for closed loop heat exchange, due to this, this type of system has been discounted.

### Air Source Heat Pumps

Air source heat pumps provide an accepted solution for using renewable energy taken from ambient air to heat a building in the winter and discharge heat from cooling in the summer.



Typical External Condenser Unit

The use of air source heat pumps in order to provide heating to the development are feasible for the phase 2 development which is covered under a separate report solution

### Solar Photovoltaic Panels

The option to utilise roof mounted or Building Integrated Photovoltaic panels to generate electrical energy is a renewable energy method of generating Carbon free electrical power.

Due to divers building usage, there is likely to be a fairly constant base electrical load prevalent which may be mitigated in part by the use of Solar PV.



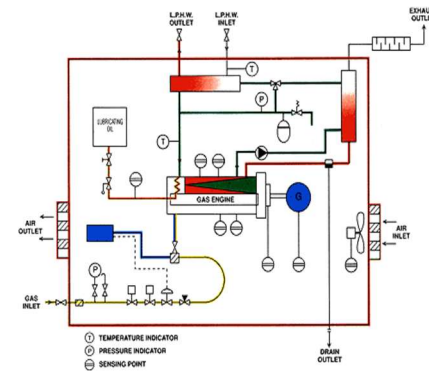
PV System components

The system would help reduce carbon emissions from grid electricity and feed into the grid in low demand periods contributing to the decarbonisation of the grid through grid export capability. This technology has been selected as the only form of LZC technology which can be applied to the development. Provision has been provide in Phase 1 to accommodate PV installed under phase 2, as the only feasible location to install PV is on the Phase 2 roof.

## Combined Heat and Power (CHP)

On-site generation of electricity and the utilisation of waste heat from this process within a building can create a beneficial arrangement whereby the transmission losses of grid supplied electricity can be omitted.

The use of CHP tends to require a steady and continuous heat demand and as this demand isn't there this technology has been discounted.



Diagrammatic layout of CHP unit



## Solar Thermal Collectors

The use of flat plate & evacuated tube thermal panels has been discounted as a potential method of harnessing renewable solar energy by pre-heating hot water due to the very limited demand for hot water at platform level



Example of Solar Thermal unit

In addition, as the wider site (Phase 2) will be providing PV to Phase 1 meaning it would be simpler to provide local electrical hot water which could be power from the PV array.

## Wind Turbines

Wind energy can be a cost-effective method of renewable power generation and turbines can produce Carbon neutral electricity with outputs ranging from watts to megawatts.

The most common design is for three blades mounted on a horizontal axis, which is free to rotate into the wind on a tall tower. The blades drive a generator either directly or via a gearbox (generally for larger machines) to produce electricity.

The electricity can either link to the grid or charge batteries. An inverter is required to convert the electricity from direct current (DC) to alternating current (AC) for feeding into the grid.

There are a variety of wind turbines on the market ranging from smaller turbines that can be attached directly to a buildings structure to larger stand-alone turbines. City centre and sub-urban locations generally experience poorer yields therefore this technology has been discounted



## Wind Turbine Installation

### Biomass

Some success on other projects has been made with the implementation of wood fuelled energy equipment forming a Carbon Neutral heat source however these projects have tended to be light density Sub-Urban or even rural in their location.

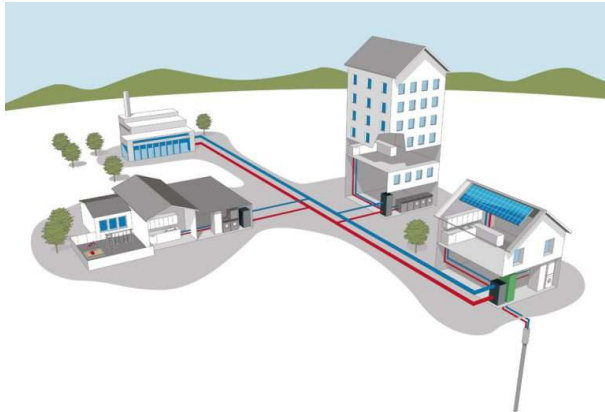
As no heating is required to the platform this technology has been discounted



## Plantroom Biomass Installation

## District Heat Network

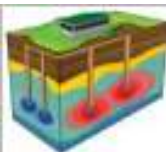
There is no local district heating network which can be utilised and insufficient heating load available to allow connection if there was a network in close proximity to the supply therefore this technology has been discounted

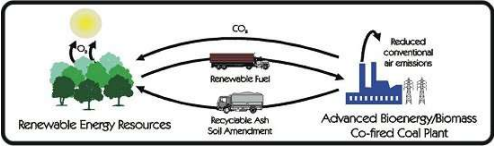


There is no heat required therefore this has been discounted

## Summary of Systems

The following table provides an overview of the systems and their suitability for this project:

| Proposed Technology                          | Image                                                                               | Comments                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solar Photovoltaic<br><b>Selected</b>        |    | Given the extensive roof area of phase 2 and the interconnecting nature of the building PV is considered a viable technology. We would consider a PV array is provided to the phase 2 roof area with a dedicated inverter provided to offset the unregulated carbon consumption of the platform welfare facilities. (see attached electrical schematic) |
| Air Source Heat Pumps<br><b>DISCOUNTED</b>   |    | ASHP have been discounted at platform level but consideration is given to their use on phase 2 as the office areas main source of heating and hot water. However at platform level there is insufficient hot water and heating load to provide this technology.                                                                                         |
| Ground Source Heat Pump<br><b>DISCOUNTED</b> |   | Ground source heat pumps have been discounted due to their high capital cost and the insufficient load in the phase 1 development                                                                                                                                                                                                                       |
| Solar Thermal<br><b>DISCOUNTED</b>           |  | There is a conflict between the use of local independent water heaters within each apartment and a central solar thermal collector array. As the usage of hot water to the platform is limited the development would be better served from PV as electricity is the prevailing load                                                                     |

|                                                       |                                                                                    |                                                                                                                                                                                                        |
|-------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Biomass Boilers<br/><b>DISCOUNTED</b></p>          |  | <p>Biomass boiler solutions have been discounted due to the insufficient building load.</p>                                                                                                            |
| <p>Wind Turbines<br/><b>DISCOUNTED</b></p>            |   | <p>Wind turbines have been discounted due to the resulting visual/noise impact from the equipment, and relatively poor performance of the solution when used within Urban and Sub-Urban locations.</p> |
| <p>Combined Heat and Power<br/><b>DISCOUNTED</b></p>  |   | <p>The integration of Combined Heat and Power technology has been discounted due to insufficient heating and hot water loadload.</p>                                                                   |
| <p>District Heating Network<br/><b>DISCOUNTED</b></p> |   | <p>Connection to a District heat network has been discounted due to the distance from the network</p>                                                                                                  |

## Section 4 – Proposed PV Installation Serving Phase 1

There is no PV provided under phase 1, the tram stop is not suitable to accommodate PV due to being located in a cutting. However, provision is included within the tram stop electrical infrastructure to accommodate future PV installation on the Interchange (Phase 2) building roof.

