







4.0 Energy & Carbon.

4.1 Energy and Carbon strategy

4.1.1 Introduction

The built environment is responsible for roughly half of the UK's carbon emissions. Achieving the Climate Change Act (2019 amendment) commitment to transition the UK to net-zero emissions by 2050 will therefore require immediate and robust action to reduce the energy use and therefore carbon emissions associated with buildings.

At a high level, when seeking to reduce energy use in buildings, three strategies are used: *reducing demand, increasing efficiency, and reducing the carbon intensity* of the energy supply. Each area has an effect on the others, meaning that improvements in each area have a self-reinforcing beneficial effect. In general the emerging sustainability plan for the building assumes a low-energy design, relying on passive design where possible.

In order to provide practical guidance for achieving the net-zero target, in January 2020 the London Energy Transformation Initiative (LETI) released the Climate Emergency Design Guide (CEDG). While the programme of the Cannock project is too complex to be covered by a specific typology within the design guide, the principles contained within are still applicable.

4.1.4 Space heating

Thanks to high performance fabric and the correct orientation, form factor and glazing ratio, the heating demand of a building will be reduced. This allows lower temperature sources of heat, such as air-source heat pumps, to be used.

Use of mechanical ventilation with heat recovery (MVHR) will further decrease heating demand since waste heat is captured and reused in the building.

Wherever possible air source heat pumps combined with MVHR will be used for the mechanical installation since their electrical operation can be cleanly driven via on site or off site renewable generation.

4.1.2 Fabric performance

Maximising the performance of a building's fabric reduces the *energy demand* by minimising heat losses and excessive solar gain. Better performing building elements, combined with continuity of insulation through careful detailing, should be specified.

The beneficial effects of increasing fabric performance are magnified by a building having a good orientation, form factor, and the correct proportion of glazing to facade.

While the programme of the Cannock project is too complex to be covered by a specific typology within the design guide, the following u-values, as advised by the LETI CEDG for the office typology, should be targeted:

- Walls	0.12 - 0.15
- Ground floor	0.10 - 0.12
- Roof	0.10 - 0.12
- Exposed ceilings / floors / soffits	0.13 - 0.18
- Windows/glazing	1.00
- External doors	1.20

4.1.5 On-site renewable generation

Reducing demand and increasing efficiency both reduce the overall energy consumption of a building. This reduction is essential since the remaining energy will in future be sourced entirely from renewable sources as part of the *reducing the carbon intensity* of the energy supply. The capacity of this future energy grid will be severely constrained. On site renewable energy generation will therefore become increasingly important.

In an urban environment photovoltaic panels are an obvious on site renewable choice. The business incubator and refurbished theatre provide a large expanse of roof area for the installation of PVs.

4.1.3 Ventilation and heat recovery

The numerous different activities taking place within the development will each require a tailored environmental solution.

While some areas of the building, such as the small, shallow plan rooms of the business incubator workspaces, may be sufficiently ventilated with natural ventilation via openable windows, more densely populated areas such as the theatre and [REDACTED] will likely require mechanical ventilation due to the larger number people and therefore air changes required.

Where possible, passive design using natural ventilation will be used. In particular, the central circulation area and cafe space of the hub, may be ventilated via the rooflights in the structure above.

Where necessary, mechanical ventilation will use a heat recovery system (MVHR) since this allows a high volume of air changes to be made while recycling the heat for re-use in the building.

Use of MVHR is positively reinforced by the use of air-source heat pumps, on site renewable generation and high performance fabric, since the heat recovery and superior fabric reduce the heating demand on the heat pump, while on site electricity generation powers the mechanical systems (heat pump and MVHR unit).

4.1.6 Materials and embodied carbon

As our buildings become more efficient through *reducing demand, increasing efficiency, and as our energy supply is decarbonised*, the embodied carbon of the materials used in the building's construction becomes even more significant.

In a building such as the new Hub, the structural frame is the building element responsible for the largest proportion (around 48%) of the embodied carbon within the building. It therefore has the greatest potential for reductions.

We are proposing a structural timber frame for the Hub which will greatly reduce the embodied carbon of the frame. Timber itself is a carbon negative material; processing it into a building material and transporting it to site adds to the embodied carbon but this will be significantly less than steel or concrete alternatives.

The refurbishment of the Prince of Wales theatre

5.0 Conclusion.

5.1 Summary

We would like to thank Tetrattech and Cannock Chase District Council for the opportunity to develop proposals for this exciting development.

The refurbishment of the Prince of Wales theatre and the development of a new Hub building and [REDACTED] will create a lively destination for socialising, entertainment and culture whose multiple functions are self-reinforcing.

The operation of the theatre will be improved by providing more space for the technical and staging functions of the theatre itself, with improved sanitary and breakout spaces in the adjacent Hub.

During the day the footfall generated by the workforces in the [REDACTED], business incubator and [REDACTED] will provide keen users for the Hub's food and drink facilities. Evening and night time activity brought by the theatre and [REDACTED] will help keep the Hub active and inhabited throughout the remainder of the day.

New landscaping around the development will link up existing pedestrian routes and St. Luke's Church.

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Appendix 4

Project visualisations