Comment on Sustainability Strategy for the Ensleigh South development on behalf of Transition Bath, a voluntary local sustainability organisation

Summary

Transition Bath strongly supports this planning application to build 40 homes meeting Code for Sustainable Home (CfSH) Code 4 standard.

We do however have some questions and comments about some of the information provided in the Sustainability Strategy Document , in summary:

1. **Solar PV**:
    a. The document states 18 kWp of solar PV will be installed, but the site sections of the roofs suggest nearer 48 kWp will be installed, and as a minimum SAP modelling suggests 37 kWp will be required to meet Code 4. Could the developer clarify this anomaly?
    b. We also feel that the option should exist for individual home owners to upgrade the area of solar PV on their properties which would allow the detached properties to meet the energy requirements of CfSH Code 5 and both detached and terraced properties to be zero carbon from a regulated energy perspective
    c. It does not appear that any renewable technology will be installed in the affordable homes, for example solar PV? This is not clearly stated, this leaves these occupants as second class citizens when they are more likely to be fuel poor and would benefit from free solar electricity
2. **Future proofing**: To 'future proof' the homes and to reduce their carbon impact we would recommend that the developers consider using Air Source Heat Pumps (ASHP) rather than gas to supply heating and hot water to the properties, or at the very least ensure there is enough space in the properties to install hot water cylinders which would allow ASHPs to be installed in future?
3. **More efficient design:** A 'boxier' less fussy design would have been preferred, particularly of the terraced properties which have led to half the space heating requirements, lower build cost but the same volumes and floor areas
4. **MVHR Specification:** MVHR is specified but the air permeability is defined as not to exceed 4 $m^3/(m^2h)$ at 50 Pa, the general advice is that the breakeven point for gaining a benefit from MVHR is 3 $m^3/(m^2h)$. We applaud the developer for including MVHR but suggest that they aim for as built permeability below 3 $m^3/(m^2h)$.

Despite these concerns we commend the developers for this new development.

Solar PV

The designs, particularly the detached, semi and terraced properties, with single pitched roofs appear ideal to maximise the properties production of renewable energy. It does however appear that the developers and their architects have attempted to minimise the solar PV installations in order to just about meet the minimum CfSH requirements at the lowest cost. The Sustainability Strategy document suggests only 18 kWp of solar panels will be installed but this doesn't seem to match the roof areas shown in the section details and what Transition Bath believes through SAP modelling would be required to meet CfSH 4?

The table below attempts to show this breakdown:

	Number of properties	Estimated area of solar panels on roof sections m2 per property	Estimated kWp/property	Total Estate kWp	Estimates of minimum per property kWp required to meet CfSH 4	Total estimated Minimum kWp	Maximum kWp per roof	Maximum kWp
Flats	14	0	0	0	NA	0	3.8	53
Semis/Terraces	16	8.3	1.26	20	1.10	18	7.7	124
Detached	10	18.6	2.81	28	2.00	20	20.0	200
Total	40			48		38		377

Comments:

1. The Sustainability Strategy document states 18 kWp will be installed, but our SAP/CfSH calculations suggest 38 kWp will be required to meet CfSH 4
2. The section details suggest a solar PV roof area of about 8 m^2 for terraces and 19 m^2 for the detached properties, implying a total of 48 kWp
3. There are no solar panels on the affordable housing. There is the opportunity for an average of 3.8 kWp per flat which would offset about 50% of each flat's regulated CO2 emissions. Could the developer discuss with whoever is taking ownership of the affordable housing whether they were prepared to pay for the solar panels? The occupiers if these properties are more likely to be fuel poor and in need of free electricity.
4. In addition we feel that the large roof areas of the terraced and detached properties if used more effectively with the installation of larger areas of solar PV would allow the detached properties to meet all the energy component requirements of CfSH 5 i.e. both the detached and terraced properties would be CO2 neutral from a regulated energy perspective which would be a great marketing opportunity. It would only cost between £5000 and £6000 per property, but provide the owners with £1100 to £1200 in annual benefit, a payback of between 4 and 5 years. We feel that new owners should be given the option of installing more solar PV than currently

specified and suggest to the developer there may significant marketing benefit in selling 'carbon neutral' or CfSH 5 homes?

5. Would the developers consider a roof leasing arrangement on the affordable homes if they were not prepared to fund them? Bath & West Community Energy a local sustainable energy company may be a potential provider of funding?

Future Proofing

By 2050 the government has committed to an 80% reduction in CO2 consumption, this is a difficult task and for some energy consumers like aircraft this is going to be very difficult or impossible to meet. As a result our homes will probably have to compensate and more than 80% and are likely to need to be carbon neutral.

The question then arises, what changes would be required to make these homes carbon neutral? The most obvious problem with the proposed design of these properties is that the heating and hot water is provided by natural gas, a fossil fuel which will not meet the 2050 commitments. The property will therefore most likely have to be upgraded and the most likely alternative to the proposed gas boilers will be an air source heat pump technology powered by carbon-free electricity.

It would be great if the developers would consider replacing the proposed gas boilers by air source heat pumps (ASHP), at least in the terraced and detached properties. This would

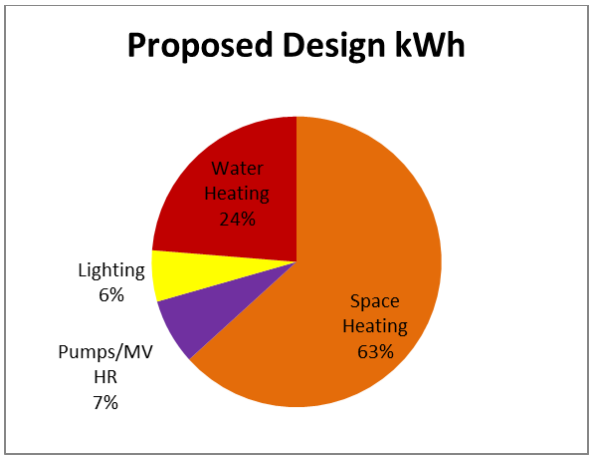
a. Immediately reduce their carbon emissions
b. Reduce their carbon emissions significantly over the lifetime of the units particularly if grid decarbonisation and particularly marginal decarbonisation takes place as predicted over the next 20 years
c. If larger solar PV arrays are installed they would provide partially no cost low-carbon heating and hot water powered by the solar panels

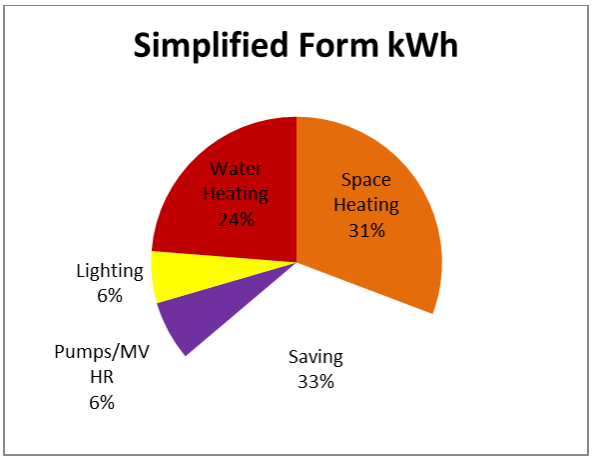
Either way, from the floor plans it looks like the space allocated for the boiler on the floor plans would not be large enough to accommodate a hot water cylinder and therefore make it very difficult to upgrade these properties by 2050 to be carbon-free.

More Efficient Design

It is probably too late in the process but the terraced properties have a particularly fussy design with a large surface area to volume ratio. As a result their heating requirements are higher than they should be, but this unfortunately is not represented in the CfSH rating as this is calculated largely on the basis of a DER/TER comparison with an identical design with 2010 Part L building regulations fabric.

The proposed design uses 50% more energy than a simplified design but with a boxier and less fussy design of the same volume, floor area, number of floors and fabric– i.e a lower surface area to volume ratio. Modelling both the proposed design versus the simplified design using full SAP 2009 software gives the following result:





The simplified design halves the terraced houses' space heating requirements, and reduces the houses' energy consumption by 50% overall. Unfortunately this is a failing of the DER/TER methodology of CfSH which fails to recognise the benefits of simplified designs.

This figure is further backed up by the Sustainability Strategy document's own data although it is hidden. Table 7.4 states total space heating requirements of 70,671 kWh and 133,510 kWh for 10 detached and 16 terraced/semi-detached properties respectively, implying annual space heating consumption of 7067 kWh and 8,344 kWh respectively per property. The terraced properties are going to require more space heating than the detached which is an uncommon result, normally because of shared party walls terraced properties require significantly less space heating but not in this case!

MVHR Specification

MVHR is specified but the air permeability is defined as not to exceed 4 $m^3/(m^2h)$ at 50 Pa, the general advice is that the breakeven point gaining a benefit from MVHR at 3 $m^3/(m^2h)$. Energy Saving Trust best practice advice suggests developers expecting to install MVHR should target air permeability below 3 $m^3/(m^2h)$. This breakeven point is where the CO2 savings from reduced space heating match the cost of running the MVHR fans. With careful selection of efficient Passivhaus certified MVHR units and efficient pipework the breakpoint could be a little higher at perhaps 4 $m^3/(m^2h)$. This is also borne out by SAP modelling of the same property with and without MVHR.

MVHR however has other benefits in improved air quality.

However we applaud the developer for including MVHR but suggest that they aim for as built permeability below 3 $m^3/(m^2h)$ and are not arguing against the installation of MVHR.

Miscellaneous

- The Sustainability Strategy document didn't specify the y-value's for the properties but this is critical in meeting the CfSH standards, the space heating consumption levels seem to suggest a figure of about 0.04 W/m^{2}K, meeting this will require careful design and build?
- The U value for the windows is very low at 1.02 W/m^2/K which implies the use of triple glazing although this is not stated; the assumption is that the U values quoted are U_w rather than U_g values?
- The kWh figures in Table 7.3 appear not to be energy consumption figures but are less helpfully energy demand figures and don't take into account boiler efficiencies which would have been more helpful and are not stated
- The U Values of the walls at 0.25 W/m^2/K and the flat roofs at 0.20 W/m^2/K are quite high being only slightly better than minimum building regulations, we would prefer to have seen lower values of perhaps 0.15 W/m^2/K which could have been included at minimal extra cost depending on the construction methodology which hasn't been stated
- We would prefer it if the washing machines and dishwashers has A+ or A++ or A+++ ratings as there is little cost difference between them and A rated appliances with careful selection
- We were unaware of any examples of permafrost in correctly specified Ground Source Heat Pumps in the UK despite what the Sustainability Strategy document claims. We would however agree with the decision not to use GSHP because of the compact nature of the site and the additional cost would probably be better spent elsewhere
- The Sustainability Strategy document's argument against district heating is primarily on the premise of significant heat losses of 30W/m in distribution pipework, however we feel this figure is very high, Logstor or Uponor products typically of 10W/m., use of these products would negate the document's argument. We would however agree that because of the size of the site it is probably too small for district heating to be economic if you ignore Ensleigh North