Comments on energy and carbon proposals for Horse Fields development

Energy Efficiency is not Maximised

The OxPlace energy proposals do not **maximise** energy efficiency – and yet the OCC Local Plan 2036 (Policy RE1 Sustainable design and construction) states that "planning permission will only be granted where it can be demonstrated that the following sustainable design and construction principles have been incorporated"… The first item on the list is "**maximising energy efficiency** …".

The OxPlace proposals have looked at energy efficiency options but do not set themselves high enough targets. Best practice today to maximise energy efficiency is widely regarded as being Passivhaus. Passivhaus requires building to the highest certifiable standard of energy efficiency, resulting in ultra-low energy buildings that are healthy and need very little fuel for heating or cooling. Scotland is looking to adopt this for all new builds. In England, Exeter City Council has already pioneered Passivhaus construction for new Council houses and other buildings. Norwich City Council has embraced it to make healthy homes that are affordable to run. Oxford City Council is lagging behind in spite of its claims to be tackling the climate emergency and wanting to go further and faster than national targets. We need housing that is fit for the future and can be demonstrated to be so.

The OxPlace energy statement makes lots of references to improvements over Building Regs, but Building Regs specify the worst building that you are allowed to build.

Specifically, in the energy statement, items that do not maximise energy efficiency include:

1. **Fabric Energy Efficiency**. It is commendable that a fabric first approach is proposed to focus on reducing energy demand. Fabric energy efficiency is a measure of a building's combined annual heating and cooling energy use per square metre of internal floor area. The design fabric energy efficiencies for this development have been calculated for each type of property based on SAP (the government's Standard Assessment Procedure used to calculate the energy performance of buildings) and are stated (in Table 5 p13) to vary between 24.04 and 35.69 kWh/m2 per annum depending on the property. For comparison, the Passivhaus criterion is a maximum of 15 kWh/m2 per annum for any property, approximately half of what OxPlace is proposing. This was proposed by Prof Dr Wolfgang Feist, a German physicist, who analysed the optimum balance of energy flows in a property. This must be modelled in the design process using purpose-made Passivhaus software to calculate the heating and cooling energy.
2. **U values and windows**. U values are a measure of the rate of heat loss through different parts of the external envelope of the building, so are a guide as to how well insulated it is. The lower the U value the better. U values are measured in W/m2K, watts per square metre of the wall/window/floor etc per degree of temperature difference between the inside and the outside in Kelvin (1 degree K is the same as 1 degree Celcius). The U values are one of the key factors that determine the Fabric Energy Efficiency, or conversely which are derived from modelling to achieve the required Fabric energy Efficiency. In Table 4 p12, it is particularly the figures for the

windows that are not ambitious (1.2-1.3 W/m2K). It isn't stated whether these are for the whole window (frame and glazing) or just for the glazing, but suggest double glazed units. The windows and doors are allowing roughly ten times as much heat loss as the walls, roof and floors. Heat loss could be further reduced with triple glazed units, typically with a U value of less than 0.8 W/m2K.

3. **Thermal bridging**. Energy efficiency is maximised by designing thermal bridges out of the construction altogether. Thermal bridges exist anywhere that there is an easy path through the fabric of the building through with energy can escape, for example where there is a gap in or thinning of the insulation. This is acknowledged in the energy statement, and will depend on the details of the construction system. It needs to be watched.
4. **Air leakage**. Air has a way of leaking through the tiniest of gaps, and takes with it heat from within the house. A building therefore wants to be as airtight as possible to keep the heat in. The energy statement sets a target of 3 m3/h/m2 at 50 Pa (which is roughly 3 air changes per hour) for this development. This isn't ambitious. Passivhaus stipulates 0.6 air changes per hour. Achieving airtightness requires great attention to detail and is a very good indication of quality of build.
5. **Ventiliation**. Any house with an airtightness of around 3 air changes per hour or less needs mechanical ventilation to maintain good indoor air quality for healthy living. It is good to see this is proposed in the form of mechanical extract ventilation, which helps to remove moisture from within the building. However, this misses the opportunity to recover the heat from the extracted air, and simply expels the damp warm air to the outside. A ventilation system with a heat exchanger allows 90% of the heat to be recovered from the outgoing stale air and used to preheat the incoming fresh air. Again, efficiency is not being maximised.
6. **Certification.** The energy statement proposes Energy Quality Assurance during the build process. This is definitely a good idea, with all the measures that have been suggested. Passivhaus takes it one step further with certification to independently confirm compliance with all the design details including airtightness. This demonstrates energy efficiency maximisation.
7. **Hot water heating**. The proposed hot water tanks at 250 litres seem very large. Storing excessive amounts of hot water wastes energy in heating it up and then losing it during storage. There would seem to be scope to reduce the amount of hot water stored and save energy without compromising the availability of hot water when required.

In summary, although there is a detailed energy statement, it stops short of meeting the council's requirement to **maximise** energy efficiency.

Use of Low Carbon Energy

The OCC Local Plan 2036 (Policy RE1 Sustainable design and construction) stipulates requirements for planning permission to be granted. As quoted above, the first item on the list is "maximising energy efficiency and **the use of low carbon energy**".

The energy statement confirms that there will be no gas used on the site. This is very welcome. All electric houses have the potential to be lower carbon energy, especially if renewable electricity is supplied.

The energy statement proposes to supply heating and hot water to all houses with air source heat pumps, and to have hot water heat pumps in the maisonette units with direct electric for space heating. Direct electric is an extravagant use of electricity and therefore of carbon, so doesn't seem a good idea. Good heat pumps with a high coefficient of performance in well specified systems and properly installed are to be welcomed.

It is stated in the energy statement that the planners have said that PV should not be used on this site. This is curious and requires further explanation.

The CO2 emissions attributable to a dwelling are those for space and water heating, ventilation and lighting, less the emissions saved by energy generation technologies (SAP 10.2). The design emission rates are set out in Table 12 in the energy statement. These would be lower if the energy efficiencies were to be maximized and if there were to be PV.

Provision of electric vehicle charging allows a switch away from fossil fuel vehicles to a much lower carbon energy source. On EV charging, the energy statement says that there will be a 'minimum provision' for electric charging points for each residential unit with an allocated parking space. It is not clear what a 'minimum provison' means. Separately, the planning statement says that all the 17 unallocated parking spaces will have capacity and ducting to allow for future installation of charging points. Charging points are needed now to encourage the switch to EVs in support of the Council's Zero Carbon Action Plan aims.

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