PROOF OF EVIDENCE OF JAMES SHELDON (MA Hons. MEng (Cantab.) MSc. Hons)

APPEAL BY FIRETHORN TRUST

LAND AT NORTH WEST BICESTER, CHARLOTTE AVENUE, BICESTER

LOCAL PLANNING AUTHORITY REF NO: 21/01630/OUT

PLANNING INSPECTORATE REF NO: APP/C3105/W/23/3315849

Introduction

1. My name is James Sheldon. I am the energy and carbon specialist at Bioregional. I hold a Master's in Engineering from Cambridge with a specialism in Sustainability and Energy. For the previous 9 years I have worked as an environmental designer and energy analyst within the building industry and have expertise in all major industry energy modelling approaches including SAP, PHPP and Design for performance methods such as CIBSE TM54.

   I have been with Bioregional for 3 year and provide expert advice and detailed analysis of the carbon and energy use implications of policies, building designs and organisational strategies. I am experienced in wholistic benchmarking of sustainability performance and bring a nuanced socially and geographically grounded view to contemporary debates such as the "net-zero" transition. I previously worked for 6 years as an Environmental Designer at a building design firm. I specialised in advanced digital building modelling, working on methods of optimising building carbon performance while creating healthy dynamic well daylit spaces.

2. I have been commissioned to present this evidence on behalf of Cherwell District Council, the planning authority within which the application site sits.

About Bioregional

3. Bioregional are a purpose-led consultancy, registered charity and social enterprise. For almost 30 years we have championed a better, more sustainable way to live. We work with partners to create better places for people to live, work and do business.

   Bioregional has an established presence in Bicester with a team working from their office at the Eco Business Centre on Elmsbrook. This satellite office was established because of Bioregional's involvement in the Bicester Eco Town programme.

   This team has worked in partnership with Cherwell District Council, A2Dominion (lead developers of NW Bicester) and other town-wide stakeholders for almost a decade. During this time, we have supported Cherwell's Bicester Team in developing the vision for Bicester, the detailed planning application for Elmsbrook, the NW Bicester masterplan and the NW Bicester Supplementary Planning Document. We have initiated, fundraised, advised on, and delivered a wide range of demonstration and community projects across the town.

   Additionally, Bioregional have deep knowledge of development best practice, the constraints, and possibilities of practical and commercial realities. This is alongside a deep, technical, and comprehensive understanding of the national and local planning policy and regulation. Bioregional is a member of the London Energy Transformation Initiative (LETI), Good Homes Alliance (GHA) and the UKGBC, allowing us to keep up to date on latest trends and changes.

Having worked closely with Cherwell District Council, A2Dominion and other key stakeholders for the past 10-years we have a deep understanding of the local political, planning and social landscape.

In addition, Bioregional have worked on major development schemes in both Oxfordshire and nationwide, alongside major developers using our globally recognised One Planet Living framework to develop, enhance and champion their sustainability approaches and help create truly sustainable places. Alongside these advisory roles for developers, we have also assisted several Local Authorities by providing zero-carbon evidence bases for emerging local plans.

Additionally, this evidence has been supported by Lewis Knight (BSc, MSc), Head of Sustainable Places (Bioregional). Lewis has worked with Bioregional for 10 years and an experienced sustainability professional who specialises in leading the sustainability strategies for large and strategic sites, working from site promotion, through planning submission and onto delivery. Lewis worked for the past decade on the NW Bicester (the UK's first eco-town). His experience spans the whole lifecycle of the scheme and across planning, design, engagement, and testing. Lewis worked for 4 years as part of the Bicester Delivery Team within CDC. During this time Lewis supported the planning team on assessment of applications and clearance of conditions.

Statement of Truth

4. All factual information provided in this proof of evidence is true to the best of my knowledge. Where opinion is offered it is my own based on the evidence before me and is identified as opinion.

Policy Context

5. The key policy compliance area reviewed in these summary comments is taken from Bicester Policy 1: Policy Bicester 1: North West Bicester Eco-Town - Development Area: 390 hectares

   Development Description: A new zero carbon(i) mixed use development including 6,000 homes will be developed on land identified at North West Bicester.

6. Planning permission will only be granted for development at North West Bicester in accordance with a comprehensive masterplan for the whole area to be approved by the Council as part of a North West Bicester Supplementary Planning Document. The Council will expect the Masterplan and applications for planning permission to meet the following requirements:

7. Housing

a. Number of homes – Up to 6,000 (3,293 to be delivered within the plan period)
b. Affordable Housing – 30%
c. Layout to achieve Building for Life 12 and Lifetime Homes standards.
d. Homes to be constructed to be capable of achieving a minimum of Level 5 of the Code for Sustainable Homes on completion of each phase of development, including being equipped to meet the water consumption requirement of Code Level 5
e. The provision of extra care housing
f. Have real time energy monitoring systems, real time public transport information and Superfast Broadband access, including next generation broadband where possible. Consideration should also be given to digital access to support assisted living and smart energy management systems.

8. Key site-specific design and place shaping principles
    a. Proposals should comply with Policy ESD15
    b. High quality exemplary development and design standards including zero carbon development, Code Level 5 for dwellings at a minimum and the use of low embodied carbon in construction materials, as well as promoting the use of locally sourced materials.
    c. All new buildings designed to incorporate best practice on tackling overheating, taking account of the latest UKCIP climate predictions.
    d. Proposals should enable residents to easily reduce their carbon footprint to a low level and live low carbon lifestyles.
    e. Layout of development that enables a high degree of integration and connectivity between new and existing communities.
    f. A layout that maximises the potential for walkable neighbourhoods.
    g. New footpaths and cycleways should be provided that link with existing networks, the wider urban area and community facilities with a legible hierarchy of routes to encourage sustainable modes of travel.
    h. A layout which makes provision for and prioritises non-car modes and encourages a modal shift from car use to other forms of travel.
    i. Infrastructure to support sustainable modes of transport will be required including enhancement of footpath and cycle path connectivity with the town centre, employment, and rail stations. Measures to ensure the integration of the development with the remainder of the town including measures to address movement across Howes Lane and Lords Lane.
    j. A well-designed approach to the urban edge, which relates development at the periphery to its rural setting and affords good access to the countryside, minimising the impact of development when viewed from the surrounding countryside.
    k. Development that respects the landscape setting and that demonstrates enhancement, restoration or creation of wildlife corridors to achieve a net gain in biodiversity.

l. Consideration should be given to maintaining visual separation with outlying settlements. Connections with the wider landscape should be reinforced and opportunities for recreational use of the open countryside identified. Development proposals to be accompanied and influenced by a landscape/visual and heritage impact assessment.
m. Careful consideration of open space and structural planting around the site to achieve an overall improvement in the landscape and visual impact of the site.
n. No development in areas of flood risk and development set back from watercourses which would provide opportunity for green buffers. Proposals should include a Flood Risk Assessment.
o. Maximisation of the sustainable transport connectivity in and around the site Consideration and mitigation of any noise impacts of the railway line
p. Good accessibility to public transport services should be provided for, including the provision of a bus route through the site with buses stopping at the railway stations and at new bus stops on the site.

9. The importance of delivering a zero carbon scheme on the appeal site is underpinned by the North West Bicester SPD. Paragraph 4.3 (p19) of that document states:
    a. "Applicants are expected to consider the principles and parameters set out in this section in the preparation of planning applications (in outline and detail) and Design and Access Statements. The principles should be applied to the development as a whole, as well as individual sites".

10. The North West Bicester SPD is also very clear that any planning application, Outline or Detailed, will need to demonstrate how the proposal is able to deliver the zero carbon principles of Policy Bicester 1. Paragraph 4.25, page 19, states:
    a. "Each full and outline application will need to be supported by an energy strategy and comply with the definition of true zero carbon development".

Key principles drawn from Policy Bicester 1

11. **The definition of zero carbon in eco-towns is that over a year the net carbon dioxide emission from all energy use within the buildings on the eco-town development as a whole are zero or below (per footnote i on p.140 of the Local Plan Part 1)**
12. The e**nergy strategy submitted with the** planning application demonstrates a partial alignment with the Cherwell District Council Local Plan policy in terms of addressing energy and carbon performance. It appropriately references relevant policies to be considered in this regard. However, it is my opinion that it lacks the clarity and detail of how these will be achieved. Additionally, as per Policy BIC1 outlined above and in the adopted Cherwell Local Plan 2011-2031, the overarching goal is to achieve "True Zero Carbon", with developments required to provide evidence of how this requirement will be met.

13. **While the planning documentation makes extensive mention of the concept of True Zero Carbon, the Energy Statement, however, lacks the necessary level of specificity in detailing how this objective would be practically implemented in practice. Despite being an outline planning application, it is important to assume additional commitments in terms of fabric performance and energy use intensity. The approach and strategy to achieving net zero should be clearly articulated and presented, alongside a carbon balance highlighting how the development will meet the 'True Zero Carbon' definition through the energy hierarchy.**

14. Furthermore, a robust feasibility study on the utilisation of renewable energy sources and low-carbon technology should be undertaken to ensure a comprehensive plan for achieving net zero carbon emissions.

15. The current energy strategy and approach to zero carbon relies on the concept of carbon offsetting. This could arguably play a role in achieving a net zero development; however, it is my opinion that this approach is not in the ethos or spirit of policy BIC1. The policy was created to meet the requirements of the Eco towns PPS, as one of only four selected Eco towns, and to showcase the ability to build truly sustainable developments/communities to a true zero carbon standard, it does not mention the use of offsetting as part of this definition.

16. This carbon offsetting approach, in my opinion does represent a departure from Policy BIC 1 as this policy requires North West Bicester development itself to be zero carbon and does not allow for carbon offsite reductions elsewhere in the district.

17. Additionally, this approach could be seen as setting a dangerous precedent for future developments on the wider North West Bicester site, in that future developers may seek to adopt a similar approach thereby undermining policy BIC 1. It is in my view that it would be better to spend these contributions on physical carbon reduction measures that genuinely off-set carbon, as part of the build.

18. My view is that the energy demand within buildings should be reduced as much as possible through efficiency measures and fabric specification and the remaining energy use should be met by on-site renewables. Offsetting should only be used as the last solution, and not be used as the 'easier' way of meeting policy compliance by using more traditional construction methods coupled with financial contributions towards unspecified measures offsite.

19. Additionally, I would question the assumptions behind the carbon offset calculations, specifically the price per tonne for carbon. Stantec cited in the FVA Report that Cherwell does not yet have a specific policy for offset pricing or timescale but observes that "if it's similar to other [local plan] policies then it would be a simple £60/tonne".

20. It is correct that £60/tonne was the figure originally charged by the Greater London net zero carbon offsetting policy when first implemented in 2016 and imitated by some other local plans since then. That 2016 London price per tonne of carbon was based on the BEIS non-traded central valuation per tonne of carbon– which at the time was £60/tonne.

21. However, in the years since the London policy was set, BEIS has since significantly raised its central non-traded carbon valuation (and proposes that this will continue to increase in coming years).In the latest data set (released by BEIS 2021) that figure is £248/tonne and rises at approximately a 2% year-on-year increase every year, reaching £378 in 2050. BEIS applies this increase to reflect the cost of carbon abatement and inflation.

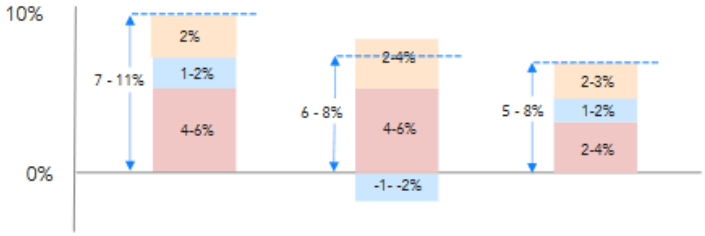
22. I have calculated what the new carbon offset figure would be if the revised BEIS carbon prices were used and multiplied the development's annual emissions, with grid carbon reduction, by the BEIS annual £/tonne of carbon figure for each respective year from 2022-2051 (this acknowledges the development is proposing an all-electric energy solution and would benefit from grid decarbonising over time). This yields an annual £ amount that it would be reasonable to expect Firethorn to offset, reflecting each year's reduction in the carbon of electricity used by the development, and each year's increase in the value per tonne of that carbon, as follows:

	Firethorn annual TCO2 emissions	BEIS £/tonne	Annual £ offset
2022	**332**	**£ 248**	**£ 82,453**
2023	318	£ 252	£ 80,297
2024	347	£ 256	£ 88,945
2025	294	£ 260	£ 76,374
Etc …	Etc …	Etc …	Etc …

23. I then summed all 30 years' £annual offset. This gives a total of £ 819,868 (average £1,547/home). This is significantly higher than Stantec's estimate of £543,600 (note this is based on a residual carbon emission calculation of 490 tonnes/annum). It should also be noted that it was unclear how the unregulated elements of the carbon emissions were calculated.

Precedent policy examples showing achievability of Zero Carbon in other areas of country.

24. The above policy context is clear around achieving net zero carbon, and I note there is evidence that this context is achievable. See Lincolnshire local plan policy evidence documents. Specifically:
    a. 1. Lincolnshire local plan Task C viability of achieving true net zero on site (20200345-Central Lincolnshire Climate Change Evidence Base-Report-Task C-Rev D (n-kesteven.gov.uk)
    b. 2. Lincolnshire local plan Task G financial feasibility of true net zero on site (20200345-Central Lincolnshire Climate Change Evidence Base-Task G Feasibility-Rev C (n-kesteven.gov.uk)
25. Core bullet points:
    a. When achieving Passivhaus premium with standard roof design, true zero carbon is achievable on plot for up to 4 storey buildings.
    b. When achieving best practice with roof orientation optimised to allow efficient photovoltaic module mounting, true net zero carbon is achievable on plot for up to 6 storeys residential buildings.
    c. Estimate construction cost impacts to achieve True Net Zero Carbon are 5-11% depending on strategy taken by applicant:



	Policy option 1 Fabric: 20 kWh/m²/yr EUI: 35 kWh/m²/yr PV: match EUI	Policy option 2 Fabric: 20 kWh/m²/yr EUI: 45 kWh/m²/yr PV: match EUI	Policy option 3 Fabric: 30 kWh/m²/yr EUI: 35 kWh/m²/yr PV: match EUI
Building fabric and ventilation	4-6%	4-6%	2-4%
Heating system	1-2%	-1 to -2%	1-2%
Renewable energy generation with PVs	2%	2-4%	2-3%
Total capital cost uplift	**7-11%**	**6-8%**	**5-8%**
Running costs/yr (as % of baseline)	**-80%**	**-40%**	**-80%**

Figure 5.2 - Summary of cost impacts of different policy options on four modelled typologies: by building fabric and ventilation, heating system and renewable energy provision. Uplifts are relative to the baseline building and reflect the cost of additional materials required to meet specs. Running costs are relative to running costs of the baseline building, and include for savings and returns from photovoltaic panels.

*Above figure from Task G central Lincolnshire feasibility assessment

26. It should be noted that this is also seen in the Bath and NE Somerset (B&NES) Local Plan Partial Update and the Cornwall Climate Emergency DPD. B&NES and Cornwall set identical net zero policies for new residential development:
    a. 40 kWh/m^2/year limit for energy use intensity/total energy use (includes unregulated energy)
    b. 30 kWh/m^2/year limit for space heating demand
    c. On-site renewable energy generation to match total energy use.
27. The following documents established the technical evidence base that subsequently enabled the adoption of the policies.
    a. Energy Review and Modelling (Feb 2021) – Etude and Currie & Brown
    b. New Housing (July 2021) – Etude and Currie & Brown

c. New Housing Technical Appendices (July 2021) – Etude and Currie & Brown

28. Six common house types were modelled by Etude:
    a. Semi-detached house
    b. Terraced house
    c. Bungalow
    d. Detached house.
    e. Low-rise block of 7 flats
    f. Mid-rise block of 20 flats
29. The modelling in the technical evidence base shows that it is technically feasible for the B&NES/Cornwall policy to be achieved across all typologies set out above. It is important to note that full compliance with this policy results in **zero offsetting**. In an exceptional circumstance where policy compliance was not feasible, the total energy use and space heating limits must still be met and it would only be any residual on-site renewable energy generation than can be offset – the evidence base supports this.
30. **If the Firethorn development requires offsetting, it should only be residual on-site renewable energy generation that is offset, instead of reducing energy efficiency. This enables the site to become net zero in future if further renewable energy is installed or as the grid decarbonises.**
31. The energy use limits are easier to meet under the B&NES/Cornwall policy than they are under the Central Lincolnshire policy, yet more on-site solar PV is required to match total energy use. The cost uplift to comply with the Central Lincolnshire policy is higher due to these more stringent energy use limit requirements, yet a genuinely on-site net zero energy balance is achievable at a lower cost uplift under the B&NES/Cornwall approach. Therefore, a *reasonable approach* to take would be to follow to B&NES/Cornwall approach, particularly as B&NES have been implementing the policy with compliant applications since January 2023, which further proves the requirements are achievable in practice.
32. Cornwall cost uplifts from the DPD Viability Report:

Dwelling type	Cost/sq m of meeting Part L 2021	Cost/sq m of meeting DPD	Uplift from part L 2021 to DPD
Semi	£77	£90	£13
Terrace	£79	£110	£31
Bungalow	£89	£108	£20
Detached	£68	£75	£7
Low rise flats	£29	£79	£51
Medium rise flats	£24	£80	£56

Dwelling type	Sq m	Cost/dwg of meeting Part L 2021 compared to Part L 2013	Additional cost/dwg over Part L 2021 of meeting DPD SEC 1
Semi	93	£7,162	£1,196
Terrace	84	£6,623	£2,609
Bungalow	108	£9,590	£2,115
Detached	142	£9,618	£1,030
Low rise flats	92	£2,612	£4,660
Medium rise flats	80	£1,943	£4,436

33. Based on the cost uplift values in the tables above, the Viability Report concluded that:

    "*The overall conclusion is that, based on the testing in this report,* ***the additional costs associated with building new dwellings to the standards required in DPD policy SEC 1 can be met without jeopardising viability across the majority of cases****. The exceptions relate to higher density and older persons development as well as some affordable-led schemes. This conclusion is not dissimilar to the findings of the February 2021 study and suggests that these types of development may not be viable even without the DPD requirements.*"

34. The B&NES Viability Study produced the same conclusions, showing widespread viability across the majority of typologies. The primary typology that was found to not be viable was high-rise flat blocks in rural areas with low land value, which is not a realistic development option.

35. As the Etude evidence sets out, the B&NES/Cornwall policy cost uplift is 0.5-2.7% over Part L 2021. The B&NES Viability Study therefore tested at a central 3% scenario but also tested at 5% and 6% to provide additional headroom. The two higher uplift scenarios remained viable across the majority of typologies.

Implications and comments on current costings plan:

36. The viability cost estimate notes the following:
    a. "This Cost Estimate includes for measures to satisfy Item 4, Future Homes Standard (plus photovoltaic panels)."
    b. "In order to achieve the equivalent of Zero Carbon and True Zero Carbon (which assume direct connection to renewable energy), carbon offsetting contributions will be necessary to supplement the additional design measures. The estimated contribution is excluded from this estimate and will need to be added to the 'all-in' build cost rate as reported in this estimate, to determine the overall build cost rate to deliver (1) Zero Carbon homes and (2) True Zero Carbon homes."
    c. "In order to achieve the Future Homes Standard, the space heating and domestic hot water (DHW) strategy for all house types (detached, semi-detached, terraced) is to

be delivered by individual Air Source Heat Pumps (ASHP). For the apartments, the strategy is to install smart night storage heaters (due to spatial constraints to these units). A separate cost exercise has been undertaken for the potential to connect to a centralised ASHP district heating system, but this option is not included in this estimate, which assumes a standalone strategy."

37. I note that this does not comply with the definition of true zero carbon as defined in the Policy Bicester 1 above. The applicant claims that achieving true zero carbon would harm viability and capacity to achieve other policy objectives on site.

38. I make the following comments on the current design strategy.

    On heating system design:

    a. Use of night storage heaters in apartment blocks requires a significantly greater amount of energy and hence carbon emissions to deliver the space heating requirements compared to a heat-pump solution. See SAP 10.2 technical document for detailed energy factors used in heat-pump and night storage heater energy analysis.
    b. Immersion heaters for DHW provision significantly increases energy and carbon intensity of DHW provision compared to a heat-pump heated domestic hot water cylinder – again, please refer to SAP 10.2 technical documentation to see difference in factors between the two technologies.
    c. Heat pumps typically achieve annual operational coefficient of performance (SCoP) of greater than 300%. This means for one part of electricity used, three parts of heat are delivered to the space. Direct electrical solutions such as night storage heaters, immersion heaters etc will always have efficiencies of less than 100% (See: BRE : Domestic Annual Heat Pump System Efficiency (DAHPSE) - Estimator - BETA (bregroup.com))
    d. The applicant refers to FHS specification as its core target. There is no formal specification for the FHS yet, and the current published notional specification is only indicative. However, that notional specification contains heat pumps for heating and domestic hot water provision. The Future Homes Hub, a policy hub bringing together many developers, housebuilders and SME's, have proposed some alternative contender specifications for the Future Homes Hub. Within these specifications, heat pumps are used for DHW and if heating is provided, heating, in all contender specifications bar one. In this singular exception, a SMART technology solution using radiant heaters is suggested.
    e. There is no mention of night storage heaters in relation to any contender specification, or the governments notional specification in relation to the Future Homes Standard.
    f. Due to the higher energy demands, night storage heaters significantly increase the energy demands per plot, thereby undermining the ability of the proposed

development to meet the True Zero Carbon standard. Other design solutions are possible and should be explored to ensure this policy requirement is met.

g. CIBSE AM16 provides design guidance on heat pump installation in multi-residential buildings – very common solution in other parts of the country. (CIBSE are the Chartered Institution of Building Services Engineers (CIBSE), they are the professional body that exists to advance and promote the art, science and practice of building services engineering)
h. For example, one common solution in multi-residential buildings is for the main ASHP heat generating units to be on the roof. Heat distribution pipework is then provided to the flats through risers and down corridors, with small heat interface units, no larger than a traditional combi-boiler, within the flats. In this solution, the flat can be laid out as per a system boiler, with no low temperature radiators or thermal storage. Rooftop ASHP would reduce the area available for solar PV, but this may be balanced by the 60-70% reduction in electricity needed to run ASHP compared to direct electric. Additionally, the residents will always gain the energy bill savings benefit of ASHP because it reduces their actual electricity use.
i. In addition, the life cycle impacts of a heat-pump are vastly less than any other technology, due to the high efficiency and significant reductions in life-time operational energy use.
j. Changing heating strategy would make it significantly easier for applicant to achieve on-site zero carbon balance.
k. Further note that utilisation of ASHP/heat-pumps in all dwellings/flats would reduce peak electricity demand significantly, thereby potentially reducing the current connection costs quoted by SSE – current cost of £713,573.

39. On Design options:
    a. Rainwater harvesting included as a measure at £4,710 cost addition per dwelling, £4,004 per flat (approx. £5-6/ft^{2}GIA uplift, which is around 5% build cost uplift)
    b. Greywater harvesting included as a measure at £6,810 cost addition per dwelling, £5,789 per flat (approx. £7-8/ft^{2}GIA uplift, around 6% build cost uplift)
    c. Future home spec is estimated at a £21/ft^2 uplift per dwelling, which is around 18% build cost uplift.
    d. Over-all uplift estimated by applicant at 34% of build cost – significantly greater (3x) than the policy cost estimates for true net zero in Central Lincolnshire – which is considered to be roughly equivalent to the FHS spec referenced by applicant. Please see table below for a side-to-side comparison:

Building element	Future Homes Standard – government notional specification (Jan 2021)	Central Lincolnshire notional guide SAP specification (in Design guide document)
Windows	1.2 W/m2.K	0.8 W/m2.K
Doors	1.0 W/m2.K	0.8 W/m2.K
External Walls	0.18 W/m2.K	0.13 W/m2.K

Roof	0.11 W/m^2.K	0.10 W/m^2.K
Floor	0.13 W/m^2.K	0.10 W/m^2.K
Air Permeability	5m^3/(h.m^2) @50Pa	1m^3/(h.m^2) @50Pa
Party Wall	0 W/m^2.K	0 W/m^2.K

e. Applicant claims night storage heaters are cost neutral compared to gas boilers. This doesn't reflect the likely cost saving of omitting gas connections, gas meters, wet system pipework etc. Cost savings not adequately accounted for

40. Based on the current design and when the viability of the scheme has also been impacted by significant cost inflation, the desirable, but not required, elements could be removed. This could include, reducing costs on the use of mature trees (whilst we do recognise younger trees do often 'fail' due to lack of maintenance) and we suggest redirecting the greywater recycling investment into further energy efficiency measures. Whilst greywater recycling is a positive step to take into terms of reducing water consumption, it would not directly reduce energy use within the dwellings or assist with the aim of achieving true carbon zero. This re-directing of this element could contribute towards the following:
    a. Incorporation of Mechanical Ventilation and Heat Recovery for all dwellings. Estimate cost of £2,000 per dwelling
    b. ASHP installations for the flatted units
    c. Increase of building fabric specification to increase energy performance. Such as through increased depth of insulation in solid elements.
    d. Possible expansion of PV array provision on dwellings, at a cost of c.£1k/kW of extra provision