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Date	03 07 2015
Reference	UA005241
From	Philip Harker
To	Lewis Knight, Bioregional
Copies	
Subject	**Exemplar Local Centre application 15/00760/F - Response to Bioregional Comments**

Please find our responses to Bioregional Comments regarding the Bicester Local Centre Energy Strategy below.

1 P6 Table 3.1 provides the proposed non-residential uses in the local centre. The total GIA of these uses adds up to 3,066 m2, 350 more than the 2,716 m2 stated. The Energy Centre GIA appears to have been omitted from the total.

Correct – Table 3.1 should state 3,066 m2.

However it should be noted that the Energy Centre is not included within this application and therefore does not contribute to the energy demand of the application. [Note: the Energy Centre was part of the detail element of the original hybrid application and is currently being build out]. As such it does not form part of the energy calculations for the Local Centre.

The cumulative GIA utilised within the energy calculations is therefore the 2,716m2 currently stated within the table. The table should remove the Energy Centre GIA.

2 No assumptions are provided for translating the total floor area of building types to GIA in table 3.1. Different land uses have different ratios of GIA to Total Area, presumably due to outdoor space and multi-storey buildings. It would be helpful if the assumptions were stated.

This information is directly from the architect's schedule of accommodation – relative to the design of the building and therefore represents an as designed GIA.

3 Hyder has used CIBSE TM46 benchmarks to calculate the CO2 emissions from each of the proposed uses. This is appropriate. However, as the energy statement does not state which specific benchmarks are being used for each business use we are unable to re-perform the calculation of predicted CO2 emissions.

Please refer to Appendix A which outlines the TM46 benchmarks used.

4 Hyder has used CIBSE Guide F to calculate the energy demand. As above, the specific benchmarks used from CIBSE Guide F for each business use are not provided. This means we are unable to re-perform the calculation of estimated energy demand. The specific benchmarks used would need to be provided to gain a better understand of the accuracy of the projected energy demand.

Apologies – we can appreciate the confusion here. To clarify; the report ensures consistency of the energy demand baseline by deriving information solely from TM46 benchmark figures. No figures were derived from the CIBSE Guide F benchmarks.

CIBSE Guide F does however contain numerous guiding principles which are useful in developing robust assumptions required at this stage of the design process.

5 We are unsure why Hyder are using two different benchmarks sources from two different documents to calculate energy demand (kWh) and carbon emissions (CO2). We suggest that Hyder could have used CIBSE guide F to calculate the energy demand and then multiplied this by a carbon factor to obtain the predicted emissions.

As above. TM46 figures are used throughout. These are outlined within Appendix A.

6 As stated above, without knowing the individual benchmarks used, we are unable to reperform Hyder's calculations and see how Hyder has arrived at an estimate of total energy consumption and total carbon emissions. However, using a best estimate as to which benchmarks have been used, we have calculated that the estimated energy demand could be considerably higher. This would have implications for the amount of renewable energy required on site.

The calculations are based upon TM46 figures. Some assumptions have been made to provide a breakdown of space, water, L&A and cooking demands. This breakdown is provided within Appendix A.

It should also be noted that the TM46 figures have been adjusted to represent the improvement in Building Regulations since their conception. This is discussed in section 6 paragraph 3 which states that the figures "*are reflective of energy consumption of 2006 Part L compliant buildings and so have been reduced by 31.75% to obtain the energy demand for non-domestic buildings reflective of new buildings, built to current Building Regulations.*"

7 Checking table 6.1, The sub total for the BR2013 Building Emissions (111,086 plus 70,082) should be 181,167 kgCO2 not 188,051 kgCO2, a difference of 6,884kg.

Correct – this is simply a typo. However the calculations underpinning the remainder of the report are correct, including the percentage reductions later identified.

8 The percentage reduction for lean measures is not provided (using the figures in section 8.3 (181,168 kgCO2 and Hyder's stated baseline demand of 188,051 kgCO2 it is approx. 3.7%). However, using the correct subtotal for table 6.1 carbon emissions (181,167 kgCO2), it would appear that the 'Be Lean' measures are embedded in the calculation of Baseline Energy Demand and Carbon Emission. No breakdown is given of how this 'lean' reduction is achieved.

Incorrect - Section 7.2 states the following:

Due to the nature of the energy demand profiles of the buildings it is expected that fabric enhancements outlined above will only marginally reduce the energy demand. This is because the energy demand for non-domestic buildings tends to be predominantly the result of the services and plant equipment.

For the purposes of representing a worst case scenario the energy demand profile and carbon emissions following the Be Lean enhancements is assumed to be unchanged from the baseline scenario.

This is consistent with comment 7 above which highlights that the baseline figure is actually 181,167 KgCO2.

9 Section 8.3.3 states that the power to heat ratio is 1.03:1. Appendix A specification sheets show the thermal output to be greater than the electrical output so this ratio should be reversed with power to heat as 1:1.03.

Correct – this is a typo. The calculations do however use the correct ratio of 1:1.03

10 It is not clear how the annual thermal demand of 238,588 kWh in table 2.2 has been arrived at.

The thermal demand in the gas CHP scenario is a 15% reduction on the Baseline scenario to represent the exclusion of the 85% efficient gas boiler.

11 It is assumed that the CHP will run at 100%. The load factor will affect the efficiency of the CHP as set out in the CHP specification sheet.

Yes, it is intended that the CHP will run at full load when in operation. This maintains increased levels of efficiency and CO2 reductions.

12 The efficiency of the heat distribution network appears to have been factored into the fuel requirements for the CHP but not the gas boiler. This means that CO2 emissions associated with the gas boiler are likely to have been understated. The efficiency of the heat distribution has not been stated. In the overall Exemplar energy strategy, thermal losses in the heat network were assumed to be 28% (i.e. 72% efficient).

We have once again assumed 28% distribution losses. You are correct however that this currently doesn't extend to the gas boiler. This will increase the CO2 emissions resulting from the gas boiler (sized to meet 10% of the thermal demand) by 28% accordingly. This increases the CO2 emissions following the Be Clean scenario by just under 1,700 KgCO2

13 It is not clear how FCHP (Gas fuel to run CHP) of 694,489 kWh has been arrived at.

This is the total electrical generation and total thermal generation combined and then increased to represent the 78% combined efficiency.

- Total Electrical Generation 266,848 kWh
- Total Thermal Generation 274,853 kWh
- Combined 541,701 kWh
- At 78% efficiency 694,489 kWh

14 The Electricity generated from CHP in table 2.2 appears to be 90% of what it should be when we re-performed the calculation (Gas fuel x CHP electrical efficiency).

The electrical generation was calculated by dividing the total thermal output by the heat to power ratio. The CHP is specified to meet 90% of the thermal demands which could explain the difference in your calculations.

15 It is not clear how the reduction in CO2 emissions associated with the CHP of 43,051kgCO2 below table 2.2 on p23 has been arrived at. This means that we cannot verify the further CO2 savings to be achieved by PV.

There are additional CO2 emissions associated with the Cooking demands (gas) for the site. This equates to 9,452 KgCO2. The reduction is therefore 181,168 – (128,665+9,452) = 43,051 KgCO2

16 No information is provided on the breakdown of the area of the PV installed across roofs and the car park. Without this information it is not possible to replicate Hyder's calculations.

PV Provision	Panels	Area	kwp/10m2	Total kwp	Annual Output kwh/year
Cloth arrangement	234.00	382	1	38	32,510
First Floor	165.00	270	1.41	38	32,322
Second Floor	385.00	629	1.41	89	75,419
Roof Plan	72.00	118	1.41	17	14,104
	856.00	**1,399.12**			**154,356**
Carbon Savings					
Hence carbon savings	80,111	kgCO2			
	80	tCO2			

Note – the Energy Centre and Eco office area are excluded as they are outside of this application.

17 There is a lower PV output (1 kWp vs 1.41kWp at 850kWh pa) for the car-park mounted PV (1kWp/10m2) instead of 1.41kWp/10m2 for roof mounted. A specification sheet for the PV technology used for the car parks would be beneficial. A websearch suggests that the 'Solar Cloth Company' power parking solution could be the solution referred to in the energy statement. http://www.thesolarclothcompany.com/ .

Design Specification sheet provided with Appendix B

Appendix A

Commercial Centre Uses				CIBSE TM46 Benchmarks				(kWh/m2/yr)			
Use	**sub-use**	**GIA m2**	**Use Class**	**Category**	**Name**	**Electricity (kWh/m2/yr)**	**Fossil-thermal (kWh/m2/yr)**	space	water	L&A	cooking
Nursery		628	D1	17	Schools & Seasonal Public Bu	40	150	90	60	40	0
Community		350	D1 /D2	17	Schools & Seasonal Public Bu	40	150	90	60	40	0
Retail - Convenience Store		418	A1	5	Small Food Store	310	0	0	0	310	0
Retail unit		69	A1 / A3 / A5	3	General retail	165	0			165	
Retail unit	Café	68	A1 / A3 / A5	7	Restaurant	90	370	140	120	90	110
Retail unit	Takeaway	68	A1 / A3 / A5	7	Restaurant	90	370	40	120	90	210
Retail unit	Hairdresser / Beaty Sa	89	A1 / A3 / A5	3	General retail	165	0			165	
Retail unit	Medical / Dental	75	A1 / A3 / A5	19	Clinic	70	200	110	90	70	
Pub		343	A4	8	Bar / Pub	130	350	225	125	130	0
Pub Restaurant		200	A3	7	Restaurant	90	370	140	120	90	110
Office unit		0	B1	1	General office	95	120	70	50	95	0
Office unit		54	B1	1	General office	95	120	70	50	95	0
Office unit		78	A2 / B1 / D1	1	General office	95	120	70	50	95	0
Office unit		110	A2 / B1 / D1	1	General office	95	120	70	50	95	0
Office unit		166	A2 / B1 / D1	1	General office	95	120	70	50	95	0

Appendix B


Power Parking
The Solar Cloth Company
FEATURES
• Highest specification solar parking shades available
• Utilises state of the art flexible solar technology
• Ideal for office/shopping centre/municipal car parks
• Modular design
• Consistent year round energy generation
• Opportunity for further revenue generation through advertising
• Enhance the look of your car park
• Designed and built in the UK
SPECIFICATIONS
Construction
Corrosion protected steel structure
Choice of painted/unpainted finishes
Flexible fire retardent fabric panels
Flush mounted on concrete base
Snow loading
Wind resistance – 23 m/s wind speed
Vehicle impact resistant
Seismic Zone 1 compliant
Power Generation
100 watts per hour peak per m² (N Europe)
Works in low level light
Works on North facing elevations
Full end of life eco solution for PV cells
Utilise DC direct from PV cells or AC via optional inverter
Designed to British Standards
Snow Load: BS 6399:3-1988
Steel Frame Design: BS 5950:1-2000
Wind Load: BS 6399:3-1988
Reinforced concrete base design: BS 8110:1-1997
Car Park Impact Load: BS 6399:1
OPTIONS
• Bespoke colours and designs
• Electric car chargers
• LED lighting
• Power storage and management systems
• CCTV mounting plates
• Wi-Fi and Audio/Visual systems
• Fabric branding
• End fabric walls
E&OE