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1.0 EXECUTIVE SUMMARY

The Energy statement has been prepared to present the passive, active and low zero carbon measures which are proposed for the BHAFC Padel Courts.

An IES-VE Energy model has been created for the proposed padel courts within the Brighton F.C. training ground. The report includes all supporting assessments and studies for the statement including full micro climate analysis.

Based on the analysis detailed within this report the energy conservation measures and proposed Low Zero Carbon technologies to be applied to the design are presented.

Complying with Part L 2021 will by default comply with the Adur District city planning requirements relative to 19% reduction in the carbon emissions against the Part L 2013. This is demonstrated by the Energy Hierarchy presented in the following sections and maximizing the use of low and zero carbon technologies referred to as renewable including on site energy generation as PVs and Air Source Heat pump for space and water heating.

The aspiration for the project energy targets is the targeted BREEAM Energy credits and the completion of a Low Zero Carbon Feasibility Study contributing to achieving the BREEAM rating for the proposed development.

The Energy assessments results demonstrate that the proposed building complies with Part L 2021 energy performance requirements with a sufficient buffer of compliance and achieves an EPC Rating of A based on the defined building elements performance requirements. Justification for use of the proposed low carbon technologies is presented in the following sections.

2.0 INTRODUCTION

The BHAFC Padel Courts Energy Statement has been prepared to demonstrate how the proposed development aligns with Adur District's sustainable building and energy efficiency policies. The Low Carbon Feasibility Study has also been prepared to demonstrate compliance with the requirements of the targeted credits within the BREEAM rating.

3.0 ADUR DISTRICT COUNCIL ENERGY PLANNING REQUIREMENTS

The Adur District Council includes Supplementary Planning Document (SPD) Sustainable Energy and Adur Local Plan sets out the principles to reduce greenhouse gas emissions, particularly CO_2 emissions, and mitigate against and adapt to climate change.

All major residential developments are required to prepare an energy statement which details of the building fabric efficiency and low and zero carbon energy technologies used including the size/capacity of the systems and the estimated CO_2 savings that will be achieved.

Current Building Regulations (Part L) requires that developments involving new buildings to calculate and assess the:

- Dwelling Emission Rate - DER - estimated carbon dioxide emissions in kg per metre square, per annum, arising from energy use for heating, hot water and lighting for the actual dwelling, and the
- Target Emission Rate - TER - the maximum emission rate permitted by building regulations

The Energy Statement prepared provides the a baseline for annual CO_2 emissions arising from fossil fuel energy use within the development. The baseline will be equivalent to a Part L Compliant building or 'Target Emissions Rate' required in Part L.

In addition to the requirements set out in Adur Local Plan, the following standards of energy efficiency and energy performance are required:

- Non-residential development (major and non-major) to achieve at least 19% improvement on the carbon emission targets set by Part L (2013) until the Future Buildings Standards or any interim uplift in Part L which exceeds 19% improvement come into effect. In this case Part L 2021 has been applied on all new buildings since June 2022 which by default intended to deliver 27% lower CO2 emissions than under the part L 2013 compliance requirements.

  Consequently, complying with Part L 2021 will be default comply with the Adur District Council planning requirements related to 19% reduction in carbon emissions as compared to the Part L 2013 baseline.
- Opportunities for new development to achieve greater reductions in CO_2 emissions through the use of passive design, fabric standards, energy efficiency measures and low and zero carbon technologies.

The BHAFC Energy Strategy is considered in accordance with the Adur District Heating and Cooling System Hierarchy:

1. Connection to existing heat/cooling networks
2. Site wide heat/cooling network
3. Building Heat/Cooling Network
4. Individual Heating/Cooling Network

The BHAFC Energy Strategy is considered in accordance with the Adur District Heating and Cooling Technology Hierarchy:

1. Systems using renewable/waste energy sources e.g. heat pumps and/or secondary sources
2. Low Carbon low emissions technologies
3. Conventional Systems e.g. gas or direct electric

Where no heat network is in place, development proposals must be designed to be connection ready, and will be expected to demonstrate that all specifications below have been met:

- All buildings must use a centralised communal wet heating system rather than individual gas boilers or electric heating.
- All buildings must allow adequate plant room space to allow for connection at a later date. (the exact requirement to be agreed with the councils and their representatives).
- Plant rooms must be situated to consider potential future pipe routes. The developer must identify and safeguard a pipe route to allow connection between the building and the highway or identified network route where available.
- The developer must not in any other way compromise or prevent the potential connection.

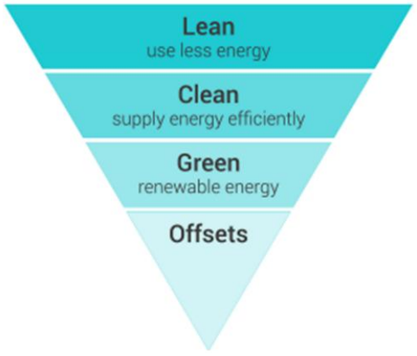
4.0 ENERGY HIERARCHY

The Energy Hierarchy of the Be-Lean, Be-Clean and Be-Green is adopted for the project. Such approach identifies the contribution of each energy efficiency measure whether it is passive in terms of the construction elements and shading structures or active in terms of the mechanical and electrical system.

The definition of each level of the energy hierarchy is as follows:

- Be lean: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures.
- Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks.
- Be green: maximise opportunities for renewable energy by producing, storing, and using renewable energy on-site.





5.0 MICROCLIMATE ANALSYIS

The Microclimate analysis is one of the fundamental studies conducted at the early stages of the project to identify the sustainability potentials of the project and optimizing the Energy Conservation Measures (ECMs) for different components of the masterplan. This section covers the microclimate items which have influence on the energy strategy. The current weather file applied for this simulation is Southampton_TRY.epw. The following charts present the dry-bulb and wet-bulb temperature variation for Southampton_TRY.epw weather file with peak dry-bulb temperature of 30.7 °C.

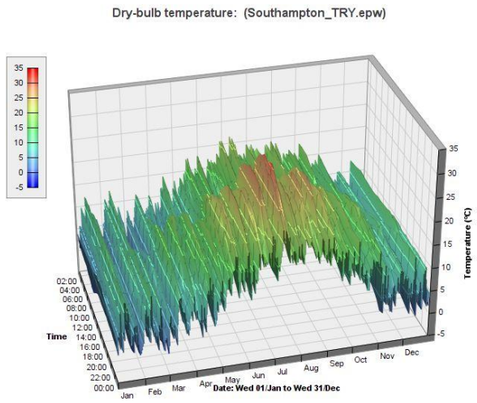


Figure 1: Southampton Dry-Bulb Temperature

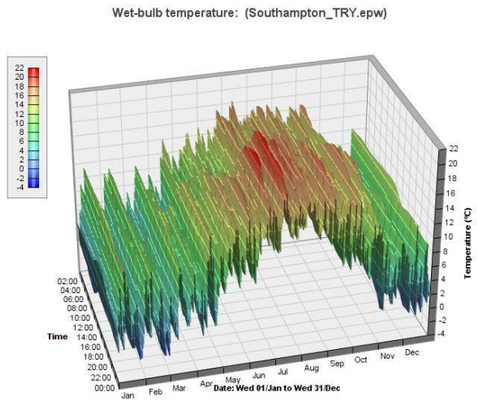


Figure 2: Southampton Wet-Bulb Temperature

The number of hours per year where the temperature is higher than 26°C is 76 hours.

6.0 BUILDING SOLAR ANALYSIS AND PV ANALYSIS

The northern façade has lower solar radiation which is about 30% of the incident solar radiation on the southern façade.

The building orientation assists in mitigating the incident solar radiation particularly on the eastern façade of the building, with approximately 561.28 kWh/m^2/year indicated.

The western façade of the building is unshaded with relatively high solar loads with approximately 694.68 kWh/m^2/year indicated.

The annual incident solar radiation on the roof ranges from 961.48 to 1028.18 kWh/m^2/year.

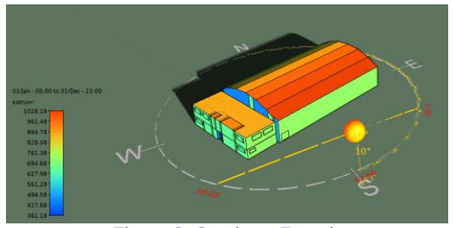


Figure 3: Southern Facade

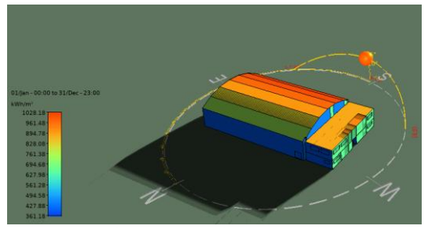


Figure 4: Northern Facade

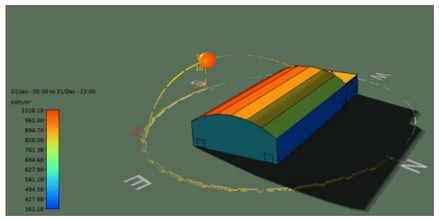


Figure 5: Eastern Façade

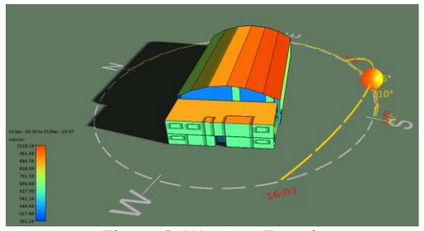


Figure 6: Western Facade

The typical power that could potentially be generated from PVs on the roof has been evaluated based on hourly generated energy per meter square basis presented as the direct solar radiation in the following graph.

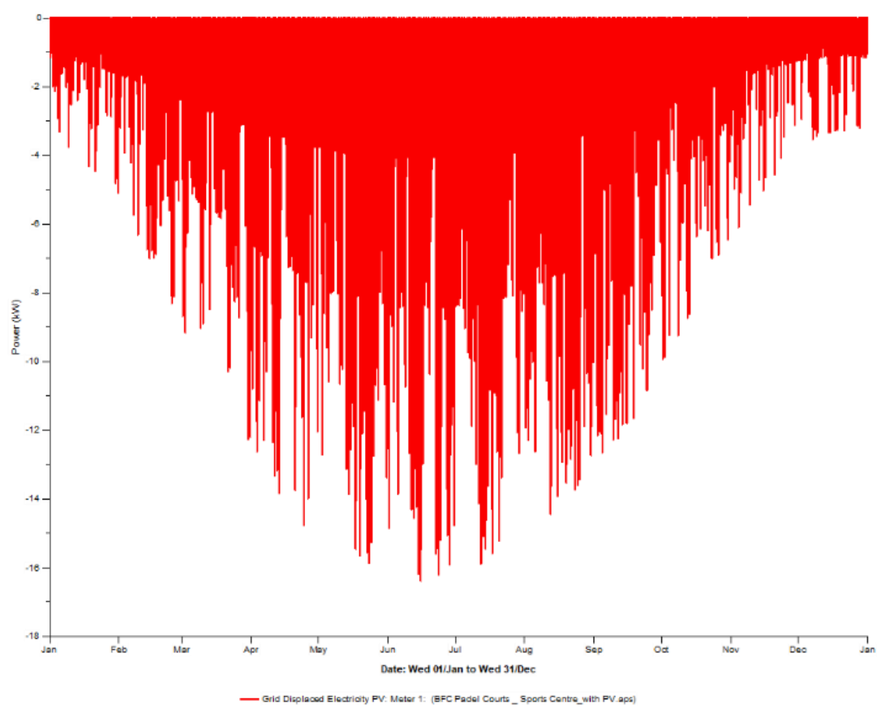


Figure 7: Hourly Grid Displaced Electricity with PV Solar generation

7.0 BE LEAN

In line with the Energy Hierarchy, the first step is to demonstrate the energy efficiency measures applied to reduce the project energy demand through various passive design measures, such as optimizing orientation, natural ventilation and lighting, thermal mass and solar shading, and other active design measures, including high efficacy lighting and efficient mechanical ventilation with heat recovery.

Natural ventilation for the Indoor Padel Courts and the multifunctional office space is proposed to boost the reliance on passive cooling techniques. This shall be delivered without compromising the thermal comfort of future building users. The following table presents the fabric performance criteria defined for the proposed development in comparison to current regulations:

Element or System	Part L 2021	BHAFC Padel Courts Requirements
External Walls, opaque panels, including semi exposed walls	0.26 W/m²K	0.22 W/m²K
External Doors	1.6 W/m²K	1.3 W/m²K
Roof	0.18 W/m²K	0.15 W/m²K
Ground Floor	0.18 W/m²K	0.15 W/m²K
Windows	1.6 W/m²K	1.3 W/m²K
Rooflight	2.2 W/m²K	1.6 W/m²K
Interior Lighting	Minimum efficiency 95 lumens/watt	Minimum Efficiency 100 Lumens/Watt
Mechanically Ventilated Zones	Heat Recovery with sensible efficiency higher than 73% variable speed controller	SFP less than 1.4 W/l/s Heat Recovery with sensible efficiency 80% in changing rooms.
Air Distribution	VRF Unit SFP	0.2 – 0.3 W/l/s

Table 1: Demand Reduction Design Requirements

All glazed elements have been assigned as g-value of 0.3971 as a default. All rooms have remained within the limits of solar gain exceedance, with the exception of the main entrance circulation zone. The g-value for the main entrance door glazing has been reduced to 0.22. This is a proposed passive control measure to limit solar gains in the summer.

G-Value	Main Entrance Door Solar Gain Limit Exceeded ? (%)
0.3971	YES (+30.3%)
0.2255	NO (-26.7%)

Table 2: Main Entrance Lobby Solar Gain Limit Exceedance

The proposed lighting efficacy has been defined as 100 lm/W as a minimum. The project will strive to improve luminous efficacy of lighting fixtures where feasible based on market availability. Proposed lighting controls have also been applied to the model. It is proposed to specify automatic daylight zoning for lighting controls for the L01 Multifunctional Space and the Padel Courts given the increased level of glazing/canopy to wall ratio for this room. This control will reduce lighting energy usage through automatic detection of sufficient daylight within the room, to instruct the lighting systems to be turned off.

The following occupancy sensing have been defined for the spaces:

Space Name (Actual)	Occupancy Sensing (Actual)
R00-19 Indoor Padel Courts	AUTO-ON-OFF (Foc = 0.90)
R00-13 Stair	AUTO-ON-OFF (Foc = 0.90)
R00-13 Stair	AUTO-ON-OFF (Foc = 0.90)
R00-11 Circulation	AUTO-ON-OFF (Foc = 0.90)
R00-8 Male Changing	AUTO-ON-OFF (Foc = 0.90)
R00-12 AWC & Changing	AUTO-ON-OFF (Foc = 0.90)
R00-17 Female Changing Room	AUTO-ON-OFF (Foc = 0.90)
R00-20 Multifunctional Space	MAN-ON-AUTO-OFF (Foc = 0.82)
R00-10 Plant	MAN-ON-AUTO-OFF (Foc = 0.82)
R00-14 Cleaner Cupboard	MAN-ON-AUTO-OFF (Foc = 0.82)
R00-9 Male WC	MAN-ON-AUTO-OFF (Foc = 0.82)
R00-16 Female WC	MAN-ON-AUTO-OFF (Foc = 0.82)
R00-15 Kitchen	MAN-ON-AUTO-OFF (Foc = 0.82)

Table 3: Occupancy Sensing IES Settings

Lighting Power Density have been applied based on the latest design information. These are summarised in the following table:

Space ID	Room Name	Lumens/Watt
PC000008	PC00-02 Male Changing	100.60
PC00000A	PC00-01 Stairs	128.77
PC00000B	PC00-03 Male WC	103.63
PC00000E	PC00-11 Female Changing	100.60
PC000010	PC00-06 Circulation	105.60
PC000018	PC01-02 Lobby	113.32
PC000002	PC01-03 Multi-Functional Space	112.22
PC000000	PC01-01 Stairs	128.77
PC000014	PC00-Padel Courts Lobby	158.00
PC000017	PC01-06 Riser	143.48
PC000001	PC00 Padel Courts	158.00
PC00000D	PC00-07 AWC/Changing	100.00
PC000011	PC00-09 Female WC	102.39
PC00000C	PC00-05 Plant & Cleaners	119.66
PC000012	PC00-104 Kitchen	149.87
PC00000F	PC00-10 Plant	143.48

8.0 BE CLEAN

This stage considers the following stages of the Adur District Heating and Cooling Hierarchy:

1. Connection to existing heat/cooling networks
2. Site wide heat/cooling network

There is a gas network on site but, this is not to be connected to the proposed development. The first two stages of the Adur District Heating and Cooling System Hierarchy are discounted. The proposed development space heating and cooling is to be served by ASHPs technology.

This is considered a small-scale development. The energy consumption of the proposed BHAFC Padel Courts is not sufficient to justify the infrastructure that would be required to connect to any of the following community energy options:

1. The building is connected to an existing local community CHP system OR
2. the building is connected to an existing source of waste heat or power OR
3. a building or site CHP system is specified with the potential to export excess heat or power via a local community energy scheme OR
4. a source of waste heat or power is specified with the potential to export excess heat or power via a local community energy scheme

Hence, a building heat/cooling network is adopted for the proposed development. The Be-Clean energy level has been set as that of Be-Lean subject to any further information about potential plans for a community heating or heating network in the area of the project.

9.0 BE GREEN

The final stage of the Energy Hierarchy, which applies to the use of renewable, low and zero carbon Energy technologies. Based on the preliminary assessment, PV panels as the proposed low and low carbon technologies have been identified as feasible for the BHAFC Padel Court development.

A decentralized HVAC system approach based on VRF systems have been adopted for all elements in the development with advantage of having higher efficiency (Typically Less individual system capacity results Higher SCOP/SEER) and modularity that gives higher resilience.

The hot water generation for all application is based on electric point-of-use water heaters. This report is focusing on the system impact on the building regulation compliance and associated energy performance milestones of the Energy Hierarchy. However, the system selection must also to account for cost and life cycle impacts.

The below table presents the benchmark performance anticipated for decentralized systems for space heating and cooling and hot water systems.

	System	Efficiency
Cooling and Heating	Decentralised VRF Units	Heating SCOP 4.0 Cooling SEER 7.25
Ventilation	• VRF & MVHR (Changing Rooms) • Natural Ventilation (Multifunctional Space and Courts) • VRF (throughout remaining spaces)	MVHR SFP - 1.65 W/l/s Heat Recovery Efficiency 85%
Domestic Hot Water	Electric Point-of-Use Water Heaters	Efficiency 100%

Table 4: Be Green Scenario Design Requirements

The following table presents the proposed systems and ventilation strategies based on the initial design assessment:

Element	Energy Strategy
Space Cooling	VRF (Decentralised)
Space Heating	VRF (Decentralised)
DHW	Electric Point of Use Water Heaters
Naturally Ventilation Areas	1- Padel Courts 2- Multifunctional Room

Table 5: BHAFC Proposed Systems

The following table presents comparison between multiple PV options that can be adopted for the project:

Solar Cell Type	Efficiency Rate	Advantages	Disadvantages
Monocrystalline Solar Panels (Mono-SI)	~20%	High efficiency rate; optimised for commercial use; high life-time value	Expensive Heavy and has to be accounted for structurally
Polycrystalline Solar Panels (p-SI)	~15%	Lower Price	Sensitive to high temperatures; lower lifespan & slightly less space efficiency
Thin-film: Amorphous Silicon Solar Panels (A-SI)	~7-10%	Relatively Low costs; easy to produce & flexible	Shorter warranties & lifespan Plus, thin film panels degrade much faster than other panel types, meaning they need to be replaced more often, which leads to more long-term recurring costs.

Table 6: PV Type Comparison

While, PVs are expected to further reduce the operational carbon emissions, the overall reduction in the project's carbon footprint on the long run must account for the project's operation nature, generated power management strategy, the additional requirements for energy storage, PVs maintenance requirements and life cycle.

At the current stage, monocrystalline PVs are recommended and will be the basis of all assessments in the energy strategy with a proposed roof area of 110m^2. This is based on a nominal efficiency of 21.7% for the monocrystalline panels. This is proposed to achieve a buffer of compliance above the Part L 2021 requirements. As previously noted, the new Part L 2021 is required to be applied to all new buildings since June 2022 which by default is intended to deliver 27% lower CO2 emissions than under the Part L 2013 which is required by Adur District Council.

10.0 BE SEEN

In order to effectively contribute to the "reduce" stage within the carbon hierarchy throughout the project lifetime, there shall be a measurement and monitoring framework to identify the potentials of carbon reduction opportunities related to incorporating rising technologies.

This is a crucial measure where smart metering can be integrated in BMS will facilitate:

1. Benchmark its operational carbon footprint
2. Identify operational opportunities to reduce carbon footprint
3. Assist in transparent carbon footprint reporting as part of offsetting framework to achieve carbon neutrality.

This data can be essential in the journey towards net zero where various operational and maintenance decisions can be taken to reduce the operational carbon emissions of the buildings. The data can be used in simulation models where cutting-edge technologies can be studied as they become available in the market to evaluate its sustainability benefits.

11.0 THERMAL MODEL

A full-scale thermal model has been created for the BHAFC Padel Courts using IESVE 2024.

All shading elements have been modelled per the latest architectural models.

The models have followed CIBSE AM11. The below figure shows thermal template view for the models.

All Energy assessments are conducted via Dynamic Simulation Method.

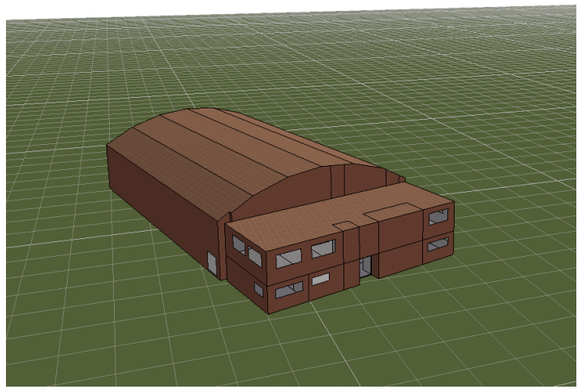


Figure 8: Thermal Model

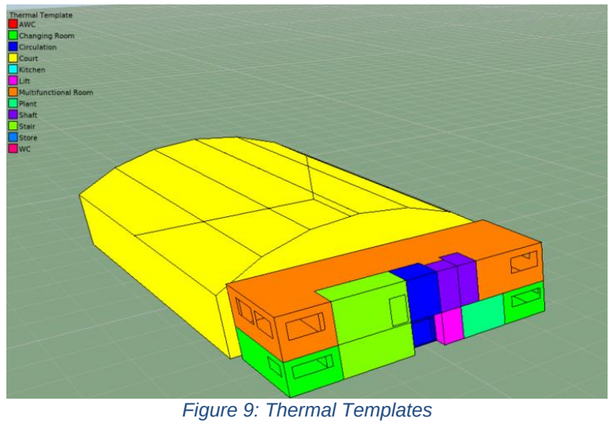


Figure 9: Thermal Templates

12.0 ENERGY ASSESSMENT RESULTS

At the Be Lean Stage, the U-value performance exceeds that of the notional values for all constructions and solar gain is not exceeded in any instances. Natural ventilation has also been applied for the Multifunctional space and Indoor Padel Courts.

Noting that the requirements of Adur District Council planning requirements have been outlined based on the previous building regulations Part L 2013. The new building regulations including the new part L 2021 has been applied on all new buildings since June 2022 which by default delivers 27 % lower CO2 emissions than under the Part L 2013. Consequently, complying with Part L 2021 will by default comply with the Adur District planning requirements related to 19% reduction in the carbon emissions against the Part L 2013 version.

With the Be-Green scenario applied, the results confirm that the proposed design achieves reduction in carbon emissions of 5.8% and reduction in the Primary Energy Rate of 6.1% for Part L 2021. This exceeds the compliance requirements of Part L 2021 and so demonstrates compliance with the requirements of Part L 2013 by default.

The installation of PVs is proposed to achieve a buffer of compliance over the Part L 2021 baseline. The proposed PV areas are indicative and subject to further design consideration including, available roof space and structural capacity of the proposed design. Please refer Appendix A for BRUKL document generated.

The BHAFC with the proposed Be Green Strategy applied achieves an EPC Rating 'A'. Please refer to Appendix B for EPC generated.

The Adur District Heating and Cooling System Hierarchy has been addressed in the proposed energy strategy at the Be-Clean Stage. A building heat/cooling network is adopted for the proposed Energy Strategy.

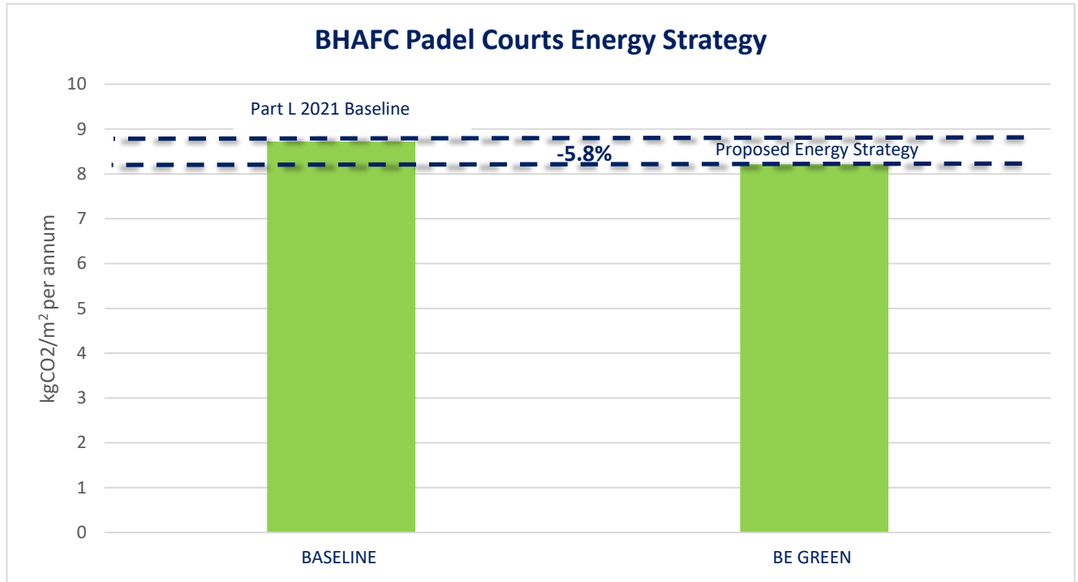
The proposed use of ASHPs for space heating and cooling aligns with the Adur District Heating and Cooling Technology Hierarchy which prioritises the use of systems using renewable energy sources e.g. heat pumps and/or secondary.

The next stage of the Adur District Heating and Cooling Technology Hierarchy is the use of low carbon low emissions technologies. This is addressed in the Be Green Stage of the proposed Energy Strategy with the allocation of 110 m^2 of roof space for PV panels including an allowance for maintenance area.

The overall contribution of onsite renewable energy generation is 17%, which demonstrates compliance with Principle 5 of the Adur District Council Sustainable Energy requirements.

A conventional system is adopted for domestic hot water system with the proposed use of point-of-use direct electric water heaters in the BHAFC padel courts. The use of ASHPs has been deemed not feasible for the proposed development's domestic hot water system given the increased spatial requirements that would be required to accommodate additional storage of a calorifier, increased spatial requirements for DHW ASHP systems with a subsequent increase in associated noise nuisance. Current proposed MEP storage space is limited within the proposed footprint of the building and this has been limited further by roof area which has been allocated for PV panels. This is discussed in further details in Section 13.8.

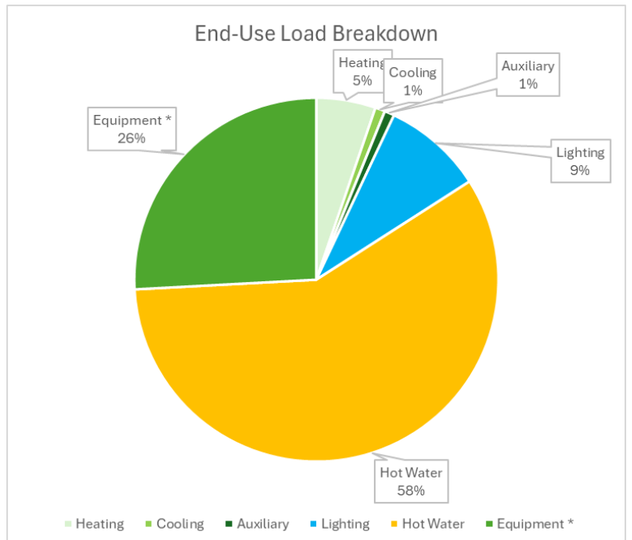
The following chart presents the energy assessment results.



Energy	Actual	Notional	Savings
Total Regulated	109306.3	104162.7	-5143.6
Total Unregulated	38079.2	38079.2	0.0
Total PV	11414.0	0.0	11414.0
Total	158717.9	142241.9	6270.3

Adur District Council Planning Principle 5	kWh	% Contribution
PV	11413.97	9.5%
ASHPs	9046.3	7.5%
Total	20460.237	17.0%

Energy Strategy	Energy Assessment Output	kWh/m^2	% Reduction
BE GREEN Heating SCOP = 4 Cooling SEER = 7.25 SFP=1.65 PV Area (including maintenance)= 110m2 Lighting = 100 lm/W	TER	8.72	5.7%
	BER	8.22	
	TPER	94.42	6.1%
	BPER	88.69	



13.0 LOW ZERO CARBON FEASIBILITY STUDY

This report presents the findings of a low and zero carbon energy technologies (LZCs) desktop feasibility study carried out by ME Engineers for BHAFC Padel Courts. This report demonstrates compliance with the targeted credit for completion of a Low-Zero Carbon Feasibility Study for the proposed development in accordance with BREEAM v6.1.

A wide range of LZCs were initially considered, the potentially feasible LZCs were assessed in further detail via calculations. Based upon the indicative results presented within this report, it is recommended that the use of solar photovoltaics is considered further.

- No significant constraints were identified to the deployment of solar photovoltaics;
- Solar photovoltaics offer the greatest level of whole life cost / benefit of all the technologies;
- Solar photovoltaics offer the highest level of greenhouse gas emission savings, relative to the base case of gas boilers;
- Solar photovoltaics yield the quickest simple payback period, of approximately nine years

The final credits awarded will need to be based on the as-built BRUKL document and as such cannot be guaranteed until this document has been produced.

13.1 Adur District LZC Planning Requirements

The Adur District Council Local Plan includes ALP Policy 19: Decentralised Energy, Stand-alone Energy Schemes and Renewable Energy which sets out the principles to reduce greenhouse gas emissions, particularly CO_2 emissions, and mitigate against and adapt to climate change.

All major residential developments are required to prepare an energy statement which details of the building fabric efficiency and low and zero carbon energy technologies used including the size/capacity of the systems and the estimated CO_2 savings that will be achieved.

Current Building Regulations (Part L) requires that developments involving new buildings to calculate and assess the:

- Dwelling Emission Rate - DER - estimated carbon dioxide emissions in kg per metre square, per annum, arising from energy use for heating, hot water and lighting for the actual dwelling, and the
- Target Emission Rate - TER - the maximum emission rate permitted by building regulations

The Energy Statement prepared provides the a baseline for annual CO_2 emissions arising from fossil fuel energy use within the development. The baseline will be equivalent to a Part L Compliant building or 'Target Emissions Rate' required in Part L.

The following standards of energy efficiency and energy performance are required as set out in ALP Policy 19: Decentralised Energy, Stand-alone Energy Schemes and Renewable Energy:

- Non-residential development (major and non-major) to achieve at least 19% improvement on the carbon emission targets set by Part L (2013) until the Future Buildings Standards or any interim uplift in Part L which exceeds 19% improvement come into effect. In this case Part L 2021 has been applied on all new buildings since June 2022 which by default intended to deliver 27% lower CO_2 emissions than under the part L 2013 compliance requirements.

  Consequently, complying with Part L 2021 will be default comply with the Adur District Council planning requirements related to 19% reduction in carbon emissions as compared to the Part L 2013 baseline.
- A minimum energy Performance Certificate EPC rating 'B' for new build residential and non-residential development.
- Opportunities for new development to achieve greater reductions in CO_2 emissions through the use of passive design, fabric standards, energy efficiency measures and low and zero carbon technologies.

13.2 BREEAM V6.1 Ene 04 Requirements

Ene 04 issue encourages the adoption of design measures, which reduce building energy consumption and associated carbon emissions and minimise reliance on active building service systems.

Credit achievement in this issue requires Ene 04 Thermal Comfort (Thermal Modelling) to demonstrate that the building meets satisfactory thermal comfort levels in occupied spaces to be produced.

The energy specialist completes a feasibility study by the end of Concept Design which is intended to establish the most appropriate recognised local (on-site or near site) Low-Zero Carbon energy sources for the building based on feasibility study. The appropriate LZC technology is specified and the total reduced regulated CO_2 emissions is quantified.

The Low-Zero Carbon Technologies which have been assessed are as follows:

13.3 Electrification

Electrification refers to the process of replacing technologies that use fossil fuels (coal, oil, and natural gas) with technologies that use electricity as a source of energy. Depending on the resources used to generate electricity electrification can potentially reduce carbon dioxide (CO_2) emissions from the transportation and building sectors.

Addressing emissions from these sectors is critical to decarbonizing the economy and, ultimately, mitigating the impacts of climate change as highlighted in the future building regulations. With continuous decarbonization of the grid which increasingly relies on emission-less energy sources such as nuclear power and off and on shore renewable energy sources, technologies that use electricity as a fuel source result in lower carbon dioxide emissions on average than those that use fossil fuels directly.

Additionally, the electricity grid is expected to become even cleaner over time as the aim is to increase the amount of electricity generated by zero-carbon sources. Therefore, the benefits associated with electrification will likely grow in the future as electricity generation becomes less carbon intensive. Additionally, switching to electric heating and cooking technologies can have substantial air quality benefits. Some electric appliances can be better for indoor air quality than their fossil fuel-based counterparts—natural gas cooking stoves, for example, release carbon monoxide, nitrogen dioxide, and other harmful pollutants when in use.

13.4 Photovoltaic Panels – Solar Energy

For United Kingdom Global Solar irradiation, Brighton is located in GHI region >1022 kWh/m2 as shown in the following figure. PV is considered as an effective on-site energy generation source given the location of BHAFC and its GHI range.

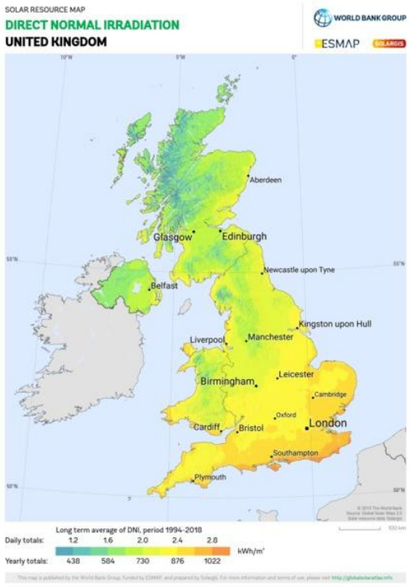


Figure 10: Solar Irradiation

13.4.1 Energy Assessment Results and Life Cycle Cost Analysis

The following results have been obtained from the BRUKL generated for the proposed development.

BHAFC BRUKL output	
Energy generated from LZC energy source per year	11413.97 kWh
Carbon dioxide savings from LZC energy source per year	1268 $kgCO_2e$

Table 7: BHAFC Brukl Output

A Life-Cycle cost analysis has been undertaken to estimate a simple payback period for the proposed installation of 110m^2 of PV panels on the roof area. This indicates a payback period of 8 years based on the following assumptions:

PV Installed Cost	**£/kWp**	**2,000.00**
Inflation Rate:	**% as fraction**	0.05
Degradation Rate:	**% as fraction**	0.005
Maintenance Cost:	**£/kWh**	0.045
System Size:	**kWp**	12.375
Annual Generation Rate	**kWh/kWp**	920
Electricity Cost Offset:	**£/kWh**	0.27

Figure 11: PV System Properties

The results of the Life Cycle Cost analysis and 8 years payback period (along the y-intercept) is presented in the following graph:

		Year	Year	Year	Year	Year	Year	Year	Year	Year
	Units:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Innitial Cost:	**£**	£24,750.00	£24,750.00	£24,750.00	£24,750.00	£24,750.00	£24,750.00	£24,750.00	£24,750.00	£24,750.00
Energy Generation:	**kWh**	11,385	11,328	11,271	11,215	11,159	11,103	11,048	10,992	10,937
Maintenance:	**£/year**	£512.33	£537.94	£564.84	£593.08	£622.73	£653.87	£686.56	£720.89	£756.94
Misc Costs:	**£/year**	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Electricity Cost Offset:	**£/year**	£ 3,073.95	£ 3,211.51	£ 3,355.22	£ 3,505.37	£ 3,662.24	£ 3,826.12	£ 3,997.34	£ 4,176.22	£ 4,363.11
Feed In Tarrif:	**£/year**	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Export Tarrif:	**£/year**	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Total Funds Generated:	**£/year**	£ 3,073.95	£ 3,211.51	£ 3,355.22	£ 3,505.37	£ 3,662.24	£ 3,826.12	£ 3,997.34	£ 4,176.22	£ 4,363.11
Total Funds Expended:	**£/year**	£ 512.33	£ 537.94	£ 564.84	£ 593.08	£ 622.73	£ 653.87	£ 686.56	£ 720.89	£ 756.94
Saving:	**£/year**	£ 2,561.63	£ 2,673.57	£ 2,790.39	£ 2,912.29	£ 3,039.50	£ 3,172.25	£ 3,310.78	£ 3,455.33	£ 3,606.17
Cumulative Savings:	**£**	£ 2,561.63	£ 5,235.19	£ 8,025.58	£ 10,937.87	£ 13,977.37	£ 17,149.62	£ 20,460.40	£ 23,915.72	£ 27,521.89
Over All:	**£**	-£ 22,188.38	-£ 19,514.81	-£ 16,724.42	-£ 13,812.13	-£ 10,772.63	-£ 7,600.38	-£ 4,289.60	-£ 834.28	£ 2,771.89

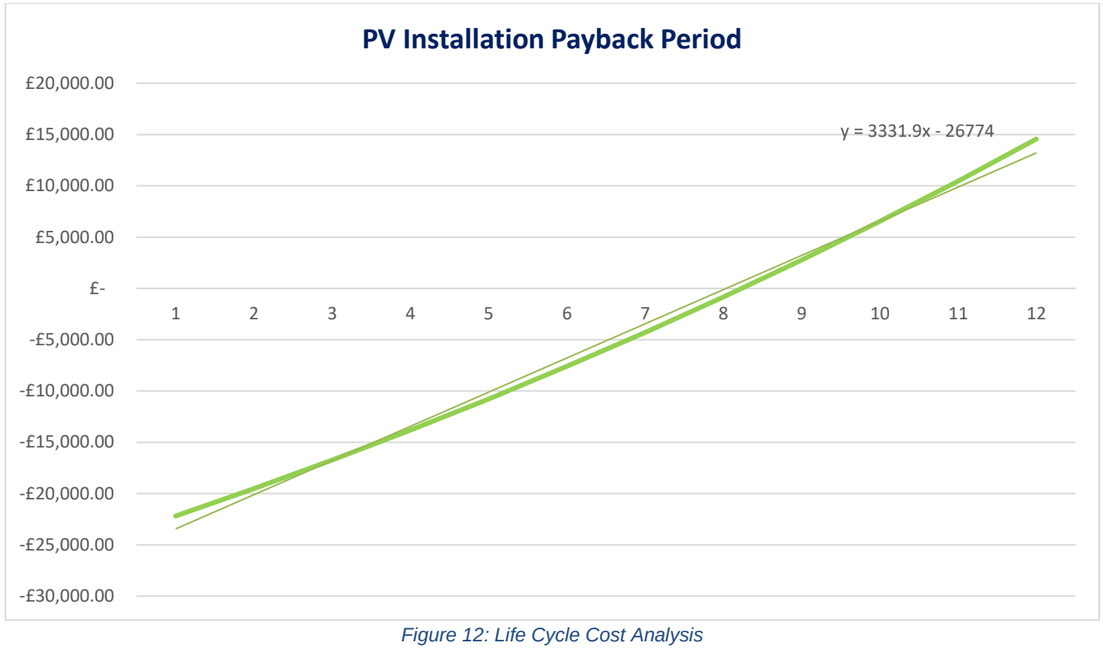


Figure 12: Life Cycle Cost Analysis

13.4.2 Feasibility of Exporting Heat/Electricity to Grid

The anticipated energy generation of the proposed PV area is below the base load and will be totally consumed on site. This is not sufficient to justify the infrastructure that would be required to export electricity/heat back to the grid.

13.4.3 Grants

No grants are available for the BHAFC training ground proposed development for the installation of PVs.

13.4.4 Energy Storage

The load of the proposed BHAFC Padel Courts is below the base load and will be totally consumed on site. Therefore, energy storage is not feasible.

13.5 Wind Power

To evaluate the suitability for wind power generation it is necessary to undertake a full survey and analysis of the site to ascertain the likely wind speeds available to support the viability of wind generation.

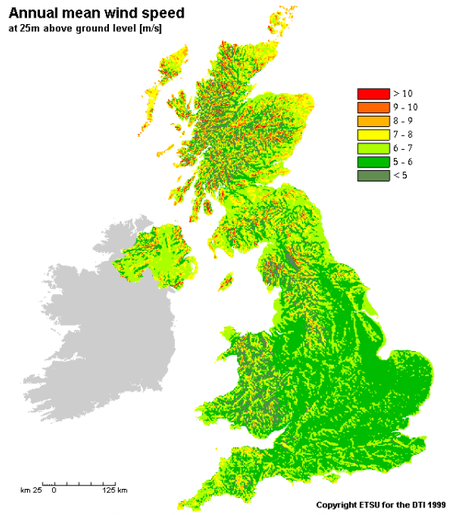


Figure 13: Annual Wind Speed

British Wind Energy Association (BWEA) wind data base suggests that wind speed at the site would be around 5-7m/s at 25m could support small wind turbine, however, annual load generation will be relatively low.

Installation of wind turbines would have a negative effect on the architectural character of the building. This issue aside, wind turbines can have a detrimental effect on telecommunications in the vicinity of their location.

Given the surroundings of the Padel Courts in the middle of Brighton Football Club training grounds which puts a limiting factor on location of the wind turbine installation. Wind patterns in urban areas can be very turbulent and are not the best conditions to yield a good output from small scale wind turbines.

It would therefore be reasonable to conclude that based on the above information, even without a technical review of the installation costs, the requirements for maintenance and the installation restraints are unlikely to support the installation of electrical wind generation for this development.

13.6 Hydrogen Cells

Hydrogen fuel cells have been considered for use within the building but have been discounted due to the current lack of a commercially viable source of hydrogen. Many current installations are known to be running on natural gas to generate the Hydrogen fuel until the hydrogen becomes available from sustainable non-fossil fuel-based source. Utilization of organic food decomposition and anaerobic digestion process to generate Biogas which can be used in generating Hydrogen fuel is other more environmentally friendly emission less process, however, the area footprint of such system is huge and will require specialist operation to maintain the process flow with expected complicated maintenance for such multiprocessor system.

There is currently no commercially available fuel cell technology in the European market.

13.7 Ground Source Heat Pump (GSHP)

Ground source systems provide the opportunity to obtain both heating and cooling via water to water or water to refrigerant heat pumps. This technology can reduce the demand for conventional energy and thus reduce overall CO2 emissions.

They do however have limited effect in reducing CO2 emission levels compared to the other renewable energy technologies. Geothermal technology can be utilised virtually anywhere in the UK and be installed under landscape areas and car parks. A more efficient and less expensive option is to utilise a nearby body of water for heat extraction/rejection.

Geothermal systems provide the opportunity to connect to water-to-water heat pump units for heat rejection and to VRF heat pump units for cooling and heating. VRF system heat pumps using inverter controls on the compressors can provide improved energy efficient operation, where the heating and cooling input are mixed so that the actual load is limited to the resultant difference thereby further reducing the energy input. Installing a ground source system will require approval from the environment agency to pump heat in and out of the ground.

It is not known how the ground conditions within the BHAFC training ground will react to a ground source heat pump system, and there are risks associated with ecology that will affect the size of system that will be possible. The area requirements for the below grade pipe work will be constrained by the surrounding infrastructures within the training ground.

It has been concluded that a GSHP is technically infeasible due to ecological implications and impracticality for the project.

13.8 Air Source Heat Pump (ASHP)

Air source heat pump systems draw heat from the ambient outside air during the heating season and reject heat outside during the summer cooling season. This technology can reduce the demand for conventional energy and thus reduce overall CO_2 emissions.

ASHP is recommended to be implemented as a low zero carbon technology for the space heating and cooling system. The required system capacity can be delivered within a reasonable footprint to accommodate the proposed building space heating and cooling and assists with the reduction of CO_2 emissions that would be produced by a boiler of comparable capacity.

The ASHP technology is to be installed in accordance with the Adur District Heat Pump briefing notes and guidance which has been prepared by the Institute of Acoustics (IoA) and Chartered Institute of Environmental Health (CIEH) to ensure the design avoids significant adverse noise impacts associated with their use.

13.8.1 Energy Assessment Results and Life Cycle Cost Analysis

A simple payback period has been calculated based on the following space heating and cooling energy generation outputs for the proposed development:

Gas Boiler Energy Consumption (kWh)	**39763.81**
ASHP Energy Consumption (kWh)	9046.266
Annual Energy Savings (kWh)	30717.54
Gas Boiler Emissions (kgCO2e)	8350.40
ASHP Emissions (kgCO2e)	1230.29
Annual Emissions Savings (kgCO2e)	7120.11
Boiler Initial Cost (£)	15000.00
Boiler Annual Energy Cost (£)	2783.47
ASHP Initial Cost (£)	20000.00
ASHP Annual Energy Cost (£)	2442.49
Annual Cost Savings (£)	340.97
Simple Payback Period (Years)	14.66

The BHAFC is a small footprint building with limited MEP storage space, especially with the proposed installation of PVs on the roof. ASHP technology is discounted as a viable Low-Zero Carbon technology for use with domestic hot water given the space requirements and the likely excessive noise impacts associated with the increased system footprint required for use in domestic hot water generation. Hence, point of use electric water heaters are required to be specified.

13.8.2 Feasibility of Exporting Heat/Electricity to Grid

The anticipated heat generation of the proposed ASHPs is below the base load and will be totally consumed on site. This is not sufficient to justify the infrastructure that would be required to export electricity/heat back to the grid.

13.8.3 Grants

No grants are available for the BHAFC training ground proposed development for the installation of ASHPs.

13.9 Biomass Boilers

Biomass technology could be installed as part of the central heating provision. The most economical option and the best for reducing CO2 emission levels would normally be to install Biomass Boilers to act as the lead boiler to cater for the base hot water heating load with the remaining gas fuelled boilers sized to meet the total heating load and to form a standby facility.

The Bio-energy boiler system would require the installation of additional components for the storage of the wood chips or pellets used as fuel, along with the necessary transportation components to link between the storage hoppers and the boiler. Wood chips or pellets would need to be stored in external or internal hoppers. The amount of wood chips or pellets stored will affect the choice of the silo or bunker storage types. Storage systems require sufficient space for large delivery vehicle to 'shoot' the wood fuel directly into the storage facility. The wood chips or pellets are transferred from the storage facility by screw or similar transportation system linking between the wood hoppers and the boiler house. The waste combustion products from the boilers (in the form of ash) can either be removed manually or automatically by the use of screw feed units direct to a collection skip. This plant ash is an inert ash and can be used as fertiliser assuming that the wood is obtained from clean sources (i.e., nonindustrial, and not contaminated with plastics).

The use of automatic removal of the plant ash will reduce maintenance costs but increase the initial capital installation costs. Wood burning boilers have comparable combustion efficiencies as basic gas fired systems. The fluing requirements for modern wood fired boilers are comparable with those of gas fired systems and the emissions are similar to that of gas fired units. Where the heat output to water is above 300kW (400kW input) there is a requirement under the clean air regulations when using waste wood to install continuous flue monitoring of the waste gas products.

These systems are relatively expensive to install and maintain. Biomass Boilers can also operate on a modulating basis to vary the heat output. Boilers can operate as low as 30% of their maximum load they do, however require additional plant room area then the standard models. The installation of Biomass Boiler with pellet storage as the main heating boiler is not a viable option when CHP plant is proposed, as the majority of the base heating would be provided by CHP. Biomass boilers also cause other issues such as fuel storage, which need to be maintained in a dry storage area. With space being at a high premium in the project, it is not anticipated that biomass fuel store will be a provision that is easy to make.

Biomass is therefore discounted as a feasible and viable option for the project given the space requirements.

13.10 Solar Thermal - Hot Water Generation

The use of solar heating for hot water generation would require the installation of solar panels at roof level. Ideally the panels should be aligned in a southerly direction with a tilt of between 30° and 40°. Solar thermal panels will also require to be mounted in areas that are unshaded.

The potential, therefore, of incorporating solar thermal is limited as it would compete for roof space with the PVs system that would feed ASHPs where the water system would be generating 4 W of hot water for each W of generated electrical energy while Solar hot water system ideally generates 1 W for every 1 W of absorbed Solar energy. With minimum 4 to 1 advantage for ASHP hot water generation, expansion of electricity generating PVs is always superior to solar hot water solutions.

13.11 Micro CHP

Micro CHP system is one of the low carbon technology options. However, this is fed by mains gas to have both thermal and electrical power output. This is one of low carbon technologies which are not encouraged to be adopted as preferred design option in built environment as it still uses main gas as its fuel source. The proposed building is not to be connected to an existing gas network.

14.0 LOW ZERO CARBON FEASIBILITY STUDY SUMMARY MATRIX

BREEAM V6.1 Ene 04 Criteria Checklist	PV Solar	Wind Power	Hydrogen Cells	GSHPs	ASHPs	Biomass Boilers	Solar Thermal	CHP
Feasibility Study	Feasible	Not Feasible	Not Feasible	Not Feasible	Feasible – Space heating and Cooling Not Feasible - Domestic Hot Water Generation	Not Feasible	Not Feasible	Not Feasible
1. Energy generated from LZC energy source per year	11413.97 kWh	N/A	N/A	N/A	9046.3 kWh	N/A	N/A	N/A
2. Carbon dioxide savings from LZC energy source per year	1268.4 kgCO2e	N/A	N/A	N/A	7120.11 kgCO2e	N/A	N/A	N/A
3. Life cycle cost of the potential specification, accounting for payback	Payback Period of 8 years	N/A	N/A	N/A	Annual Cost Savings over Boiler – £ 340.97 Payback Period of 14.7 years	N/A	N/A	N/A
4. Local planning criteria, including land use and noise	Refer to Section 13.1							
5. Feasibility of exporting heat or electricity from the system	The anticipated energy generation of the proposed PV area is not sufficient to justify the infrastructure that would be required to export electricity back to the grid.	N/A	N/A	N/A	The anticipated energy generation of the proposed ASHP is not sufficient to justify the infrastructure that would be required to export electricity back to the grid.	N/A	N/A	N/A
6. Any available grants	No grants are available for the BHAFC training ground proposed development for the installation of PVs. This LZC technology has a payback period of circa. 8 years.	N/A	N/A	N/A	No grants are available for the BHAFC training ground proposed development for the installation of PVs.	N/A	N/A	N/A
7. All technologies appropriate to the site and energy demand of the development	110 m^2 of the roof area to be allocated to PV panel system (including panel size and maintenance requirements).	N/A	N/A	N/A	ASHP (SCOP 4) for space heating and cooling.	N/A	N/A	N/A
8. Reasons for excluding other technologies	-	BHAFC Padel Courts will be located within the training ground. Surrounded by existing infrastructure space for wind turbines is not available and is not deemed appropriate for the site.	No commercially available technology available.	Invasive Ground Works which is further constrained by surrounding infrastructure within the training ground.	DHW - Noise and Space Requirements	Lack of provisions/spatial requirements for biomass fuel store.	Lack of roof space which would compete with area already allocated to PV panels.	Whilst there is an existing gas network on site, this is not intended to be connected to the proposed BHAFC Padel Courts.
9. If appropriate: ***The building is connected to an existing local community CHP system OR The building is connected to an existing source of waste heat or power OR A building or site CHP system is specified with the potential to export excess heat or power via a local community energy scheme OR A source of waste heat or power is specified with the potential to export excess heat or power via a local community energy scheme***	Refer to Section 8.0 of Energy Statement Report This is considered a small-scale development. The energy consumption of the proposed BHAFC Padel Courts is not sufficient to justify the infrastructure that would be required to connect to any of the relevant community energy options.							
10. Energy storage.	The base load of the proposed BHAFC Padel Courts is too low for energy storage to be feasible.	-	-	-	-	-	-	-

15.0 ENERGY STRATEGY SUMMARY

The first step of the energy strategy is to effectively reduce the energy demand of the new buildings through the application multiple energy conservation measures (ECMs) such that the buildings will have less carbon emissions than the baseline building without onsite renewable energy generation. The main adopted ECMs can be summarized below:

- Envelope with High thermal performance.
- Efficient fans with low Specific Fan power (SPF) for AHUs, MVHRs and FCUs.
- High performing High recovery for changing area ventilation.
- Efficient interior and exterior lighting power densities and controls.
- Metering and Building management system
- Electrification of energy end uses

The second step of the strategy is to increase the carbon reduction through using low and zero carbon technologies. Based on the feasibility assessment conducted for these systems. The following system will the adopted:

- A decentralized HVAC system approach based on VRF systems has been adopted for all elements in the development with advantage of having higher efficiency (Typically Less individual system capacity results Higher SCOP/SEER) and modularity that gives higher resilience.
- The hot water generation for all high demanding application is based on electric point-of-use hot water generation.
- Photovoltaics on the buildings' roof. In principle any PV area added will further increase the carbon emissions reduction and the buffer of compliance over the Part L 2021 baseline.

The Energy assessments results demonstrate that the proposed BHAFC Padel Courts building comply with Part L 2021 energy performance requirements based on the building elements performance requirements are outlined in this section. The energy assessment approach also aligns with the requirements of assessment for the BREEAM Ene 01 methodology which will contribute to the BREEAM Rating for the proposed development. The proposed development achieves an EPC Rating of B in line with the Adur District Council requirements.

16.0 APPENDIX A- BHAFC BE GREEN BRUKL

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

BHAFC Padel Courts_15052025 As designed

Date: Thu May 15 17:36:15 2025

Administrative information

Building Details

Address: 60 Mash Barn Ln,, London, BN15 9FP

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m^2]: 235.18

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	8.72	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	8.22	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	94.42	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	88.69	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.22	0.22	PC000008:Surf[2]
Floors	0.18	0.15	0.15	PC000008:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.06	0.06	PC000018:Surf[1]
Windows** and roof windows	1.6	1.3	1.3	PC000008:Surf[1]
Rooflights***	2.2	1.67	1.7	PC000001:Surf[3]
Personnel doors^	1.6	1.3	1.3	PC000000:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m^2K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m^2K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m^2K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- FCU.00.01/02/03 VRF - BE GREEN

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	7.25	0	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

2- MVHR.RF.01 - VRF & MVHR - BE GREEN

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	7.25	0	1.65	0.85
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

3- DX.00.01 - BE GREEN

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	6.5	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

4- FCU.01.01/02/03 VRF - BE GREEN

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	7.25	0	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHW - Elec Instantaneous

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m^2]**
Standard value	95	80	0.3
PC00-02 Male Changing	101	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
PC00-01 Stair	129	-	-
PC00-03 Male WC	104	-	-
PC00-11 Female Changing	101	-	-
PC00-06 Circulation	106	-	-
PC00-07 AWC/Changing	100	-	-
PC00-09 Female WC	102	-	-
PC00-05 Plant & Cleaners	120	-	-
PC00-04 Kitchen	150	-	-
PC00-10 Plant	143	-	-
PC00-Padel Courts Lobby	158	-	-
PC01-02 Lobby	114	-	-
PC01-03 Multi-Functional Space	112	-	-
PC00 Padel Courts	158	-	-
PC01-01 Stair	129	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
PC00-02 Male Changing	NO (-74.7%)	NO
PC00-01 Stair	N/A	N/A
PC00-03 Male WC	N/A	N/A
PC00-11 Female Changing	NO (-71%)	NO
PC00-06 Circulation	NO (-31.6%)	NO
PC00-07 AWC/Changing	N/A	N/A
PC00-09 Female WC	N/A	N/A
PC00-05 Plant & Cleaners	N/A	N/A
PC00-04 Kitchen	N/A	N/A
PC00-10 Plant	N/A	N/A
PC01-02 Lobby	N/A	N/A
PC01-03 Multi-Functional Space	NO (-69.5%)	NO
PC00 Padel Courts	YES (+712.7%)	NO
PC01-01 Stair	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	1632.9	1632.9
External area [m²]	4045.4	4045.4
Weather	SOU	SOU
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	2503.46	1219.73
Average U-value [W/m²K]	0.62	0.3
Alpha value* [%]	8.51	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
100	**General Assembly and Leisure, Night Clubs, and Theatres**
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.75	4.03
Cooling	0.79	1.35
Auxiliary	0.79	0.79
Lighting	8.08	8.16
Hot water	52.53	49.46
Equipment*	23.32	23.32
TOTAL**	**66.94**	**63.79**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	6.99	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*6.99*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	82.42	62.85
Primary energy [kWh_{PE}/m²]	88.69	94.42
Total emissions [kg/m²]	8.22	8.72

HVAC Systems Performance										
System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	229	63.5	16.2	3.3	0	3.92	5.42	4	7.25
	Notional	179	62.7	17.9	3.8	0	2.78	4.63	---	---
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	342.6	53.3	24.3	2.7	0	3.92	5.42	4	7.25
	Notional	175.4	86.5	17.5	5.2	0	2.78	4.63	---	---
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	63.8	44.5	4.3	2.5	11.6	4.11	5	4	7.25
	Notional	42.3	91.8	4.2	5.5	11.6	2.78	4.63	---	---
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	0	0	0	0	0	3.92	4.86	4	6.5
	Notional	0	0	0	0	0	2.78	4.63	---	---
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	---	---

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

17.0 APPENDIX B- BHAFC EPC RATING

Energy Performance Certificate

HM Government

Non-Domestic Building

60 Mash Barn Ln,
Lancing
BN15 9FP
London
BN15 9FP

Certificate Reference Number:
7242-0629-3919-7543-9563

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+

Net zero CO_2 emissions

A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

14 **This is how energy efficient the building is.**

Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Air Conditioning
Total useful floor area (m^2):	1632.911
Building complexity:	Level 5
Building emission rate ($kgCO_2/m^2$ per year):	8.22
Primary energy use (kWh_{PE}/m^2 per year):	88.69

Benchmarks

Buildings similar to this one could have ratings as follows:

15 If newly built

59 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software:	Virtual Environment v7.0.27 using calculation engine ApacheSim v7.0.27
Property Reference:	UPRN-000000000000
Assessor Name:	Name
Assessor Number:	ABCD123456
Accreditation Scheme:	Information not available
Assessor Qualifications:	NOS5
Employer/Trading Name:	Trading Name
Employer/Trading Address:	Trading Address
Issue Date:	15 May 2025
Valid Until:	14 May 2035 (unless superseded by a later certificate)
Related Party Disclosure:	Contracted by the owner to provide other Energy Assessment services

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 8734-5756-4279-3913-3901

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.ndepcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit www.ndepcregister.com. To opt out of having information about your building made publicly available, please visit www.ndepcregister.com/optout.

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

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