OUTLINE ENERGY STATEMENT

ALBION LAND

CATALYST BICESTER

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Issued by:

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1. EXECUTIVE SUMMARY

The Outline Energy Statement supports the outline planning application 19/01746/OUT, and the outline component of the hybrid planning application 19/01740/HYBRID, for B1 development of employment units with Use Class B1a and/or B1b and/or B1c.

The statement addresses to how the new development (known as Catalyst Bicester) shall seek to comply with Building Regulation's Approved Document Part L2A (ADL2A) 2013 and with Policies ESD 1 – 5 of the Cherwell District Council's *The Cherwell Local Plan 2011-2031*, *Policy Bicester 10: Bicester Gateway*.

To comply with Building Regulation's ADL2A and Policies ESD 1 – 5, the following is proposed…

- A stage-by-stage energy hierarchy which encourages:
    - Stage 1: Employment of passive design solutions, i.e. exploiting natural daylight and providing good building fabric performance to maximise energy saving
    - Stage 2: Provision of highly efficient mechanical and electrical building services systems
    - Stage 3: The feasibility of low and zero carbon technologies to attain further carbon reduction, if required to comply with Building Regulation's ADL2A
- Target associated BREEAM NC 2018 credits in regard to sustainable construction and water consumption

2. INTRODUCTION

Engineering Services Consultancy Ltd have been commissioned by Albion Land to produce an Outline Energy Statement that will support the outline planning application (19/01746/OUT) and outline element of the hybrid planning application (19/01740/HYBRID). The statement aims to address the following…

- Building Regulation's Approved Document Part L2A (ADL2A) 2013
- Policies ESD 1 – 5 set out within Cherwell District Council's *The Cherwell Local Plan 2011-2031*.

The ADL2A is England's legal guideline standard for non-domestic buildings which regards energy efficiency and limiting carbon emissions.

Policies ESD 1 – 5 aim towards new large domestic and non-domestic developments that are under the Council's jurisdiction and their key objective is to mitigate climate change, reduce energy usage, increase resource efficiency, promote the use of renewable energy and reduce carbon emissions and embodied carbon.

To comply with ADL2A 2013 and Policies ESD 1 – 5, we shall propose an energy hierarchy that will be staged as follows…

- Stage 1: Employ passive design solutions, such as good building fabric performance, improve air tightness and exploitation of natural daylight to maximise reduction in energy and carbon emissions
- Stage 2: Provide highly efficient HVAC and lighting systems so energy can be supplied and used efficiently
- Stage 3: Assessment of the feasibility of low and zero carbon (LZC) technologies to further reduce carbon emissions, if required to comply with Building Regulations ADL2A

However, this energy hierarchy does not address the items in Policy ESD 3 that encompasses the use of sustainable construction methods and reducing water consumption. Therefore, the statement shall reference the associated BREEAM credits required to fully comply with Policy ESD 3, these credits are highlighted in Section 6. The five policies will be further elaborated.

The statement shall only set out the approach to low carbon design principles, opportunities for energy efficiency and assess the feasibility of low and zero carbon technologies across the Site. It does not set out commercially tested options at current outline stage though will be used to inform the proposals at reserved matters stage, where further detail will be provided.

This report has been produced by Kim Nguyen (Ref: LCEA203717), of Engineering Services Consultancy Ltd and was reviewed and approved by David Scott who is a certified Low Carbon Energy Assessor (Ref: LCEA156991).

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2.1 SITE DESCRIPTION

The development comprises employment units across B1a, B1b and B1c uses. Each unit are split with a core/office area and a large shell (no internal services) space. Figure 1 illustratively demonstrates how the development could be laid out. It is located on a site denoted by the Cherwell District Council as 'Bicester Gateway', which is situated adjacent to the A41 dual carriageway to the south of the retail area known as Wyvale Garden Centre.

In accordance to the Cherwell District Council's *The Cherwell Local Plan 2011-2031, Policy Bicester 10: Bicester Gateway*, the new development is to be a 'high-tech' and 'knowledge-based' employment development that shall create approximately 3,500 new science, research and technology jobs.

Figure 1: Illustrative Masterplan. Source: Cornish Architects

This report shall only focus on the employment units, discounting the leisure centre (which forms the detailed element of the hybrid planning application) located at top right of the site.

3. BUILDING REGULATION'S APPROVED DOCUMENT PART L2A 2013

The ADL2A is England's legal guideline standard document for new non-domestic buildings with an objective to regulate how much carbon dioxide is emitted, by assessing the building's intrinsic energy performance via its building fabric and internal building services. Within the document, three criteria are required to be met.

As such, the development shall aim to be meet ADL2A's standard as a minimum requirement in terms of carbon emissions and energy efficiency.

3.1 ADL2A CRITERION ONE

Criterion One is concerned with the amount of carbon dioxide emitted from a building per annum. The amount of carbon dioxide emitted is calculated by an approved Energy Assessor, using approved software tools. Within the approved software, the Energy Assessor creates a virtual building model which reflects the actual building and incorporates actual design features including building envelope, building orientation, glazing, air permeability, geographical location, and building services. This particular virtual model is referred to as the "Actual Building". The Energy Assessor also applies a standard database of internal environmental conditions and activities which take place within, known as NCM templates.

When concerned with the Criterion One assessment, the Actual Building is compared against a "Notional Building". The Notional Building is generated automatically within the accredited software and mimics the physical size, shape, orientation, location, and layout of the Actual Building. However, the design features (fabric and building services) of the Notional Building are not related to the Actual Building and may be better in performance. In order to pass the Criterion One assessment for compliance with ADL2A 2013, the carbon emission of the Actual Building must be equal to, or less than, the carbon dioxide emission of the Notional Building.

The annual carbon dioxide emission per square metre of floor area calculated for the Actual Building is known as the Building Emission Rate (BER), whilst the annual carbon dioxide emission per square metre of floor area for the Notional Building is known as the Target Emission Rate (TER). Therefore, in order to satisfy Criterion One, the BER must be equal to or less than the TER.

3.2 ADL2A CRITERION TWO

Criterion Two assesses the performance of the building fabric to ensure that reasonable provision is made to limit heat gains and heat losses. During the calculation, the software assesses building fabric U-values and building air permeability to ensure that minimum standards prescribed by the Building Regulations are met.

Criterion Two also requires M&E building services to meet minimum energy efficiency standards. Whilst the efficiency of such plant and equipment is entered into the software to calculate building carbon emission, it is not automatically checked during the assessment for compliance with Criterion Two. The BRUKL Output Document therefore provides a schedule of plant and equipment efficiency for review by the Building Control Officer (BCO).

3.3 ADL2A CRITERION THREE

Criterion Three limits the effect of solar gains during the period of April to September, whether air conditioning is installed or not. The intention of Criterion Three is to reduce the need for air conditioning or reduce the installed capacity of air conditioning if present. Where comfort cooling is not provided, it is recommended that detailed thermal simulations are undertaken on a room-by-room basis to ensure that overheating criteria are satisfied, irrespective of Criterion Three results.

Similarly, to Criterion One, the Actual Building is compared to the Notional Building. The Notional Building is automatically created by the software to incorporate specific features which relate to a room's end use, the orientation of glazing, and specification of glazing in terms of g-value. To pass Criterion Three assessment, the Actual Building must have a solar heat gain less than or equal to the Notional Building benchmark.

4. CHERWELL DISTRICT COUNCIL'S 'THE CHERWELL LOCAL PLAN 2011 – 2031'

The Cherwell Local Plan 2011 – 2031 is The Cherwell District Council's local plan with purpose to expand its district to increase job employment, improve local and national economy and improve connections on rail and road. It is their aim to execute this plan in a sustainable and environmentally conscious manner.

To encourage this in the construction and use of any new domestic and non-domestic development, *The Cherwell Local Plan 2011 – 2031* introduced five policies known as Policies ESD 1 – 5. These policies aim to mitigate a development's involvement in climate change as well as reduce its energy usage, carbon emissions and embodied carbon.

4.1 THE CHERWELL LOCAL PLAN 2011 – 2031 – POLICY BICESTSER 10: BICESTER GATEWAY

The Catalyst Bicester development is an allocated site within Local Plan, known as 'Bicester Gateway', whereby its associated policies is highlighted in section *Policy Bicester 10: Bicester Gateway* of *The Cherwell Local Plan 2011 – 2031*.

Within *Policy Bicester 10*, it includes the development's requirement to comply with Policies ESD 1 – 5, these policies are elaborated below.

4.2.1 POLICY ESD 1: MITIGATING AND ADAPTING TO CLIMATE CHANGE

Policy ESD 1 states:

Measures will be taken to mitigate the impact of development within the district on climate change. At a strategic level, this will include:

- *Distributing growth to the most sustainable locations as defined in this Local Plan*
- *Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars*
- *Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction)*
- *Promoting the use of decentralised and renewable low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy)*

4.2.2 POLICY ESD 2: ENERGY HEIRARCHY AND ALLOWABLE SOLUTIONS

Policy ESD 2 states:

In seeking to achieve carbon emissions reductions, we will promote an 'energy hierarchy' as follows:

- *Reducing energy use, in particular by the use of sustainable design and construction measures*
- *Supplying energy efficiently and giving priority to decentralised energy supply*
- *Making use of renewable energy*
- *Making use of allowable solutions*

4.2.3 POLICY ESD 3: SUSTAINABLE CONSTRUCTION

Policy ESD 3 states:

…Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.

All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of this standard should be set out in the Energy Statement.

The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- *Minimising both energy demands and energy loss*
- *Maximising passive solar lighting and natural ventilation*
- *Maximising resource efficiency*
- *Incorporating the use of recycled and energy efficient materials*
- *Incorporating the use of locally sourced building materials*
- *Reducing waste and pollution and making adequate provision for the recycling of waste*
- *Reducing the impact on the external environment and maximising opportunities for cooling and shading (by provision of open space and water, planting, and green roofs, for example); and*
- *Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment*

4.2.4 POLICY ESD 4: DECENTRALISED ENERGY SYSTEMS

Policy ESD 4 states the following…

The use of decentralised energy systems, providing either heating (District Heating (DH)) or heating and power (Combined Heat and Power (CHP)) will be encouraged in all new developments.

A feasibility assessment for DH/CHP, including consideration of biomass fuelled CHP, will be required for:

- *All residential developments for 100 dwellings or more*
- *All residential developments in off-gas areas for 50 dwellings or more*
- *All applications for non-domestic developments above 1000m^2 floorspace.*

…Where feasibility assessments demonstrate that decentralised energy systems are deliverable and viable, such systems will be required as part of the development unless an alternative solution would deliver the same or increased benefit.

4.2.5 POLICY ESD 5: RENEWABLE ENERGY

Policy ESD 5 states:

The Council supports renewable and low carbon energy provision wherever any adverse impacts can be addressed satisfactorily. The potential local environment, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications.

…A feasibility assessment of the potential for significant on site renewable energy provision (above any provision required to meet national building standards) will be required for:

- *All residential developments for 100 dwellings or more*
- *All residential developments for off-gas areas for 50 dwellings or more*
- *All applications for non-domestic developments above 1000m^2 floorspace*

Where feasibility assessments demonstrate that on site renewable energy provision is deliverable and viable, this will be required as part of the development unless an alternative solution would deliver the same or increased benefit.

5. PROPOSED 'LEAN, CLEAN AND GREEN' ENERGY HIERARCHY

To address Building Regulation's ADL2A and Policies ESD 1 – 5, we shall propose the adoption of an energy hierarchy known as 'Lean, Clean and Green'. This energy hierarchy originated from the London Councils' *The London Plan*, used to minimise carbon dioxide emissions from buildings within Greater London.

The proposed lean, clean and green energy hierarchy will be followed to demonstrate that intrinsically low energy buildings can be achieved and that carbon emissions can be reduced to the requirements of Building Regulations. The definitions are described:

- Lean – Reduce the energy demand and energy loss by designing efficiency into the thermal fabric of the building, focusing on air tightness, thermal mass and thermal bridging.
- Clean – Increase energy efficiency of the building services and controls to significantly reduce energy consumption. This includes space heating, hot water generation, ventilation and lighting systems and controls.
- Green – The potential use of LZC technologies to offset carbon emissions and energy usage, if feasible and required to comply with Building Regulation's ADL2A.

Under 'Lean' and 'Clean', passive design measures shall be incorporated. These shall include good building fabric performance, glazing systems offering good solar control and daylight dimming control for the artificial lighting system.

It is assumed that the large shell space is unconditioned (no heating and/or cooling applied) but is fitted with internal lighting.

5.1 LEAN

The development shall adopt the building fabric and air tightness highlighted in the table below. It is aimed to be above the Building Regulation's Part L2A's worst permissible requirements for building fabric performance.

Table 1: Building Envelope Performance

ELEMENT	WORST PERMISSIBLE	PROPOSED
External Wall U-value	0.35 W/m^2.K	0.26 W/m^2.K
Internal Office to Large Shell Space Wall U-value	-	0.26 W/m^2.K
Roof U-value	0.25 W/m^2.K	0.18 W/m^2.K
Internal Office to Large Shell Space Ceiling U-value	-	0.33 W/m^2.K

Ground Floor Slab U-value	0.25 W/m^2.K	0.22 W/m^2.K
First-floor Soffit Ground Floor U-value	0.25 W/m^2.K	0.23 W/m^2.K
Door U-value	2.20 W/m^2.K	2.00 W/m^2.K
Window U-value (frame & glass)	2.20 W/m^2.K	1.50 W/m^2.K
Translucent Wall Panels	2.20 W/m^2.K	1.30 W/m^2.K
Rooflight U-value (frame & glass)	2.20 W/m^2.K	1.30 W/m^2.K
Vehicle access doors & similar large doors U-value	1.50 W/m^2.K	1.40 W/m^2.K
Window g-value	-	0.40 (Subject to Criterion 3 of BR Part L2A)
Roof-light g-value	-	0.55
Air Permeability	10.0 m^3/(h.m^2) @ 50Pa	3.0 m^3/(h.m^2) @ 50Pa

This shall demonstrate compliance with the following items for each policy…

POLICY	ITEM
Policy ESD 1	Designing developments to reduce carbon emission and use resources more efficiently, including water
Policy ESD 2	Reducing energy use, in particular by the use of sustainable design and construction measures
Policy ESD 3	Minimising both energy demands and energy loss

5.2 CLEAN

The development shall seek to employ the following services and efficiencies where relevant. At this stage, the large shell space in the employment units will be assumed as unconditioned since the units are speculative, however, artificial lighting is still applied.

Table 2: M&E Building Services Strategy

SYSTEM/ZONE	DESCRIPTION
Large Shell Spaces	Unconditioned
Offices	VRV/F with mechanical ventilation heat recovery units.
Reception	VRV/F with natural ventilation
First Floor Lobby	Electric panel heaters with natural ventilation
Toilets	Electric panel heaters with remote central extract ventilation
Cleaner's Store	Electric panel heaters with remote central extract ventilation
Toilet Extract Fans	SFP = 0.4 W/(l/s)
Mechanical Ventilation Heat Recovery Units	SFP = 1.5 W/(l/s). Heat recovery efficiency = 75%
VRV/F Heating/Cooling Efficiencies	Heating: SCOP = 4.0. Cooling: SEER = 4.0
DHWS	Local electric water heaters

Table 3: Electrical Lighting Performance

ROOM	LUMINAIRE EFFICACY (LLM/CW) UNLESS OTHERWISE STATED	DESIGN ILLUMINANCE (LUX)	PRESENCE DETECTION	DAYLIGHT CONTROL	PARASITIC POWER (W/M^2)
Large Shell Space	100	300	Auto On/Off	Photocell control dimming	0.05
Offices	90	500	Manual On/Auto Off	Photocell control dimming	0.30
Reception	90	300	Auto On/Off	Photocell control dimming	0.30
Landing	90	100	Auto On/Off	Photocell control dimming	0.30
Circulation Areas	90	100	Auto On/Off	No daylight control	N/A
Toilets	90	200	Auto On/Off	No daylight control	N/A
Cleaner's Store	90	50	Auto On/Off	No daylight control	N/A

This shall demonstrate compliance with the following items for each policy…

POLICY	ITEM
Policy ESD 1	Designing developments to reduce carbon emission and use resources more efficiently, including water
Policy ESD 2	Reducing energy use, in particular by the use of sustainable design and construction measures
Policy ESD 3	Minimising both energy demands and energy loss Maximising passive solar lighting and natural ventilation

5.3 GREEN

A list of commercially available low and zero carbon technologies are described below. This section shall highlight which technologies could be considered either appropriate or unfeasible for this development.

5.3.1 AVAILABLE TECHNOLOGIES

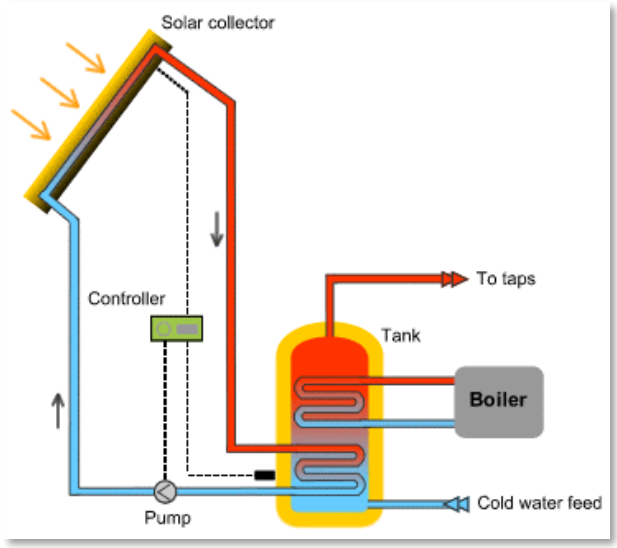
SOLAR HOT WATER

Description

Solar water heating systems use energy from the sun to heat water. A fluid within the wall/roof mounted panel is heated by the sun. The fluid is then used to heat water.

There are two types of collectors available:

- Flat plate
- Evacuated tube



Advantages

- Government Renewable Heat Incentive payments.
- Relies on a natural source (the sun).
- Low maintenance.

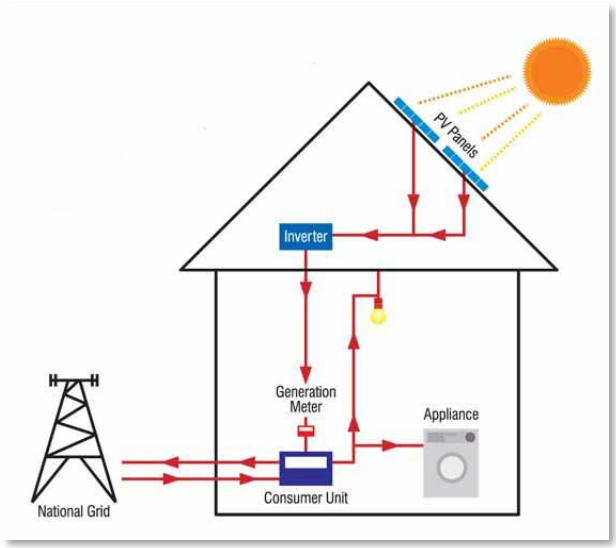
Disadvantages

- Panels ideally need to face South and at an incline of 30º to the horizontal.
- The system must be unshaded.

PHOTOVOLTAICS (PV)

Description

Photovoltaic (PV) systems convert energy from the sun into electricity through semi-conductor cells, connected together in mounted modules.



Advantages

- Panels can be incorporated into the building.
- Government Feed in Tariff payments.
- Relies on a natural source (the sun).
- Low maintenance.
- Silent in operation.
- No emissions.

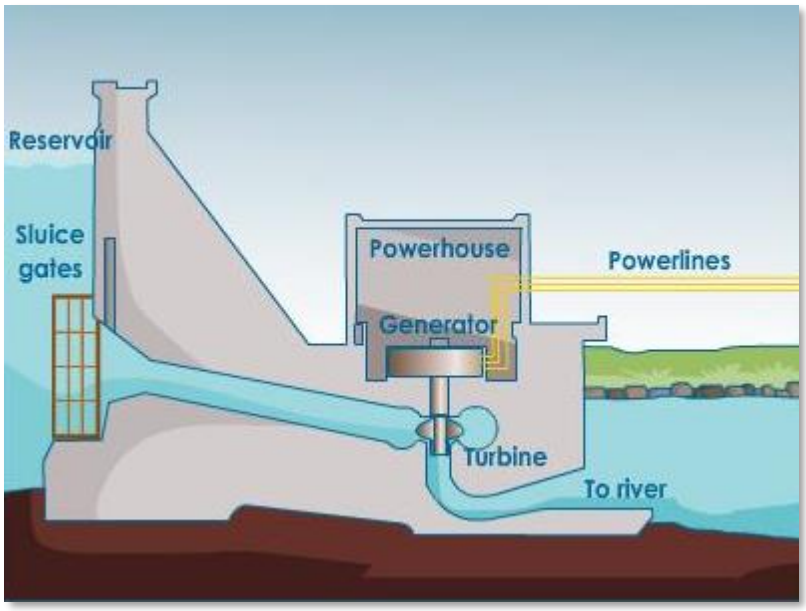
Disadvantages

- PV panels ideally need to face South and at an incline of 30º to the horizontal.
- The system must be unshaded.
- Amount of energy generated is dependent upon the daylight availability.

HYDRO POWER

Description

Hydro power is the process of using river water to generate electricity. Water is used to drive a turbine to generate electricity.



Advantages

- Government Feed in Tariff payments.
- Surplus energy can be sold to the grid.
- Low running and maintenance costs.

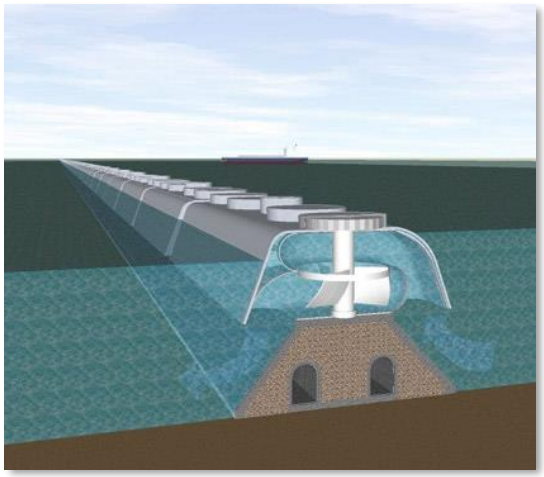
Disadvantages

- Installation is expensive.
- Very site specific – need an adequate water supply all year round.

TIDAL & WAVE POWER

Description

Tidal/wave power is the process of using tidal waves to generate electricity. Water is used to drive a turbine to generate electricity.



Advantages

- Government Feed in Tariff payments.
- Surplus energy can be sold to the grid.
- Low running and maintenance costs.
- The tide moves a huge amount of water each day and has the potential to produce a lot of energy.

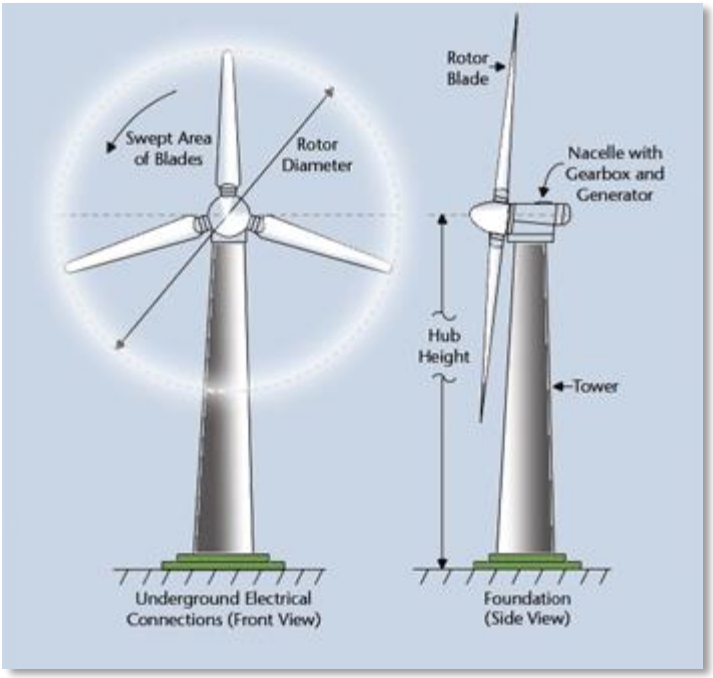
Disadvantages

- Installation is expensive.
- Very site specific – requires a tidal location.

WIND TURBINES

Description

Wind turbines harness the power of the wind to generate electricity through a vertical or horizontal axis propeller which harnesses the kinetic energy in wind and converts it to electrical power through a generator. Requires an average wind speed greater than 5m/s according to CIBSE TM 38. (Refer to https://www.rensmart.com/Maps to find the average wind speed for the site.)



Advantages

- Wind is free.
- Surplus energy can be sold to the grid.
- Extremely beneficial in exposed or coastal sites.

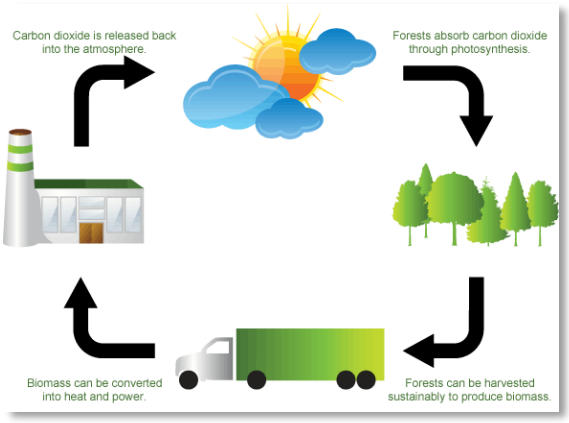
Disadvantages

- Highly dependent on the speed of the wind at the site of the turbine.
- Wind speed is dependent upon location within the UK and nearby obstructions.
- Very visible.
- High noise levels.
- Creates a flickering shadow.

BIOMASS

Description

Wood is burned to provide heat to either a single room, a central heating system or to heat water.



Advantages

- May be eligible for Renewable Heat Incentives.
- Affordable fuel.

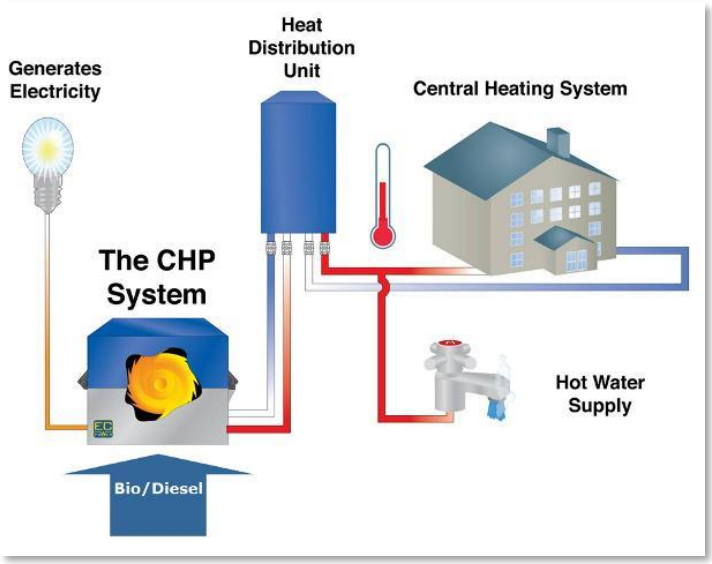
Disadvantages

- Wood is renewable but trees take a longer time to grow than to burn.
- CO_2 emitted when wood is burned.
- Requires regular deliveries of wood pellets.
- The chimney must be carefully considered as it is generally significantly taller than the building.

COMBINED HEAT AND POWER (CHP)

Description

A CHP system generates heat and electricity simultaneously through an internal combustion engine that drives an electrical alternator.



Advantages

- Electricity generated as a by-product of heat.
- Can burn a variety of fuels, such as natural gas, diesel oil, or biofuels such as bioethanol.
- Government Feed in Tariff payments.
- Easy installation.
- Cheap maintenance costs.

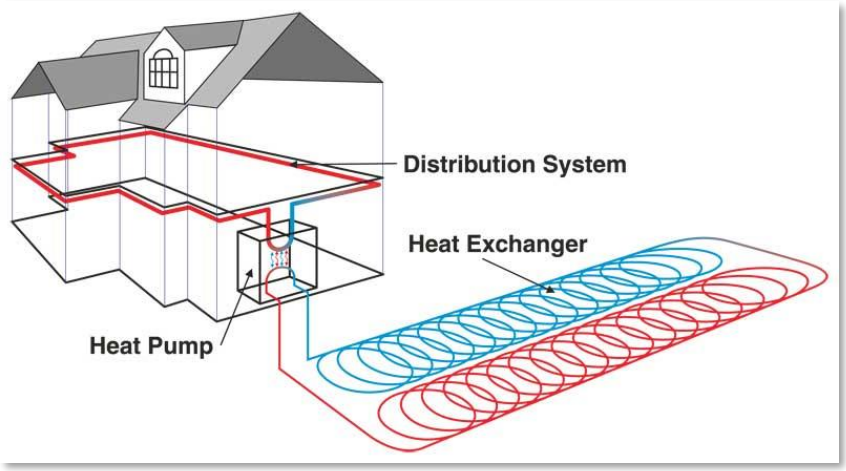
Disadvantages

- Typically powered by mains gas or LPG.

GROUND SOURCE HEAT PUMPS

Description

Ground source heat pumps extract heat from the ground via pipes buried in the ground. The pipes contain a fluid which is heated, this heat can then be used for heating or hot water.



Advantages

- Government Renewable Heat Incentive payments.
- Can be used throughout the entire year as the ground remains at a consistent temperature.

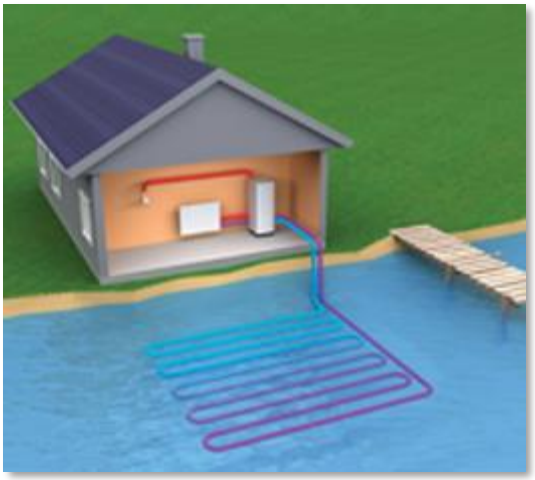
Disadvantages

- The ground must be suitable for digging a trench or boreholes.
- Require regular maintenance.
- Initial installation can be expensive.

WATER SOURCE HEAT PUMPS

Description

Water source heat pumps absorb heat from a water source which can then be used for heating or hot water.



Advantages

- Government Renewable Heat Incentive payments.
- High rate of heat transfer.

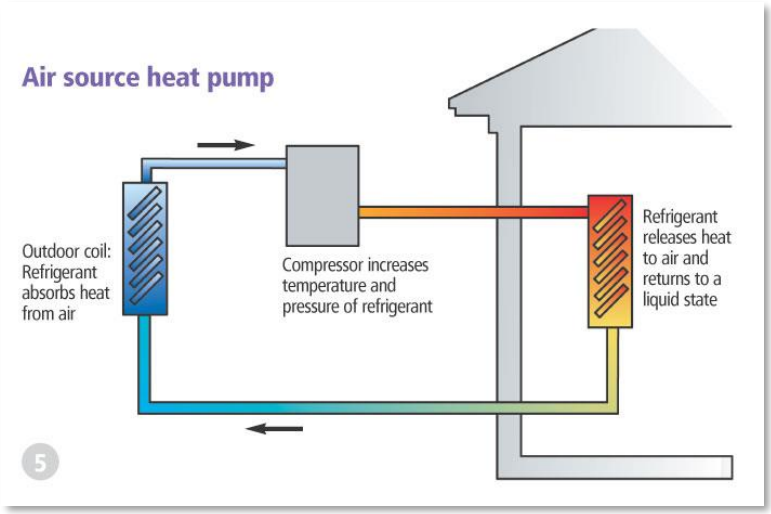
Disadvantages

- Require regular maintenance.
- The ground must be suitable for digging a trench or boreholes.
- Site specific as it requires an adequate water source.

AIR SOURCE HEAT PUMPS

Description

Air source heat pumps absorb heat from the outside air which can then be used for heating or hot water.



Advantages

- Government Renewable Heat Incentive payments.
- Relatively low capital costs.

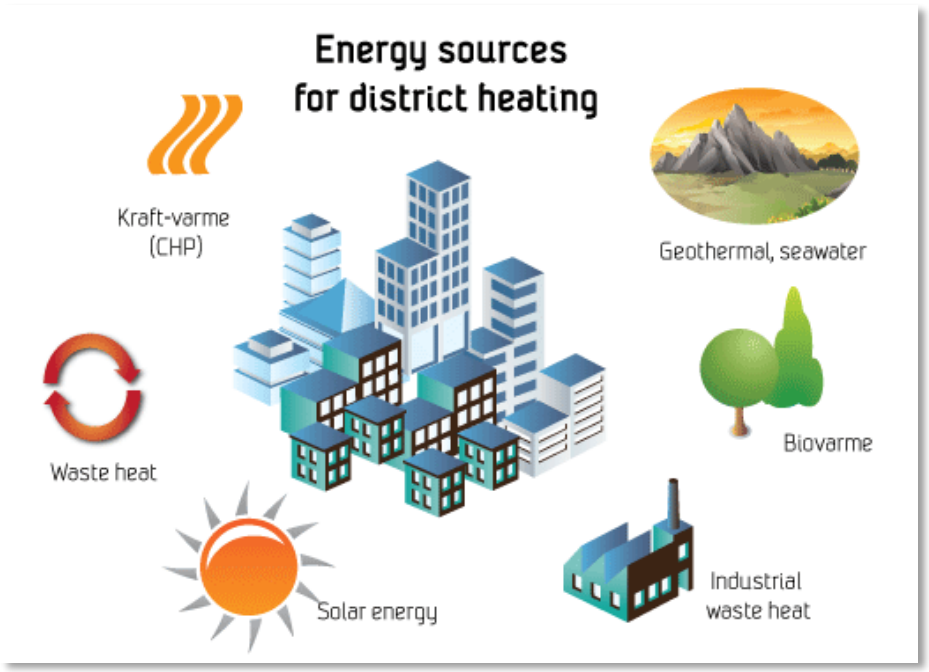
Disadvantages

- Require regular maintenance.
- Requires additional plant space.

COMMUNITY/DISTRICT HEATING

Description

A centralised heating network supplies heat from a central source to businesses/homes through a network of pipes carrying hot water.



Advantages

- Cost-effective.
- Government funding often available.

Disadvantages

- Expensive installation.
- Often requires existing network to allow a connection.

5.3.2 APPROPRIATE TECHNOLOGIES

The tables below summarise the technologies which could be considered feasible for use on this development:

Table 4: Appropriate LZC Technology Information

TECHNOLOGY	REASON FOR USE
Air Source Heat Pumps (VRV/F Air-conditioning)	Industry standard heating/cooling equipment for office/industrial type buildings. Its high efficiency will ensure low energy consumption.
Photovoltaics	The units have large roof spaces available for installation. Should a building not achieve compliance with Building Regulation's ADL2A then implementing this technology is highly recommended.

5.3.3 EXCLUDED TECHNOLOGIES

A number of technologies have been excluded due to location or resource availability; these have been summarised in the table below:

Table 5: Excluded LZC Technology Information

TECHNOLOGY	REASON FOR EXCLUSION
Hydro Power	There is no suitable water source to allow for a hydroelectric power installation.
Tidal & Wave Power	There is no suitable water source to allow for a tidal or wave power installation.
Ground Source Heat Pumps	Ground source heat pumps can be suitable for this development, however, capital cost will be greater than air source heat pumps. As the price difference between electricity and gas fuel can sometimes be a factor of three, payback will potentially be very long.
Water Source Heat Pumps	There is no suitable water source to enable the installation of a water source heat pump system.
Solar Hot Water	The domestic hot water demand is low due to the office and industrial space environment and capital cost would outweigh any potential energy saving.
Wind Turbines	The average wind speed shown in RenSMART's wind map show it is generally below or equal to 5.0 m/s. Wind turbines require average wind speeds greater than 5.0 m/s to generate meaningful amount of energy.
Biomass	The buildings are speculative and assumed to have no industrial space heating and/or cooling applied. However, spare ducts shall be provided within site for future connections onto any future decentralised energy networks
Combined Heat and Power	The buildings are speculative and assumed to have no industrial space heating and/or cooling applied. However, spare ducts shall be provided within site for future connections onto any future decentralised energy networks.

Community / District Heating	The buildings are speculative and assumed to have no industrial space heating and/or cooling applied for this report. However, spare ducts shall be provided within site for future connections onto any nearby district heating network.

This shall demonstrate compliance with the following items for each policy…

POLICY	ITEM
Policy ESD 1	Designing developments to reduce carbon emission and use resources more efficiently, including water
Policy ESD 2	Supplying energy efficiently and giving priority to decentralised energy supply Making use of renewable energy Making use of allowable solutions
Policy ESD 3	Minimising both energy demands and energy loss
Policy ESD 4	Please refer to Section 5.3.4
Policy ESD 5	All items

5.3.4 POLICY ESD 4: DESCENTRALISED ENERGY SYSTEMS

Highlighted in Table 5, decentralised energy systems – which includes combined heat and power, district heating, biomass – are described to be unfeasible at this outline stage for the employment units. However, should future tenants require heating and/or cooling to the large shell area, then decentralised energy systems shall be considered.

The closest decentralised energy centre is the Ardley Energy Recovery Facility (ERF), located approximately 5.3 km from the development, which produces electricity from the incineration of non-recyclable waste. The facility exports the electricity generated to the national grid which is then freely available via the conventional electricity providers. The facility can also generate waste heat which can be utilised locally via heating water mains. This offers potential for the shell area to be space heated and/or cooled via this medium. The constituent parts for any energy centre can be maximised via the use of biomass fuelled CHP or gas fired CHP (profile dependant) to offer heating and electric supply. It should be considered that the Ardley ERF is local to the site and already offers waste recovery electrical supply.

If district heating mains are available from the Ardley ERF, there is potential for the shell area to be space heated and/or cooled via this medium. Heating could be provided using wet heating coils, mounted within air handling units, to deliver heated air into the shell area. Cooling could be provided via the use of absorption chillers which convert heating water into chilled water. The chiller then serves wet cooling coils, again mounted in an air handling unit, to deliver cooled air to the shell area.

The office spaces are currently proposed to be heated and cooled via an air source heat pump system which represents the most practical system for this size and type of space. Integration to a heat network is not possible for this type of system so the office spaces will not benefit

from any heat network. The efficiency of the air source heat pumps system can still achieve very good efficiency ratings, so we don't assess this non interface potential as a negative.

At this current outline stage, the shell space in the employment units have potential for a wide range of heating demand, down to and including no heating demand. This makes the feasibility of connection to a local heat network, whether private or public, very difficult to assess. On the predicted basis that the majority of shell area in the employment units will either be unheated, or frost protected, the provision and connection to of a decentralised heat network would be unfeasible at this current time.

To facilitate the potential for future heat network delivery however, the buildings could be provided with service ducts capable of supporting the routing of heating mains from the site boundary to the building. This means a clear and unobstructed below ground service strip finishing in service ducts routing through the ground floor slab into the employment unit.

Below shows the location of both the Ardley ERF and the new development.

Figure 2: Location of Ardley ERF with respect to the location of the new employment development

6. BREEAM NEW CONSTRUCTION SCHEME 2018

Under Policy ESD 3, the new development is required to achieve a BREEAM NC 2018 rating of at least 'Very Good'. The BREEAM UK New Construction scheme (Building Research Establishment Environmental Assessment Method) is an environmental performance standard which new, non-domestic buildings in the UK can be assessed against. Within the scheme, there are rating benchmarks that a building may achieve through good or best practice, these ratings are:

BREEAM RATING	% SCORE
Outstanding	≥ 85
Excellent	≥ 70
Very Good	≥ 55
Good	≥ 45
Pass	≥ 30
Unclassified	< 30

Each rating represents performance equivalent to:

- Outstanding: Less than the top 1% of UK new non-domestic buildings (innovator)
- Excellent: Top 10% of UK new non-domestic buildings (best practice)
- Very Good: Top 25% of UK new non-domestic buildings (advanced good practice)
- Good: Top 50% of UK new non-domestic buildings (intermediate good practice)
- Pass: Top 75% of UK new non-domestic buildings (standard good practice)

How a building achieves any of the above ratings is by assessing how it is managed, constructed and operated. This is broken down into categories, which are:

- Management,
- Health and Wellbeing,
- Energy,
- Transport,
- Water,
- Materials,
- Waste,
- Land Use and Ecology, and
- Pollution

Another category is 'Innovation', though it is optional. Each category includes criteria a building may meet to achieve one or more credits. These credits will add up to score an overall BREEAM rating.

For this development, the thirteen units are targeting to achieve a BREEAM 2018 rating of 'Very Good'. It is suggested that this development's BREEAM NC 2018 Pre-Assessment shall account for the following…

- Material efficiency
- Use of recycled & sustainably sourced aggregates
- Construction waste management (construction resource efficiency)
- Reduction of energy use & carbon emissions
- Energy monitoring
- Low carbon design
- Water consumption

In specific response to the items set out in Policy ESD 3, the appropriate BREEAM credits to be targeted are:

ITEM	ASSOCIATED AND TARGETED BREEAM CREDIT FOR POLICY ESD 3
Maximising resource efficiency	Mat 06 – Material Efficiency Wst 01 – Construction Waste Management Wat 01 – Water consumption
Incorporating the use of recycled and energy efficient materials	Wst 02 – Use of recycled and sustainably sourced aggregates Mat 01 – Environmental impacts from construction products – Building Life Cycle Assessment
Incorporating the use of locally sourced building materials	Mat 3 – Responsible sourcing of construction materials
Reducing the impact on the external environment and maximising opportunities for cooling and shading (by provision of open space and water, planting, and green roofs, for example); and	Hea 07 – Safe and healthy surroundings Land use and Ecology Section
Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment	Mat 06 - Material Efficiency Wst 06 – Design for disassembly and adaptability

7. CONCLUSION

The aim of minimising building energy usage, carbon emissions and embodied carbon shall be met by employing the design strategy described in this report. The extent to how energy efficient each building is shall focus on complying with…

- Building Regulation's ADL2A and Policies ESD 1, 2, 4 & 5 (in terms of carbon emissions and energy efficiency),
- and Policy ESD 3 (in terms of BREEAM Rating of 'Very Good')

The proposed details of the employment units' energy efficiency and sustainability will be presented at reserved matters stage.