Energy Statement

Land South of Green Lane, Chesterton OX26

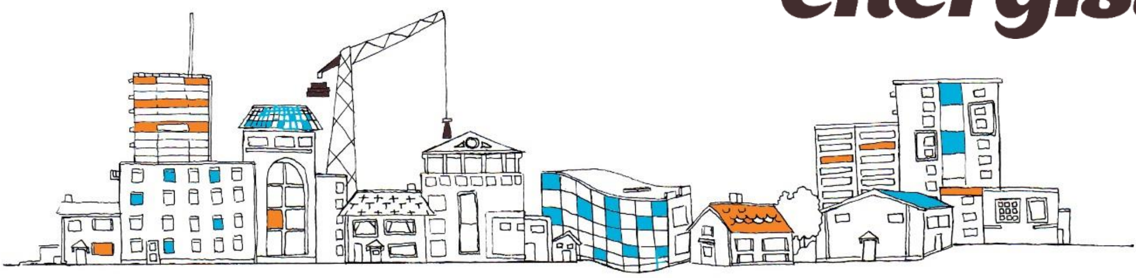
On behalf of Wates Developments

WA.GL.OX26-0

Revision 03

Date: 24th April 2023

energist®



REVISION HISTORY

Revision	Issue Date	Description	Issued By	Checked By
R00	13/09/2022	Original Document	MC	RP
R01	21/10/2022	Amendments following comments	TW	
R02	16/11/2022	Amendments following comments	TW	
R03	24/04/2023	Reduction of 100% CO_2 emissions	TW	

All advice provided by Energist regarding the performance of materials is limited solely to the purposes of demonstrating compliance with the Energy Statement. The performance of materials under other criteria, including but not limited to fire, structural, acoustics are not considered in our advice. It is the responsibility of the client to ensure the wider suitability of materials specified in our assessments.

Calculations contained within this report have been produced based on information supplied by the Client and the design team. Any alterations to the technical specification on which this report is based will invalidate its findings.

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1. EXECUTIVE SUMMARY

This Energy Statement has been produced by Energist UK on behalf of Wates Developments ('the Applicant').

It will set out the measures planned by the Applicant to achieve energy reductions at the proposed development site: Land South of Green Lane, Chesterton ('the Development') demonstrating compliance with:

i) National Planning Policy Framework.
ii) Approved Document Part L of the Building Regulations 2021
iii) The withdrawn draft local planning policy requirements for Oxfordshire County Council to meet:

- Policy Option 01: Sustainable Design and Construction

  The objective to achieve net zero whole-life carbon for both residential and non-residential buildings, taking account of embodied carbon, low energy use and renewable energy supply.

  Developments should be fossil fuel free and fossil fuels should not be used to provide space heating, hot water or fuel for cooking. Demand for energy should be balanced by the provision of on-site renewable energy generation. Carbon offsetting would only be permitted where it is demonstrable that net zero carbon cannot be achieved on site.

  Residential and non-residential buildings should be designed and built to maximise the use of natural or recycled material in construction and to enable disassembly at the end of a building's life in accordance with circular economy principles.

- Policy Option 02: Energy

  Target for 100% of energy needs for major developments to be met from renewable energy sources.

- Policy Option 03: Water Efficiency

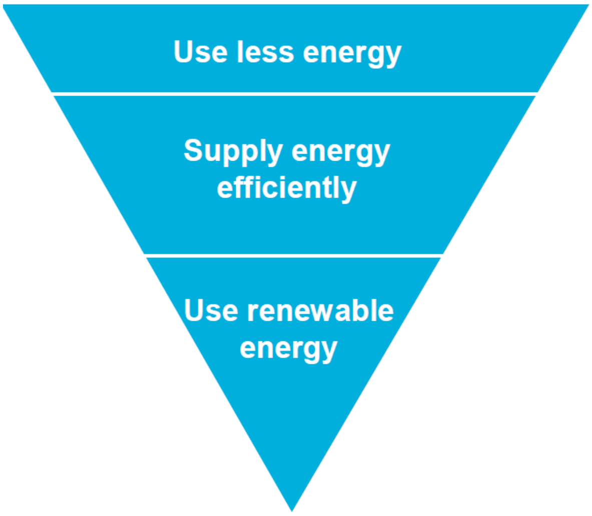
  The Oxfordshire Plan would seek to require the most ambitious minimum water efficiency standards possible for new development.

  For residential development, this would include exploring the potential to go beyond the current optional requirement of 110 litres per person per day. (For example, RIBA 2030 Climate Challenge Targets of 75 litres per person per day.)

The Draft Oxfordshire Plan 2050 was due to be a joint plan for the six Oxfordshire Authorities (including Cherwell District Council). Unfortunately, the Authorities were unable to reach an agreement on the approach to the future housing need therefore the plan has been abandoned. Each Local Authority will now progress with their own Local Plan Updates.

Please also refer to Appendix 2 for the policy details relating to Cherwell Local Plan 2011-2031.

The Energy Statement sets out how design measures will be incorporated as part of the Development, aligning with the principles of the energy hierarchy.



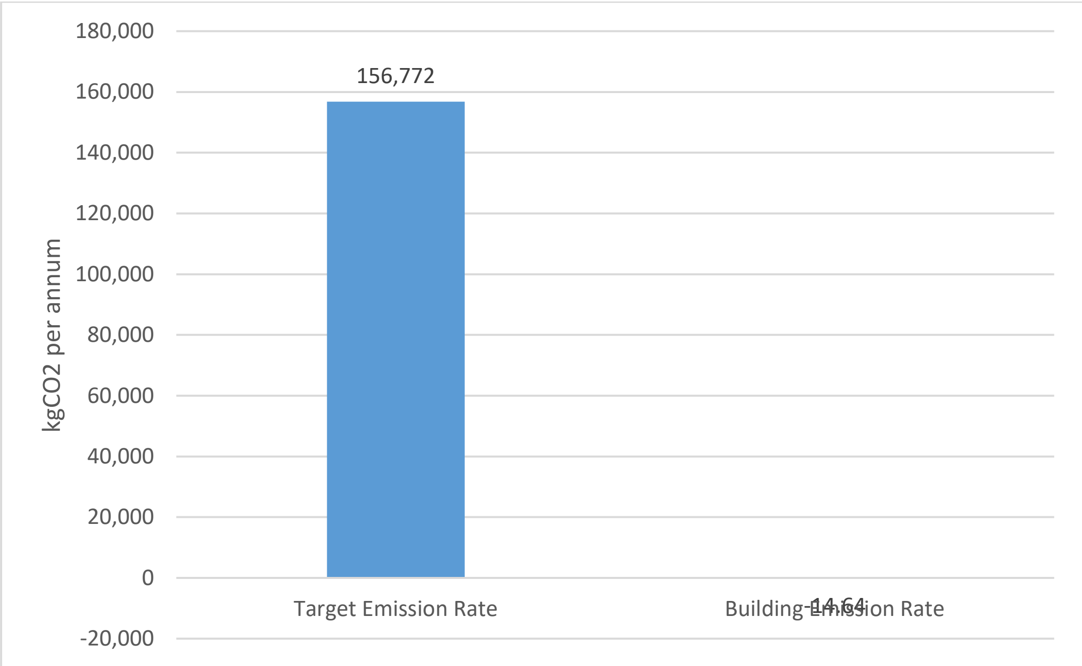
The Energy Statement concludes that the following combination of measures, summarised overleaf in Table 1, will be incorporated into the Development demonstrating how the energy standard will be delivered by the Applicant.

Table 1: Measures incorporated to deliver the energy standard.

Fabric first: Demand-reduction measures	▪ Energy-efficient building fabric and insulation to all heat loss floors, walls and roofs. ▪ High-efficiency triple-glazed windows throughout. ▪ Quality of build will be confirmed by achieving good air-tightness results throughout. ▪ Efficient-building services including high-efficiency heating systems. ▪ Natural ventilation ▪ Low-energy lighting throughout the development.
Low-carbon & renewable energy	▪ Air-source heat pump with a CoP of 170% ▪ Photovoltaic panels across the development totalling 665kWp

The impact of these design measures in terms of how the Applicant delivers the energy standard is illustrated in Figure 1:

Figure 1: How the Development meets the energy standard ADL2021 (Residential)



The calculated reduction in CO_2 emissions and the percentage reduction in CO_2 over ADL 2021 is demonstrated in Table 2.

Table 2: CO_2 emissions and percentage reduction over ADL2021 (Residential)

	CO_2 emissions	
	Kg/CO_2 per annum	% reduction
Target Emission Rate: Compliant with ADL 2021	156,772	-
Low-carbon & Renewable Energy	-14.64	101%
Total savings	**156,786**	**101%**

2. INTRODUCTION

2.1 Site Description

This Energy Statement has been prepared for the residential development at Land South of Green Lane, Chesterton. This falls under the jurisdiction of Oxfordshire County Council.

The proposed Development consists of an outline planning application for up to 147 homes, public open space, flexible recreational playing field area and sports pitches with associated car parking, alongside landscaping, ecological enhancements, SuDs, green / blue and hard infrastructure, with vehicular and pedestrian/cycle accesses, and all associated works (all matters reserved except for means of access)"

Map 1: Illustrative Masterplan for the development at Land South of Green Lane, Chesterton.

Source: ACG Architects (Dwg No: 353-ACG-XX-OO-DR-A-1050 - Masterplan Layout)

2.2 Purpose of the Energy Statement

This Statement sets out how the Applicant intends to meet:

iv) National Planning Policy Framework.
v) Approved Document Part L of the Building Regulations 2021
vi) The withdrawn draft local planning policy requirements for Oxfordshire Council to meet:

- Policy Option 01: Sustainable Design and Construction

  The objective to achieve net zero whole-life carbon for both residential and non-residential buildings, taking account of embodied carbon, low energy use and renewable energy supply.

  Developments should be fossil fuel free and fossil fuels should not be used to provide space heating, hot water or fuel for cooking. Demand for energy should be balanced by the provision of on-site renewable energy generation. Carbon offsetting would only be permitted where it is demonstrable that net zero carbon cannot be achieved on site.

  Residential and non-residential buildings should be designed and built to maximise the use of natural or recycled material in construction and to enable disassembly at the end of a building's life in accordance with circular economy principles.

- Policy Option 02: Energy

  Target for 100% of energy needs for major developments to be met from renewable energy sources.

- Policy Option 03: Water Efficiency

  The Oxfordshire Plan would seek to require the most ambitious minimum water efficiency standards possible for new development.

  For residential development, this would include exploring the potential to go beyond the current optional requirement of 110 litres per person per day. (For example, RIBA 2030 Climate Challenge Targets of 75 litres per person per day.)

For a detailed overview of the planning policy requirements specific to this development, refer to Appendix 2.

The way in which the Applicant meets the energy standard at Land South of Green Lane, Chesterton will be set out in this Statement as follows:

- **Baseline energy demand**: The Development's Target Emission Rate (TER) will be calculated to establish the minimum on-site standard for compliance with ADL 2021.

- **DER – reduced energy demand and low-carbon and renewable energy:** The Development's Dwelling Emission Rate (DER) will be calculated to explain how the Applicant's design specification will lead to a reduced energy demand and an improved fabric energy efficiency. The better the design of the building fabric in terms of, for example, insulation, air tightness and orientation to maximise solar gain, the less energy required to heat the dwelling and so the better the fabric energy efficiency. Low-carbon and renewable energy technologies will be assessed for their suitability and viability in relation to the Development. Solutions will be put forward for the development and the resulting CO_2 emission savings presented.

2.3 Methods

Energist UK has used SAP10.2 methodology to calculate the energy demand for 14 sample proposed residential dwellings.

The data has then been extrapolated and calculated to accurately reflect the expected CO2 emission rates and energy demand for all proposed dwellings included in the development application for this site.

3. BASELINE ENERGY DEMAND

3.1 Introduction

In order to measure the effectiveness of demand-reduction measures, it is first necessary to calculate the baseline energy demand which has been done using SAP10.2. This can also be referred to as the Target Emission Rate (TER.)

The resulting ADL 2021 Baseline for Land South of Green Lane, Chesterton has been calculated using Part L model designs which have been applied to the Applicant's Development details. The baseline energy demand, represents the maximum $kgCO_2$ emissions permitted for the Development in order to comply with ADL 2021.

3.2 The Development Baseline

The resulting **TER** for the dwellings, representing the total maximum CO_2 emissions permitted for the Development, has been calculated as **156,772kg/CO_2 per annum**. To ensure compliance with ADL2021, CO_2 emissions should not exceed this figure.

4. FABRIC-FIRST APPROACH - REDUCED ENERGY DEMAND

4.1 Introduction

Many Local Planning Authorities are now recognising the benefits of a fabric-first approach, where the lifetime energy consumption of a building takes precedence over the use of bolt-on renewable energy technologies.

It is clear that the fabric-first approach can create buildings with a very comfortable living and working environment. The internal temperature is consistent and fuel bills are kept to a minimum. One key advantage of a fabric-first approach is that it does not require changes to the behavioural patterns of the occupants and, as such, a building designed using a fabric-first approach will often perform more effectively once completed than a building that incorporates a low-carbon or renewable-energy technology that requires behavioural change (e.g., solar thermal). This becomes an increasingly important consideration as energy costs rise and the issue of fuel poverty becomes commonplace.

Energist UK has considered a fabric-first approach as the priority solution for this Development as it can be shown that the energy standard required to achieve the Target Emission Rate of Approved Document L (2021) at Green Lane, Chesterton development can be exceeded through the use of efficient building fabric and building services.

4.2 The Development - Reduced Energy Demand

The Applicant will integrate the following design measures to reduce energy demand:

- Energy-efficient building fabric and insulation to all heat loss floors, walls and roofs.
- High-efficiency triple-glazed windows throughout.
- Quality of build will be confirmed by achieving good air-tightness results throughout.
- Efficient-building services including high-efficiency heating systems.
- Natural Ventilation
- Low-energy lighting throughout the building.

The Applicant's design specification and intended demand-reduction measures for the Development have been modelled using the same SAP10.2 methodology as before.

Table 3. The fabric-first design specification at Land South of Green Lane, Chesterton.

Element	L1A Design Specification (Residential)
Ground Floor U-Value (W/m².K)	0.1
External Wall U-Value (W/m².K)	0.18
All Roof types – U-Value (W/m².K)	0.1
Glazing U-Value – including Frame (W/m².K)	1.0
Glazing G-Value	0.63
Door Glazing U-Value – including Frame (W/m².K)	1.0
Design Air Permeability	5.0
Space Heating	Air Source Heat Pump (CoP: 170%)
Heating Controls	Time and temperature Zoned controls to all plots
Domestic Hot Water	From main heating system with 250l cylinder
Ventilation	Natural Ventilation
Low Energy Lighting	5 Watts and 85 Lm/W
Thermal Bridging	Government Approved Details

5. LOW-CARBON AND RENEWABLE ENERGY

5.1 Introduction

The Applicant adopts a fabric-first approach as the priority solution for this Development and steps have been taken to reduce energy demand through high-quality sustainable design. The planned integration of efficient building fabric and building services has been modelled and is predicted to lead to an enhancement over Part L of the Building Regulations 2021.

The low-carbon and renewable energy solutions applicable to this development scheme are assessed and potentially viable solutions recorded.

Viability of the following low-carbon and renewable energy technologies have been considered:

- Wind
- Solar
- Aerothermal
- Geothermal
- Biomass

5.2 Wind	*The ability to generate electricity via a turbine or similar device which harnesses natural wind energy. This could be considered as an onsite solution to reducing carbon emissions (turbines included within the development), or offsite (investing financially into a nearby wind farm).*
Installation Considerations	▪ Wind turbines come in a variety of sizes and shapes. Turbines of 1 Kw can be installed to single house and large-scale turbines of 1-2 MW can be installed on a development to generate electricity to multiple dwellings and other buildings. In both instances the electricity generated can be used on site or exported to the grid. Vertical- or horizontal-axis turbines are available. ▪ A roof-mounted 1 kW micro wind system costs up to £3,000. A 2.5 kW pole-mounted system costs between £9,900 and £19,000. A 6 kW pole-mounted system costs between £21,000 and £30,000 (taken from the Energy Saving Trust, TBC by supplier) ▪ Local average wind speed is a determining factor. A minimum average wind speed of 6 m/s is required. ▪ Noise considerations can be an issue dependent on density and build-up of the surrounding area. ▪ Buildings in the immediate area can disrupt wind speed and reduce performance of the system. ▪ Planning permission will be required along with suitable space to site the turbine, whether ground installed, or roof mounted.
Advantages	▪ Generation of clean electricity which can be exported to the grid or used onsite. ▪ Can benefit from the Feed in Tariff, reducing payback costs.
Disadvantages	▪ Planning restrictions and local climate often limit installation opportunities. ▪ Annual maintenance required. ▪ High initial capital cost. It is usual for an investor to consider a series of turbines to make the investment financially sound.
Development feasibility	▪ Installing a large turbine in an area such as this is not considered to be appropriate due to its appearance and physical impact on the built-up environment. Residents' and neighbours' concerns may include the look of the turbine, the

hum of the generator and the possibility of stroboscopic shadowing from the blades on homes.

- Wind speed has been checked for the development scheme using the NOABL wind map: http://www.rensmart.com/Weather/BERR. The wind speed at ten metres for the development scheme is 3.8 metres per second (m/s) which is (below) the minimum of 5 m/s and threshold for technical viability.

- Typical payback times for a single turbine are expected to be greater than 15 years which means that the cost of installing and maintaining a single wind turbine is not considered a commercially-viable option.

5.3 Solar PV and Solar Thermal

The ability to generate energy (either electricity, hot water, or a combination of the two) through harnessing natural solar energy. This could include the use of solar thermal panels, photovoltaic (PV) panels, or a combined solution. PV panels, similarly, to turbines, can be considered both on and offsite.

Solar Photovoltaics convert solar radiation into electricity which can be used on site or exported to the national grid.

Solar Thermal generates domestic hot water from the sun's radiation. Glycol circulates within either flat plate or evacuated tube panels, absorbing heat from the sun, and transferring this energy to a water cylinder. A well designed solar thermal system will account for 50-60% of a dwelling's annual hot water demand. Sizing the system to meet a higher demand will lead to excess heat generation in the summer months and overheating of the system.

Installation considerations

- Operate most efficiently on a south-facing sloping roof (between 30 and 45-degree pitch.)
- Shading must be minimal (one shaded panel can impact the output of the rest of the array.)
- Panels must not be laid horizontally on a flat roof as they will not self-clean. Panels will therefore need to be installed at an angle and with appropriate space between them, to avoid over-shading.
- Large arrays may require upgrades to substations if exporting electricity to the grid.

	▪ Local planning requirements may restrict installation of panels on certain elevations. ▪ Installation must consider pitch and fall of the roof, along with any additional plant on the roof to ensure there is sufficient room. ▪ The average domestic solar PV system is 4kWp and costs £5,000 - £8,000 (including VAT at 5 per cent) - (taken from the Energy Saving Trust, TBC by supplier.)
Advantages	▪ Relatively straightforward installation, connection to landlord's supply and metering. ▪ Linear improvement in performance as more panels are installed. ▪ Maintenance free. ▪ Installation costs are continually reducing. ▪ Can benefit from the Feed in Tariff to improve financial payback.
Disadvantages	▪ Not appropriate for high-rise developments, due to lack of roof space in relation to total floor area. ▪ With Solar Thermal, performance is limited by the hot water demand of the building – system oversizing will lead to overheating.
Development feasibility ✓	▪ The suitability of solar panels has been considered for this Development and are concluded as a technically-viable option. ▪ There are potential areas of roof space suitable for the positioning of unshaded solar PV arrays. ▪ The Development is not on land, which is protected or listed, so it is considered that solar panels would not have a negative impact on the local historical environment or the aesthetics of the area. ▪ The commercial viability of Solar PV or Solar Thermal would need to be fully explored if considered part of an Energy Strategy as the economical investment would need to be justified by the return on the Applicant's investment.

5.4 Aerothermal	*The transfer of latent heat in the atmosphere to a compressed refrigerant gas to warm the water in a heating system. This includes air to water heat pumps and air conditioning systems.* Air Source Heat Pumps (ASHPs) extract heat from the external air and condense this energy to heat a smaller space within a dwelling or non-domestic building. A pump circulates a refrigerant through a coil to absorb energy from the air. This refrigerant is then compressed to raise its temperature which can then be used for space heating and domestic hot water. They can feed either low-temperature radiators or underfloor heating and often have electric immersion heater back-up for the winter months.
Installation Considerations	▪ ASHPs operate effectively in buildings with a low energy demand, as they emit low levels of energy suitable for maintaining rather than dramatically increasing internal temperatures. It is therefore vital that the dwelling has a low heating demand to ensure the system can provide appropriate space-heating capability. ▪ Underfloor heating will give the best performance, but oversized radiators can also be used. ▪ Immersion heater back-up required to ensure appropriate Domestic Hot Water (DHW) temperature in winter months. ▪ Noise from the external unit can limit areas for installation. ▪ £7,000-£11,000 per dwelling (taken from the Energy Saving Trust, TBC by supplier.)
Advantages	▪ Air source systems are a good alternative solution to providing heating and hot water to well-insulated, low heat loss dwellings. ▪ They require additional space when compared to a gas boiler. Space for an external unit is needed, as is space for the hot water cylinder and internal pump. ▪ Heat pumps are generally quiet to run. ▪ Running costs between heat pumps and modern gas boilers are comparable. ▪ Heat pumps are a low energy heating solution and are encouraged as part of the Future Homes Standard package of regulations changes which are being implemented in England over the next few years.

Disadvantages	▪ Residents need to be made aware of the most efficient way of using a heat pump, as the low flow rates used by such a system means that room temperature cannot be changed as reactively as a conventional gas or oil boiler system. ▪ Will not perform well in homes that are left unoccupied and unheated for a long period of time. ▪ Back-up immersion heating can drastically increase running costs. ▪ Noise and aesthetic considerations limit installation opportunities.
Development feasibility ✓	▪ ASHPs are considered a technically viable option for this development scheme. ▪ The costs of installing an ASHP, compared to the costs of installing an A-rated boiler, are higher which means there is a capital-cost implication to consider. ▪ Additional space is required for larger internal units, incorporating hot water cylinders, and also outside to install the condenser unit.

5.5 Geothermal

The transfer of latent heat from the ground to a compressed refrigerant gas to warm the water in a heating system. This includes ground source heat pumps. Heat can be collected through the use of either horizontally laid or vertically installed coils.

Ground Source Heat Pumps (GSHPs) operate on the same principle as an Air Source Heat Pump (ASHP) in that they extract heat from a source (in this instance the ground) and compress this energy to increase temperature for space heating and hot water. Pipework is installed into the ground, either through coils or in bore holes and piles, circulating a mix of water and antifreeze to extract energy from the ground, where the year-round temperature is relatively consistent (approx. 10℃ at 4 metres depth). This leads to a reliable source of heat for the building.

Again, an electrically powered pump circulates the liquid and powers the compressor, however annual efficiencies for GSHPs tend to be higher than those of ASHPs.

Installation considerations	▪ Require appropriate ground conditions to sink piles/bore holes or excavate for coils (which also require a large area of land.) ▪ Decision between coils or piles can lead to significant extra cost. ▪ Need to consider whether low temperature output is fed through underfloor heating (most efficient) or oversized radiators. ▪ Similar to ASHPs, perform best in well-insulated buildings with a low heating demand. ▪ Electric immersion heater required for winter use. ▪ £11,000-£15,000 per dwelling dependent on the size of the system (taken from the Energy Saving Trust, TBC by supplier.)
Advantages	▪ Perform well in well-insulated buildings, with limited heating demand. ▪ More efficient than ASHPs.
Disadvantages	▪ The coils can be damaged by natural earthworks and by intensive gardening practices – occupants would need to be aware of the location of the coils for this system, and how to operate the system efficiently. Coils may also be damaged within the dwelling where the circuit is connected to the internal unit. ▪ Will not perform well in buildings that are left unoccupied and unheated for a long period of time. ▪ Back up immersion heating can drastically increase running costs. ▪ Large area of ground needed for coil installation.
Development feasibility ✘	▪ GSHPs are not considered a technically viable option for this development scheme as there are no physical constraints in terms of ground conditions and area available for installation. ▪ The capital installation cost would, however, be high which leads us to the conclusion that GSHPs would not be a commercially viable option for this development scheme.

5.6 Biomass	*Providing a heating system fuelled by plant-based materials such as wood, crops, or food waste.* Biomass boilers generate heat for space heating and domestic hot water through the combustion of biofuels, such as woodchip, wood pellets or potentially biofuel or bio diesel. Biomass is considered to be virtually zero carbon. They can be used on an individual scale or for multiple dwellings as part of a district-heating network. A back-up heat source should be provided as consistent delivery of fuel is necessary for continued operation.
Installation considerations	▪ Biomass boilers are larger than conventional gas-fired boilers and also require what can be significant storage space for the fuel source. This needs to be considered at planning stage to ensure an appropriate plant room can be provided. ▪ Flue required to expel exhaust gases – design needs to be in line with the requirements of the Building Regulations. ▪ Need to consider whether fuel deliveries will be reliable and consistent to the location of the site (especially relevant in rural areas) and whether the plant room can be easily accessed by the delivery vehicle. ▪ £9,000-£21,000 per dwelling dependent on size (taken from Energy Saving Trust, TBC by Supplier).
Advantages	▪ Considerable reduction in CO_2 emissions.
Disadvantages	▪ Limited reduction in running costs compared to A-rated gas boilers, but at a substantially higher up-front cost. ▪ Plant room space required for boiler and storage. ▪ Dependent on consistent delivery of fuel. ▪ Ongoing maintenance costs (need to be cleaned regularly to remove ash.)

Development Feasibility ✗	▪ Biomass is considered a technically viable option for this development scheme as there are no apparent physical constraints on site in terms of installing biomass boilers or storing a sufficient supply. ▪ There are, however, concerns regarding a sustainable supply of biomass to the site. ▪ The capital installation cost would, however, be high which leads us to the conclusion that biomass would not be a commercially viable option for this development scheme.

5.7 Viable Technologies

The following low-carbon and renewable energy technologies, summarised here in Table 4, are considered potentially viable options for the residential development at Land South of Green Lane, Chesterton.

Table 4: Summary of Feasibility for Land South of Green Lane, Chesterton.

✓	Air Source Heat Pumps Solar Thermal Solar PV
✗	Ground Source Heat Pumps Wind Turbines Biomass Boilers

The Applicant has opted to install Air-source Heat Pump with a CoP of 170% across the residential element of the development and a PV installation 655kWp across the development ensuring a total reduction for the residential dwellings of -14.64Kg/CO_2 or 101%.

6. CONCLUSIONS

The Applicant demonstrates commitment to delivering the energy standard at Land South of Green Lane, Chesterton:

- The Development has been designed to generate a total reduction in CO_2 emissions of **101%** compared to the TER ADL 2021.

- This energy standard is delivered through a fabric-first approach to design with low-carbon measures and renewable energy.

  A combination of demand-reduction measures, energy-efficiency measures low-carbon heating and renewable energy will deliver the Applicant's target for on-site reduction in CO_2 emissions.

The following measures, summarised here in Table 5, are incorporated in the development proposals.

Table 5. Measures incorporated to deliver the energy standard.

Fabric first: Demand-reduction measures	▪ Energy-efficient building fabric and insulation to all heat loss floors, walls and roofs. ▪ High-efficiency triple-glazed windows throughout. ▪ Quality of build will be confirmed by achieving good air-tightness results throughout. ▪ Efficient-building services including high-efficiency heating systems. ▪ Natural ventilation ▪ Low-energy lighting throughout the development.
Low-carbon & renewable energy	▪ Air-source heat pump with a CoP of 170% ▪ Photovoltaic panels across the development totalling 665kWp

The way in which these design measures deliver the Applicant's commitment to the energy standard is illustrated in Figure 2 and Table 7 overleaf.

Figure 2: How the Development delivers the energy standard.

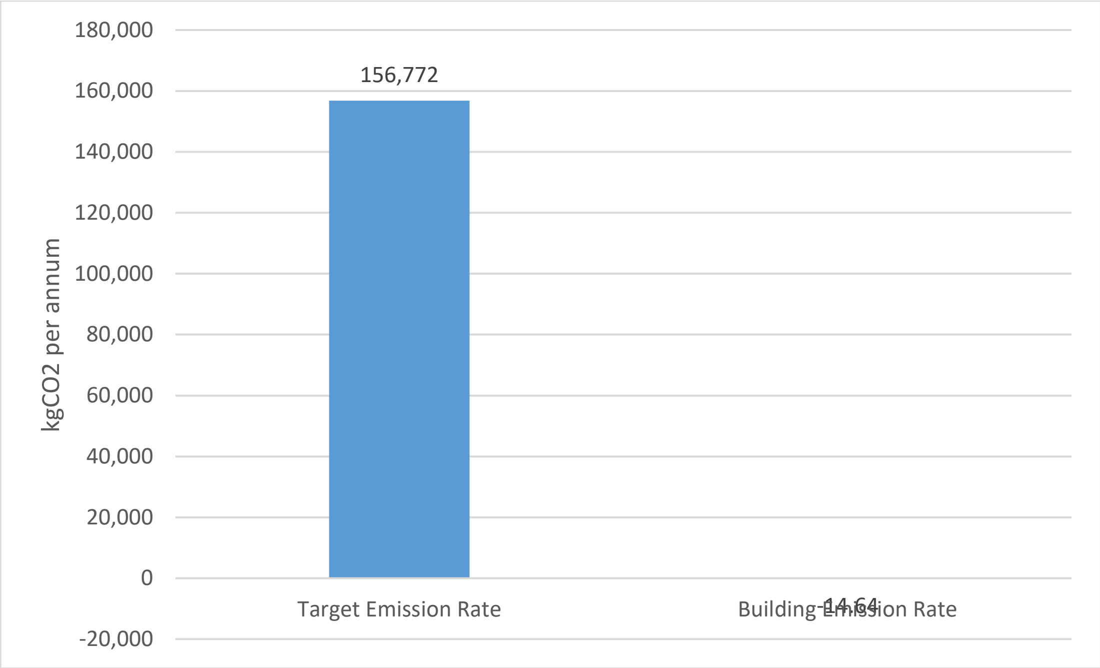


Table 7: How the Development reduces CO_2 emissions.

	CO_2 emissions	
	Kg/CO_2 per annum	% reduction
Target Emission Rate: Compliant with ADL 2021	156,772	-
Low-carbon & Renewable Energy	-14.64	101%
Total savings	**156,786**	**101%**

7. APPENDICES

APPENDIX 1: LIST OF ABBREVIATIONS

ADL 2021	Approved Document Part L 2021
ASHP	Air Source Heat Pump
CHP	Combined Heat & Power
DER	Dwelling Emission Rate
DHN	District Heat Network
DHW	Domestic Hot Water
ESCO	Energy Services Company
GSHP	Ground Source Heat Pump
LPA	Local Planning Authority
PV	Photovoltaics
SAP	Standard Assessment Procedure
TER	Target Emission Rate

APPENDIX 2: PLANNING POLICY AND DESIGN GUIDANCE

The Climate Change Act (2008)
Passed in November 2008, the Climate Change Act mandated that the UK would reduce emissions of six key greenhouse gases, including Carbon Dioxide, by 80% by 2050. As a consequence, the reduction of carbon dioxide emissions is at the forefront of National, Regional and Local Planning Policy, along with continuing step changes in performance introduced by the Building Regulations Approved Document L (2021).
National Planning Policy Framework (2021)
The National Planning Policy Framework encourages Local Planning Authorities to '*support the transition to a low carbon future in a changing climate, taking full account of flood risk and costal change' (*NPPF paragraph 152), *'whilst taking a proactive approach to mitigating and adapting to client change, taking into account the long-term implication for flood risk, costal change, water supply, biodiversity and landscapes, and the risk of over shading from rising temperatures'.* (NPFF Paragraph 153). Paragraph 155, upholds the requirement for Local Plans to: *'To help increase the use and supply of renewable and low carbon energy and heat, plans should: a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts); b) consider identifying suitable areas of renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for collocating potential heat customers and suppliers.'* In paragraph 157, NPPF stipulates that local planning authorities should take account of the benefits of decentralised energy and passive design measures as a means of energy efficiency in new development: *'In determining planning applications, local planning authorities should expect new development to: a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.'*

Withdrawn Draft Oxfordshire Local Plan 2050
Policy Option 01: Sustainable Design and Construction To include in the Oxfordshire Plan a policy setting out sustainable design and construction requirements to be applied to major residential and non-residential developments within Oxfordshire. This policy would be subject to viability and deliverability testing but with the objective to achieve net zero whole-life carbon for both residential and non-residential buildings, taking account of embodied carbon, low energy use and renewable energy supply. Developments should be fossil fuel free and fossil fuels should not be used to provide space heating, hot water or fuel for cooking. Demand for energy should be balanced by the provision of on-site renewable energy generation. Carbon offsetting would only be permitted where it is demonstrable that net zero carbon cannot be achieved on site. A financial contribution based on defined calculation would be made to carbon offsetting projects including off-site renewable energy generation or carbon sequestration consistent with defined natural capital and nature recovery approaches defined in the Plan. Buildings should be designed to be resilient to the effects of a changing climate, including overheating. New buildings should be designed to be durable but flexible and adaptable to changing needs over time. Residential and non-residential buildings should be designed and built to maximise the use of natural or recycled material in construction and to enable disassembly at the end of a building's life in accordance with circular economy principles. **Policy Option 02: Energy** The Oxfordshire Plan would seek to minimise energy demand and maximise the use of renewable energy, where viable, meeting all demands for heat and power without increasing carbon emissions. Target for 100% of energy needs for major developments to be met from renewable energy sources. Developments would be required to maximise energy efficiency whilst integrating renewable and smart energy technologies in order to minimise energy demand. Installation and integration of these technologies should be delivered at the development stage to avoid more costly retrofitting after completion.

The Oxfordshire Plan would support the delivery of strategic and community scale renewable energy schemes, particularly where their establishment can support development and the transition to a smart, local energy system for Oxfordshire.

Policy Option 03: Water Efficiency

The Oxfordshire Plan would seek to require the most ambitious minimum water efficiency standards possible for new development.

For residential development, this would include exploring the potential to go beyond the current optional requirement of 110 litres per person per day. (For example, RIBA 2030 Climate Challenge Targets of 75 litres per person per day.)

For non-residential development, this would include exploring the potential to set minimum water efficiency standards for some uses. (For example, RIBA 2030 Climate Challenge Targets or BREEAM standards.)

The Oxfordshire Plan would also require development at strategic growth locations to maximise water efficiency through the delivery of community-scale rainwater harvesting and grey water recycling schemes.

It would be important for the Oxfordshire Plan to provide flexibility to adapt to any new, more ambitious water efficiency standards that may be introduced or become achievable over the plan period.

Cherwell Local Plan 2011 - 2031

Policy ESD 1: Mitigating and Adapting to Climate Change

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 Cherwell Local Plan 2011-2031 Part 1 85 Section B - Policies for Development in Cherwell 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 or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy).

The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:

- Taking into account the known physical and environmental constraints when identifying locations for development

- Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling
- Minimising the risk of flooding and making use of sustainable drainage methods, and
- Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).

Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

Policy ESD 2: Energy Hierarchy and Allowable Solutions
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.

Policy ESD 3: Sustainable Construction
All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy.
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 the achievement 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 Making use of sustainable drainage methods
- Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the 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.

Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an independent economic viability assessment can be undertaken. Where it is agreed that an economic viability assessment is required, the cost shall be met by the promoter.

Policy ESD 4: Decentralised Energy Systems
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 1000m2 floorspace.

The feasibility assessment should be informed by the renewable energy map at Appendix 5 'Maps' and the national mapping of heat demand densities undertaken by the Department for Energy and Climate Change (DECC) (see Appendix 3: Evidence Base).
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.

Policy ESD 5: Renewable Energy
The Council supports renewable and low carbon energy provision wherever any adverse impacts can be addressed satisfactorily. The potential local environmental, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications.
Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

- Landscape and biodiversity including designations, protected habitats and species, and Conservation Target Areas
- Visual impacts on local landscapes
- The historic environment including designated and non designated assets and their settings
- The Green Belt, particularly visual impacts on openness
- Aviation activities
- Highways and access issues, and
- Residential amenity.

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 in off-gas areas for 50 dwellings or more
- All applications for non-domestic developments above 1000m2 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. This may include consideration of 'allowable solutions' as Government Policy evolves.

APPENDIX 3: SAP RESULTS.

Dwelling Type	Target Emission Rate (Kg/CO2 per annum)	Low-carbon & Renewable Energy (Kg/CO2 per annum)
2B3P House East	5,686	-673
3B5P Semi E	9,167	-159
2B4P Semi N	10,799	-476
4B7P det NE	22,436	216
3B6P east	12,010	255
1B2P Flat TF	9,304	-23
2B3P House West	5,686	-541
2B4P Flat GF	9,787	-516
3B5P Detached N	9,912	-17
3B5P Semi N	8,933	84
4B7P det W	21,261	2,037
3B6P North	10,458	123
3B5P Detached W	10,138	-151
2B4P Semi W	11,193	-174

APPENDIX 4: TPER/DPER RESULTS ADL2021.

Dwelling Type	Target Primary Energy Rate	Dwelling Primary Energy Rate
2B3P House East	62.73	8.57
3B5P Semi E	57.27	5.92
2B4P Semi N	61.6	4.55
4B7P det NE	49.38	14.62
3B6P east	59.25	9.72
1B2P Flat TF	62.31	3.43
2B3P House West	62.73	9.98
2B4P Flat GF	66.78	4.6
3B5P Detached N	62.01	7.95
3B5P Semi N	55.76	7.4
4B7P det W	46.74	19.77
3B6P North	58.03	9.17
3B5P Detached W	63.49	7.6
2B4P Semi W	63.94	7.01

APPENDIX 5: WATER EFFICIENCY CALCULATION.

Part G Calculation

Green Lane , , Chesterton, OX26

Ref: WA.GL.OX26

Water efficiency calculation - Summary

Table A1: The water efficiency calculator

Installation type	Unit of measure	Capacity / Flow rate	Use factor	Fixed use (l/p/d)	Litres per person per day
WC (Dual flush) - Full flush	Flush volume (litres)	4.00	1.46	0	5.84
WC (Dual flush) - Part flush	Flush volume (litres)	2.60	2.96	0	7.70
Taps (Wet room basins)	Flow rate (litres / minute)	5.00	1.58	1.58	9.48
Baths	Capacity to overflow (litres)	165.0	0.11	0	18.15
Showers	Flow rate (litres / minute)	8.00	4.37	0	34.96
Taps (Kitchen and utility)	Flow rate (litres / minute)	6.00	0.44	10.36	13.00
Washing Machine	Litres / kilograms of dry load	8.17	2.10	0	17.16
Dishwashers	Litres / place setting	1.25	3.60	0	4.50
Waste Disposal	Litres per use	0	3.08	0	0.00
Water Softener	Litres / person / day	0.00	1.00	0	0.00

Total calculated use	110.8
Contribution from greywater	0.00
Contribution from rainwater	0.00
Normalisation factor	0.91
External water use	5.00
Total water consumption	105.8

Assessed by: in the Energist Technical Team on 8 Spt 2022.
Accreditation number: n/a

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Part G Calculation

Green Lane , , Chesterton, OX26

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Water efficiency calculation - Methodology compliance for Approved Document Part G

Assessment Criteria

Target methodology:	Part G Level 3	110.0 litres/person/day
Calculated:		105.8 litres/person/day
Compliance:		Yes

Fittings approach

As an alternative approach to calculating the water consumption, a fittings approach that is based on the water efficiency calculator methodology may be used.

Where the fittings approach is used, the water consumption of the fittings provided must not exceed the values in the following Table. If any value is exceeded, the water efficiency calculator must be completed to demonstrate compliance.

Similarly, where a shower is not to be provided, or where a waste disposal unit, a water softener or water re-use system is specified, the water efficiency calculator must be completed.

Part G (2015)* Table 2.2:

Maximum fittings consumption (optional requirement level)

Water fitting	Maximum consumption	Proposed	Notes
WC (Dual flush)	4 / 2.6 litres per flush	4 / 2.6	Within the requirement
WC (Single flush)	N/A		
Shower	8 litres per minute	8.0	Within the requirement
Bath	170 litres to overflow	165	Within the requirement
Basin taps	5 litres per minute	5.0	Within the requirement
Sink taps	6 litres per minute	6.0	Within the requirement
Dishwasher	1.25 litres per place setting	1.25	Within the requirement
Washing machine	8.17 litres per kilogram	8.17	Within the requirement

Summary

All fittings are equal to or less than the Maximum Fittings Consumption table.

* Includes 2016 amendments.

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Part G Calculation

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Water efficiency calculation - Tables

Table A2: Consumption calculator

Table A2.1: Taps (excluding kitchen and utility)

Tap fitting name	Flow rate litres / minute	Quantity	Total litres / minute
Basin Taps	5.0	2	10.0
	Totals	2	10.0
	Average flow rate		5.0
	Maximum flow rate		5.0
	Proportionate flow rate		3.5

Table A2.2: Baths

Bath fitting type	Capacity litres	Quantity	Total litres
Bath	165.0	1	165.0
	Totals	1	165.0
	Average capacity		165.0
	Maximum capacity		165.0
	Proportionate capacity		115.5

Table A2.3: Taps (kitchen and utility)

Tap fitting name	Flow rate litres / minute	Quantity	Total litres / minute
Kitchen Taps	6.0	1	6.0
	Totals	1	6.0
	Average flow rate		6.0
	Maximum flow rate		6.0
	Proportionate flow rate		4.2

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Water efficiency calculation - Tables

Table A2: Consumption calculator

Table A2.4: Dishwashers

Dishwasher type	Capacity (litres / place setting)	Quantity	Total (litres / place setting)
	1.25	1	1.25
	Totals	1	1.25
	Average litres per place setting		1.25
	Highest litres per place setting		1.25
	Proportionate litres per place setting		0.88

Table A2.5: Washing machines

Washing machine type	Capacity (litres / kg)	Quantity	Total (litres / kg)
None - Default assumed	8.17	1	8.17
	Totals	1	8.17
	Average litres per kg of dry load		8.17
	Highest litres per kg of dry load		8.17
	Proportionate litres per kg of dry load		5.72

Table A2.6: Showers

Shower fitting type	Flow rate (litres / minute)	Quantity	Total (litres / minute)
Showers	8.0	1	8.0
	Totals	1	8.00
	Average flow rate		8.00
	Maximum flow rate		8.00
	Proportionate flow rate		5.60

Table A2.7: WCs

WC type	Effective flush (litres)	Quantity	Total (litres)
Toilets	3.1	2	6.1
	Totals	2	6.12
	Average flow rate		3.06

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Part G Calculation

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Water efficiency calculation - Tables

Table A3: Water softener consumption calculation

Total capacity used by regeneration	0.0	%
Water consumed per regeneration	0.00	litres
Average number of regeneration cycles	0.00	per day
Number of occupants served by system	4	
Water consumed beyond 4%	0.00	litres/day
	0.00	l/p/d

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