JOSTEC

BUILDING REGULATIONS COMPLIANCE SERVICES

ENERGY STATEMENT

Glenwood, Harthall Lane, Kings Langley, WD4 8JN

JosTec Ref: 24129
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Prepared for: Kedgling Developments Ltd

Version: ES1

Contents

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1. Introduction

JosTec has been commissioned by Kedgling Developments Ltd to prepare an Energy Statement in support of the planning application for the proposed development at Glenwood, Harthall Lane. This development falls within the jurisdiction of the Three Rivers District Council. Therefore, must adhere to the policies in the Local Development Framework – Core Strategy.

Section CP1 requires applicants to demonstrate that their development will produce carbon dioxide emissions at least 25% lower than the Building Regulations Part L (2006) requirements. This must include a minimum of 10% of on-site renewable and/or low-carbon energy supply systems, such as Combined Heat and Power. The software used for the calculations, SAP 2012, has been updated from previous versions. Therefore, the client is required to achieve a 5% reduction in carbon emissions.

2. Planning Policy

2.1. National Policy - England

The Department Ministry of Housing, Communities & Local Government released the National Planning Policy Framework (NPPF) in March 2012. The latest revision was released in July 2021. The Government's objective is to streamline the process, encouraging sustainable development and promoting the needs and priorities of local communities.

This framework is to be used as the base by councils to develop their own local policy. Section 14 of the framework addresses climate change, flooding and coastal change. Considerations include:

- Minimising CO_2 emissions by providing 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).
- Consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure, where this would help secure their development A promotion of decentralised, low carbon and renewable energy sources wherever viable.
- Recognize opportunities for development to draw its energy supply from decentralised, renewable, or low-carbon energy supply systems and for co-locating potential heat customers and suppliers.

Local planning authorities should support community-led initiatives for renewable and low-carbon energy, including developments outside areas identified in local plans or other strategic policies being taken forward through neighbourhood planning.

In determining planning applications, local planning authorities should expect new developments too:

- 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
- Take account of landform, layout, building orientation, massing, and landscaping to minimise energy consumption.

2.2. Local Policy – Core Strategy (Adopted 17th October 2011)

CP1 Overarching Policy on Sustainable Development

All development in Three Rivers will contribute to the sustainability of the District. This means taking into account the need to:

a) Tackle climate change by reducing carbon emissions, increasing energy and water efficiency of buildings, promoting the use of renewable energy systems, and using other natural resources wisely, including through the use of sustainable building materials.

b) Avoid development in areas at risk from flooding.

c) Minimising flood risk through the use of Sustainable Drainage Systems.

d) Make efficient use of land by guiding development onto previously developed, brownfield land and incorporate mixed-use development wherever possible, recognising that some previously developed land can have significant biodiversity value.

e) Reduce waste going to landfill by reducing materials used, reusing and recycling building materials and providing opportunities for recycling wherever possible.

f) Protect and enhance our natural, built and historic environments from inappropriate development and improve the diversity of wildlife and habitats.

g) Build mixed and sustainable communities by providing housing across a range of tenures and types including affordable housing.

h) Maintain high levels of employment by attracting jobs and training opportunities for local people.

i) Improve access to jobs, skills, services and facilities particularly within areas of deprivation in the District.

j) Sustain the viability and vitality of the Principal Town, Key and Secondary Centres and Villages as identified in the Three Rivers Settlement Hierarchy.

k) Protect and enhance existing community, leisure and cultural facilities and provide new facilities.

l) Reduce the need to travel by locating development in accessible locations and promoting a range of sustainable travel modes.

m) Provide necessary infrastructure to enable and/ or support development, including (but not limited to) transport, education, health, green infrastructure, utilities, waste facilities, waste water, leisure, cultural and community facilities.

n) Promote buildings and public spaces of a high enduring design quality that respects local distinctiveness, is accessible to all and reduces opportunities for crime and anti-social behaviour.

o) Manage and reduce risk of and from pollution in relation to quality of land, air and water and dealing with land contamination.

Requirements for Applicants

Applications for all new residential development of one unit and above and for all new commercial development will be required to submit a 'CPLAN Energy and Sustainability Statement'8 demonstrating the extent to which sustainability principles have been incorporated into the location, design, construction and future use of proposals, and the expected carbon emissions.

Applicants should demonstrate that their development will produce at least 25% less carbon dioxide emissions than Building Regulations Part L (2006) requirements with a minimum of 10% being provided by on-site renewable and/or low carbon (i.e. Combined Heat and Power) energy supply systems.

In line with Government policy, where it can be proven that on-site renewable technology is not feasible, the Council will consider connection to a local, decentralised, renewable or low carbon energy supply as a substitute for on-site renewable energy technology.

The Council will set higher targets for carbon reduction and energy contributions from renewable sources in future in line with the Government's target for all new homes to be zero carbon by 2016 and non-domestic developments to be zero carbon by 2019. These targets will be set out in the forthcoming Development Management Policies Development Plan Document and will be informed by changes to national policy, the Council's Sustainability Action Plan 9 and the Low and Zero Carbon Study10.

Development will not be permitted unless it is demonstrated that sustainable development principles are satisfied through compliance with the policies of this Core Strategy and other relevant regional and national policy requirements.

2.3. Building Regulations – England Approved Document L

Approved document L1A – Conservation of Fuel and Power sets the standard for carbon emissions for new dwellings and was last revised in 2016 (Part L: 2013). Residential development will need to comply with the criteria set out in the document, as follows:

1. The predicted Dwelling Emission Rate of CO_2 emissions from dwellings (DER) are not greater than the Target Emission Rate (TER).

2. The predicted Dwelling Primary Energy Rate from dwellings (DPER) are not greater than the Target Primary Energy Rate (TPER)

3. The performance of the building fabric and fixed building services should be no worse than the design limits set out in the Approved Document.

4. The dwellings will have appropriate passive control measures to limit the effect of solar gains on indoor temperatures in summer.

5. That the performance of dwellings as built comply with the DER values achieved, including site testing of a representative sample of dwellings demonstrating that the 'air permeability' rate achieved is as per that specified, or better.

6. The necessary provisions for energy-efficient operation of dwellings are put in place, including operation and maintenance instructions aimed at achieving economy in the useof fuel and power in a way that householders can understand.

Compliance with the Approved Document Parts L1 should be demonstrated at the detailed design stage, prior to construction.

2.4. Assessment Methodology Domestic (SAP)

The Standard Assessment Procedure (SAP) is the official methodology endorsed by the Government for evaluating the projected energy consumption and carbon dioxide emissions of new constructions. The outcomes are determined based on the building's floor area and account for energy usage (kWh/m2/yr) as well as the associated CO2 emissions (kg.CO2/m2/yr). These calculations encompass the following factors:

- Space heating
- Domestic hot water
- Ventilation
- Lighting
- Ancillary pumps and fans
- Energy generating technology.

A trained and accredited Elmhurst Energy Assessor has used Elmhurst Design SAP 2012 (4.14r19) & SAP 10 software (Version: 1.7.44) to assess compliance and generate the necessary results data.

SAP calculations have been conducted for the intended residential dwelling, and the outcomes have been employed to ascertain the anticipated energy consumption and CO2 emissions for the entire development. An overview of the input data utilised in these calculations can be found in the Appendix. Furthermore, comprehensive SAP Calculations will be included in the Appendix to support these findings will be included in the Appendix as well.

A detailed fabric and systems specification has been based on information provided by Chris Jackson.

Figure 1. Sketch Up Model

3. Target Emission Rates

The following results are calculated using approved SAP 2012 software with minimum standards used to achieve Part L 2013 Building Regulations compliance, including a notional gas-fired system boiler to provide heating and hot water.

The 2013 Building Regulations referred to within South Oxfordshire Planning Policies are the Approved Document L1A 2012: Conservation of Fuel and Power – Edition 2013 incorporating 2016 amendments. For the ease of this document, we will refer to this as "Part L 2012 Building Regulations or ADL: 2012".

3.1. Baseline Calculation

The development is subject to 5% Carbon Emissions Reduction compared to the notional building described above. This is as per the latest Local Plan.

A fabric-first approach has been followed, incorporating passive design measures such as low u-values, low air leakage and low thermal bridging.

Active design measures have then been incorporated via energy-efficient building services, such as 100% low-energy lighting, and an air source heat pump.

We can now explore several options to reduce the Dwelling Emission Rates (DER) in order to comply with the Reading Borough Local Plan target requirements.

	ADL:2012 Emission Rate KG CO²/m²/year (TER/DER)	ADL:2012 Fabric Energy Efficiency kWh/m²/year (TFEE/DFEE)
House	15.19 / 12.79	64.00 / 44.47

	ADL:2012 Emission Rate KG CO²/m²/year (TER/DER)	ADL:2012 Fabric Energy Efficiency kWh/m²/year (TFEE/DFEE)
Annexe	15.43 / 13.04	62.13 / 43.30

Table 1. TER & TFEE ADL:2012

3.2. Baseline Calculation

This section outlines the proposals for specifying building fabric and services beyond the requirements of Building Regulations (the baseline).

Fundamental to achieving energy efficiency in any new building is the specification of a thermally efficient building envelope. Passive design features such as high levels of insulation, designing to maximise solar gain and limiting heat loss through reduced air leakage and enhanced thermal bridging are all proven techniques to reduce energy consumption and emissions.

The baseline "compliant" case for emissions will be determined by using the Target Emissions Rates (TER) from the compliance calculations. These figures provide an emission rate, and hence a figure for acceptable total regulated emissions from a dwelling.

The emissions saving from efficiency measures will be determined by comparing the total emissions based on the TER figures with the predicted emissions based on the actual proposed specification. The emissions saving from the low and zero-carbon technologies will be calculated separately and incorporated into the final residential results using the SAP methodology.

FABRIC FIRST

Use Less Energy

4.1. Building Fabric - Residential

Limited assumptions have been made on this development to meet the fabric efficiency targets for Building Regulations 2013 as the majority of the specification has been provided by the client.

Compliance has been achieved by aiming for values corresponding to the prescribed notional U-values specified in Table 1.1: Summary of concurrent notional dwelling specification, as outlined in Approved Document L 2012. The Target Fabric Energy Efficiency (TFEE) has been successfully met by targeting a thermal bridging Y Value lower than 0.150. This will likely entail incorporating improved thermal bridging details into the design to minimize heat losses.

Table 2 shows the proposed building fabric specification applied to the SAP calculations with respect to the upper limits stipulated by Part L: 2012. The values represent in some areas a significant bettering of the mandatory requirements set out in the current Building Regulations

Fabric	ADL:2012 Notional Values W/m^2K	Proposed Values W/m^2K
Walls	0.28	0.17
Roof	0.18	0.11
Floor	0.22	0.10
Windows	1.40	0.8
Doors	1.40	0.8
Air Permeability	5.0 m3 / (h. m2) at 50 Pa	5.0 m3 / (h. m2) at 50 Pa
Ventilation	Natural Ventilation (openable windows + trickle vents)	Natural Ventilation (openable windows + trickle vents) / MVHR
Thermal bridging	Default Psi Values Y = 0.05	Psi Values Calculated Y = 0.033

Table 2. Building Fabric Specification

4.2. Building Services - Residential

For the early design stage, space heating and domestic hot water (DHW) will be supplied by an 89.5% efficient combi boiler, adhering to the guidance provided. To ensure energy efficiency, heating controls will be implemented, including a programmer with independent time and temperature zone controls, in accordance with Part L 2012 Approved Document. These controls will enable effective management of heating requirements based on specific zones and desired temperature settings.

The dwelling will be ventilated primarily through the use of mechanical ventilation with heat recovery. These systems will provide efficient and targeted extraction of air in specific areas where moisture and pollutants are likely to be generated, ensuring a healthy and comfortable indoor environment.

To promote energy efficiency, low-energy lighting will be selected for the development. In accordance with the Domestic Building Services Compliance Guide (DBSCG), the specified lighting will possess a luminous efficacy exceeding 45 lumens per circuit watt and an output greater than 400 lamp lumens. This requirement is typically met by utilizing LED or compact fluorescent lights, rather than low-voltage Halogen variants. By opting for these energy-saving lighting options, the development can reduce its overall electricity consumption and contribute to sustainability objectives.

Element	Specification
Boilers	89.5% Efficiency
Heating emitter	Underfloor heating – pipes in screed above insulation and radiators upper floor
Heating control	Time and temperature zone control.
Domestic hot water	From the main heating system/Hot water cylinder
Water consumption	≤125 litres/person/day
Internal fixed lighting	100% low energy
Ventilation	Natural Ventilation (openable windows + trickle vents) + MVHR
Thermal bridging	Psi Values Calculated Y = 0.033
Thermal mass parameter	Calculated

Table 3. Building HVAC/TMP

4.3. Fabric First – Results Summary

House	ADL:2012 Emission Rate KG $CO^2/m^2/year$ (TER)	ADL:2012 Fabric Energy Efficiency $kWh/m^2/year$ (TFEE)	Percentage Reduction DER %	Percentage Reduction DFEE %
TER	15.19	64.00	-	-
DER – Fabric First	12.79	44.47	15.82	30.51

Annexe	ADL:2012 Emission Rate KG $CO^2/m^2/year$ (TER)	ADL:2012 Fabric Energy Efficiency $kWh/m^2/year$ (TFEE)	Percentage Reduction DER %	Percentage Reduction DFEE %
TER	15.43	62.13	-	-
DER – Fabric First	13.04	43.30	15.48	30.30

Table 4. Fabric First Results

4.1. Summertime Overheating

In recent years, the impacts of overheating have been extensively studied and qualified, in part, to climate change and modern construction practices. The industry has developed various guidelines to assess and predict the risk of overheating. However, it is crucial to address design considerations during the concept stage to implement effective measures for adequate mitigation.

By acknowledging the potential risks of overheating early in the design process, appropriate strategies can be incorporated to prevent or minimise excessive heat buildup within buildings. These strategies may include optimising building orientation, incorporating effective shading systems, implementing natural ventilation techniques, utilising thermal insulation, and integrating efficient cooling systems.

Considering these design considerations ensures that the development can effectively mitigate the adverse effects of overheating and create comfortable and sustainable indoor environments for occupants.

4.2. Common Causes

The Zero Carbon Hub states three factors most associated with overheating risk: location, building design and occupational usage.

4.3. Location

A specific site's climate, or microclimate, is influenced by its geographic location. Factors such as sunlight, wind patterns, and rainfall intensity vary based on the site, and the design approach must be tailored accordingly. For instance, average summertime temperatures are typically higher in the southeast of England compared to the northeast. Therefore, in the southeast, increasing ventilation levels may have a limited impact on reducing internal temperatures.

Dense urban developments with limited open green spaces may be susceptible to the "urban heat island" effect. This phenomenon occurs when heat is absorbed by dense man-made structures during the day and then radiated at night, leading to elevated local temperatures. To mitigate this effect, increasing the amount of green space and incorporating solar reflective materials and coatings can help reduce heat absorption and minimise heat retention.

By recognising and addressing the specific climate characteristics and potential risks associated with a site, the design can be optimised to create comfortable and sustainable environments that mitigate the effects of climate-related factors such as high temperatures and urban heat islands.

4.4. Building Design

There are multiple aspects of building design that impact its performance in terms of overheating. The orientation of a building, along with the size and placement of glazing areas, plays a significant role in determining the amount of solar heat gain. If solar gain cannot be effectively absorbed or removed, it can lead to increased internal temperatures. While harnessing "free" solar energy for heating purposes can be beneficial, controlling the amount of solar energy entering the building is essential to prevent overheating.

Modern structures are frequently built with high levels of energy efficiency in mind, resulting in improved insulation and airtightness. However, these design features, combined with reduced levels of thermal mass compared to older buildings, can limit the ability to absorb or naturally dissipate heat. As a result, modern buildings may be more prone to overheating if not properly designed and equipped with appropriate mitigation strategies.

To address these challenges, designers need to consider various factors such as building orientation, glazing design, solar shading systems, insulation techniques, and ventilation strategies. By integrating these elements effectively, the building's ability to manage solar gain and control internal temperatures can be optimised, ensuring a comfortable and energy-efficient indoor environment.

4.5. Occupants

While occupants' specific use and behaviour cannot be controlled in new construction projects, it is important to consider the impact of room use type and location when planning a building. The arrangement of spaces should consider the potential solar and other incident heat gains. The risk of overheating is influenced by factors such as occupant density and the anticipated activity type within a particular zone.

For instance, rooms with glazed perimeter areas that are predominantly occupied in the afternoon may benefit from being situated in east-facing locations. The direct solar heat gain can be minimised by positioning them where the sun has already passed its peak. This thoughtful placement considers the potential heat load and aims to create a more comfortable indoor environment.

Considering the occupant activities and their corresponding heat generation patterns, along with the solar exposure of different spaces, allows for better design decisions that help mitigate the risk of overheating and enhance occupant comfort.

5.1. Mitigation

When it comes to new-build construction projects, it is crucial to consider design considerations for reducing the risk of overheating at the earliest opportunity. While performance measures can be incorporated at later stages, the most effective and robust techniques are often inherent to the building's design.

The "cooling hierarchy," outlines the preferred approach to mitigating overheating risks and minimising reliance on mechanical cooling. The hierarchical steps include:

1. Minimizing heat generation through energy-efficient design.
2. Reducing the amount of heat entering the building in summer through considerations such as orientation, shading, albedo, fenestration, insulation, and the incorporation of green roofs and walls.
3. Managing heat within the building using exposed thermal mass and high ceilings.
4. Implementing passive ventilation strategies.
5. Considering mechanical cooling as a last resort.

In addition to appropriate siting and orientation, several properties and functions influence the performance of overheating mitigation measures. One such consideration is the location, proportion, and specification of glazing. It is important to strike a balance between the benefits of natural light and "free heat" while ensuring that the levels of solar gain are not excessive. Glass manufacturers offer a variety of products, including those with solar control coatings, which can help reduce the transmitted solar gain (measured by the "g-value") without significantly impacting visual performance. Different glass specifications may be more suitable for specific orientations, such as using lower g-value glass for south-facing facades compared to north-facing ones.

5.1. Solar shading

In line with solar control glass coatings, the use of external solar shading is another effective approach to prevent direct transmission of solar gain while allowing for the maintenance or maximisation of glazed areas. The selection of the appropriate type of external shading depends on the orientation of the windows and the sun angles at different times of the day.

Horizontal overhangs are typically more suitable for windows facing south, with higher sun angles. These overhangs can effectively block the high-angle summer sun while allowing the lower-angle winter sun to penetrate and provide natural daylight.

On the other hand, for windows facing east and west, where the sun angles are lower, vertical fins are often a better choice. These fins can help minimise the direct entry of the low-angle morning and afternoon sun, reducing the potential for overheating while allowing for views and daylight.
By carefully selecting and designing external solar shading devices based on the orientation of the windows and the specific solar angles, it is possible to achieve optimal control of solar heat gain and create comfortable indoor environments with ample natural light.

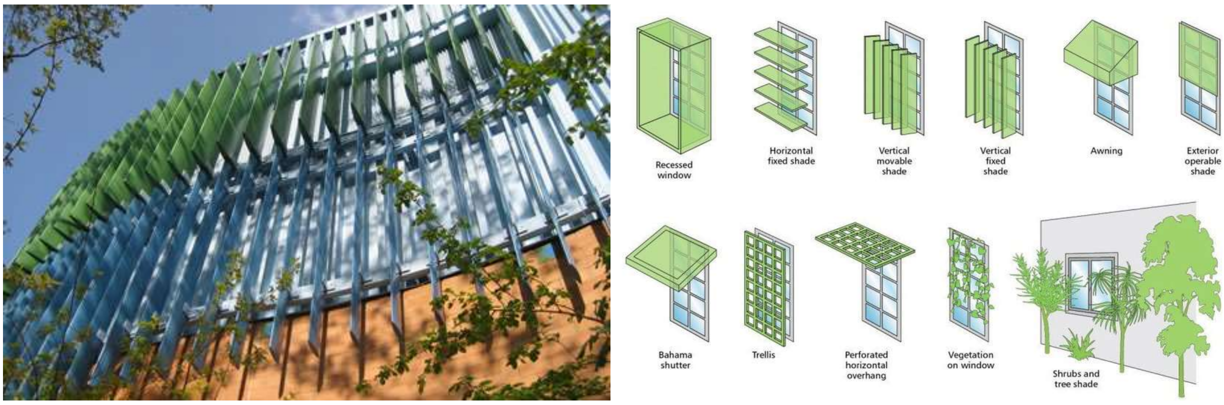

Figure 2. Examples of External Shading Systems

5.2. Thermal Mass

Thermal mass refers to the capacity of an object or construction to absorb and store heat energy. Objects with higher thermal mass can absorb heat during the day and release it at night. This characteristic can help reduce daytime temperatures and enhance the overall thermal stability of a building. However, it's important to note that increasing thermal mass may require more energy to heat the building fabric, potentially leading to increased energy consumption in certain cases. Therefore, achieving a balance is crucial when considering the use of thermal mass in building design.

There are various ways to increase thermal mass. One approach is to expose dense materials, such as concrete or masonry, which naturally possess higher thermal mass properties. Another method involves improving the physical connection between finishing materials and the building structure, ensuring efficient heat transfer between them. By increasing the physical connection, the thermal mass of the building elements can be effectively utilised.

By strategically incorporating thermal mass into the design, it is possible to optimise energy performance and enhance thermal comfort within the building. However, it's important to consider the project's specific requirements and strike a balance between the benefits of thermal mass and the potential energy implications to achieve the desired outcomes.

For example, plaster and the structural core, e.g., blockwork.

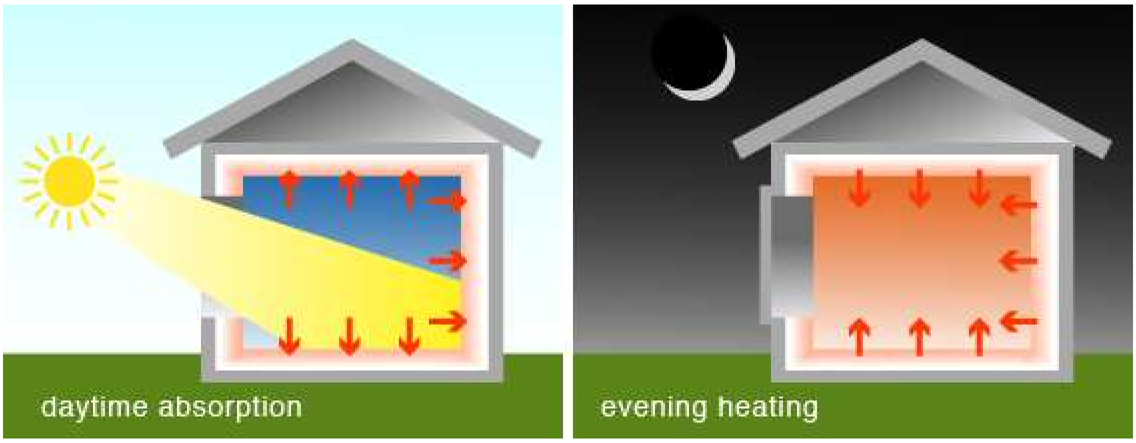

Figure 3. Thermal Mass Explained

5.3. Ventilation

The ventilation strategy plays a crucial role in managing overheating performance. While background ventilation levels are typically low, they may not be sufficient to purge excess heat from a building effectively. Therefore, the ventilation strategy must allow for significant air movement when required.

Several factors influence the potential rate of ventilation, including:

- Opening type, size, and duration: The design of ventilation openings, such as windows or vents, should consider maximising the size of the openings and their ability to remain open for an extended period, allowing for effective air exchange when needed.
- Building height and exposure: The height and exposure of the building to external factors such as wind can impact ventilation rates. Tall buildings or those in exposed locations may benefit from additional consideration in the ventilation strategy to ensure adequate air movement.
- Number of storeys and cross-ventilation opportunities: Buildings with multiple storeys offer cross-ventilation potential, where air can flow through the building from one side to the other. This design consideration can enhance ventilation rates and improve the cooling potential.

It is essential to balance the need for effective ventilation with considerations such as security and protection against water ingress. Ventilation openings should be designed to allow for the greatest possible opening size and duration without compromising the building's security or introducing the risk of water penetration.

By carefully considering these factors and incorporating an appropriate ventilation strategy, it is possible to optimise the ventilation rates and improve the building's ability to manage overheating, ensuring a comfortable and healthy indoor environment.

5.2. Calculating Overheating Risk

Numerous guidance documents are available that outline the assessment of overheating risk and establish acceptable thresholds. These include CIBSE Guide A, BB101, TM52, and TM59. To evaluate the risk, these methodologies involve conducting a Dynamic Simulation Modelling (DSM) exercise to estimate projected internal temperatures. These predicted temperatures are then compared to recommended limits to ascertain their acceptability or if they exceed the prescribed thresholds.

5.3. Part O Outline

The recently introduced Building Regulations Part O, 2021 edition, marks the first comprehensive effort to address overheating specifically in new residential buildings. The primary objective of Part O is to promote the design and construction of buildings that effectively mitigate excessive solar heat gain during summer periods and ensure occupants have suitable means to alleviate indoor heat levels. It is essential to understand that the measures implemented under Part O do not guarantee occupants' comfort but are primarily aimed at safeguarding their health and well-being.

5.4. Buildings Covered by Part O

Table 0.1 Residential buildings within the scope of this approved document

Title	Purpose for which the building is intended to be used
Residential (dwellings)	Dwellings, which includes both dwellinghouses and flats.
Residential (institutional)	Home, school or other similar establishment, where people sleep on the premises. The building may be living accommodation for the care or maintenance of any of the following. a. Older and disabled people, due to illness or other physical or mental condition. b. People under the age of 5 years.
Residential (other)	Residential college, hall of residence and other student accommodation, and living accommodation for children aged 5 years and older.

Figure 4. Approved document Part O

5.5. Part O Calculation

Part O of the Approved Document is satisfied by utilising either of the following methods:

5.3.1. Simplified Method:

- This method considers factors such as risk location and the presence of cross ventilation.
- Risk location is categorised as high (e.g., Greater London and Manchester) or medium (other areas).
- Threshold tables in Part O are referenced to determine the maximum glazing area for the building and the most glazed room.
- In high-risk locations, specific shading requirements must be met, including external shutters with ventilation, glazing with specific g-values and light transmittance, or overhangs on due south-facing facades.

5.3.2. Dynamic Thermal Modelling:

- This methodology is applicable to all residential buildings and offers greater design flexibility compared to the simplified method.
- CIBSE's TM59 methodology is used for predicting overheating risk, and the limits provided in Part O are applied during the assessment.
- Dynamic Thermal Modelling allows for a more detailed analysis of the building's thermal performance and can inform design decisions.

Our Team is committed to helping your project achieve compliance with Part O using either the simplified method or dynamic thermal modelling, ensuring that the proposed development meets the necessary criteria and guidelines to mitigate overheating risks in residential buildings.

GREEN ENERGY

Use Renewable Energy

6.1. Green Energy – Use of Renewable Technology

The CO_2 emissions resulting from the implementation of 'Fabric First' measures have been evaluated and compared to the baseline CO_2 emissions. Reductions in CO_2 emissions have been observed at each stage, to tackle the next stage – 'Green Energy' where the impact of renewable energy generation will be assessed.

Renewable energy is characterized as energy derived from naturally occurring and replenishable energy sources in the environment. Unlike fossil fuels or nuclear power, which can be depleted, renewable energy sources are sustained by ongoing natural processes. Therefore, the term "equipment to generate renewable energy" is somewhat contradictory, as the primary function of such technology is to harness and utilize natural energy flows.

Most renewable energy technologies, with a few exceptions, rely on energy derived from the sun, either directly or indirectly. The exceptions include true geothermal energy, which utilizes heat from the Earth's core, and tidal/marine current electricity generation, which capitalizes on gravitational forces between the Earth and the Moon (although solar energy also affects some marine currents). However, since this report focuses on practical on-site renewable energy options, these exceptions will not be further explored. Instead, the focus will be on the broad range of technologies listed below, some of which may not appear solar-related at first glance. These technologies can be summarized as follows: [Further details on the specific solar technologies can be provided if desired.

- Solar thermal – direct heating of water for space heating or domestic hot water
- Photovoltaic – direct generation of electricity from sunlight
- Hydroelectricity – use of solar (water cycle) driven water flows to generate electricity.
- Wind turbines – use of solar-driven air movement to generate electricity.
- Heat pumps – extraction of solar heat from the earth, atmosphere, or water bodies
- Bio-fuels – combustion of solid or liquid biofuels to produce heat or electricity.

While the technologies and their potential application to this site will be discussed in more detail in the subsequent sections, it is important to address another crucial point. The adoption of renewable energy technologies aims to reduce greenhouse gas emissions, primarily carbon dioxide. However, it is important to recognise that none of these technologies can be considered completely "zero carbon." This is because when considering the entire life cycle of these systems, energy is required for manufacturing, maintenance, and operation, and this energy is often sourced from non-renewable sources. For instance, the production and processing of silicon for manufacturing photovoltaic panels, the transportation of wood pellets using diesel fuel, and the energy used to produce fertilisers for biofuels are all examples of energy inputs derived from non-renewable sources.

Furthermore, it should be noted that the renewable energy technology industry is dynamic and innovative, and even seemingly similar products can vary significantly in practical details. As a result, the detailed design of installations must be carried out by experts, often in collaboration with product manufacturers. Virtually no two products are identical or interchangeable in this field.

The following section provides an overview of the technologies that have been considered for implementation in this development.

6.2. Heat Pumps

Heat pumps are devices that collect low-temperature heat and amplify it to a usable temperature. Typically, a heat pump serving a heat network can deliver 2-3 kWh of useful energy for every 1 kWh of input energy. Therefore, it can be considered as providing 1-2 kWh of low-carbon energy.

There are two common types of heat pumps: ground source and air source. Ground source heat pumps involve drilling boreholes up to 100m deep and spacing them at least 6m apart to extract heat from the ground. However, in urban areas like this development site, ground-source heat pumps are often not feasible due to the complexity of drilling and the need for a significant area for installation.

Air source heat pumps, on the other hand, collect heat from the ambient air using air-heat-exchanger units. While heat pumps can offer good performance, they have practical limitations. They need to be located externally, which can impact both acoustics and visual aesthetics. Additionally, their efficiency is affected by the temperature of the air. At peak heat demand, the system's efficiency is at its lowest. Moreover, since heat pumps rely on electricity from the national grid, their actual carbon emissions are influenced by the carbon intensity of the grid, which can vary.

6.3. Green Energy – Specification Applied

The design team faces the challenge of incorporating heat pump technology in a way that allows it to operate at its highest efficiency capacity. Considerations such as location, visual impact, and the grid's carbon intensity must be considered during the design process.

After thorough consideration, our team has determined that the most effective approach to meet policy and Building Regulation requirements is to incorporate both an Air Source Heat Pump (ASHP) system into the proposed development. This approach significantly reduces carbon emissions compared to using a conventional mains gas boiler for primary heating and hot water demand.

Elements	Specification
Heating	Brand Name: Vaillant Model Name: flexoTHERM 11kW
Secondary Heating	N/A
Hot Water Cylinder	Size: 300 Litre Declared Heat loss kWh/24hr: 1.6
Ventilation	MHVR Brand Name: Zehnder Model Name: ComfoAir Q600 ST

Table 5. Green Energy Specifications

6.4. Green Energy – Results Summary

House	ADL:2012 Emission Rate KG CO²/m²/year (TER)	ADL:2012 Fabric Energy Efficiency kWh/m²/year (TFEE)	Percentage Reduction DER %	Percentage Reduction DFEE %
TER	15.19	64.00	-	-
DER – Fabric First	12.79	44.47	15.82 %	30.51 %
DER – Green Energy	10.66	44.47	29.82 %	30.51 %

Annexe	ADL:2012 Emission Rate KG CO²/m²/year (TER)	ADL:2012 Fabric Energy Efficiency kWh/m²/year (TFEE)	Percentage Reduction DER %	Percentage Reduction DFEE %
TER	15.43	62.13	-	-
DER – Fabric First	13.04	43.30	15.48 %	30.30 %
DER – Green Energy	11.05	43.30	28.38 %	30.30 %

Table 6. Green Energy Results

7. Conclusions

The Energy Statement presented in this document has detailed the proposed specification for the development, highlighting the significant savings achieved at each stage of the energy hierarchy compared to the current Building Regulations baseline. By adopting a fabric-first approach, substantial energy savings have been realised.

The fabric-first approach prioritises designing and constructing a highly energy-efficient building envelope, focusing on insulation, air tightness, and thermal performance. This approach ensures that the building's fabric itself acts as a primary source of energy efficiency, reducing the need for additional energy-consuming systems.

The proposed specification surpasses the minimum requirements of the Building Regulations by implementing advanced insulation materials, efficient windows and doors, and effective air-sealing techniques. This results in substantial energy savings throughout the lifetime of the development.

By emphasising the fabric-first approach, the proposed development achieves improved energy efficiency, provides enhanced thermal comfort for occupants, and reduces environmental impact. The combination of energy-saving measures implemented in the design contributes to a more sustainable and environmentally conscious building.

Overall, the Energy Statement confirms that the proposed specification, driven by a fabric-first approach, yields significant energy savings when compared to the baseline set by the current Building Regulations.

7.1. Fabric First Approach

The proposed development features a high-performance building envelope that incorporates low U-values, construction details designed for thermal efficiency, and minimal air permeability. The performance values of the building envelope show significant enhancements compared to the 2012 Notional building used as a reference for compliance assessment.

7.2. Green Energy Approach

An air source heat pump combined with mechanical ventilation with heat recovery has been proposed. This will help future-proof the dwelling with the envisaged decarbonisation of the National Grid.

7.3. SAP 10/ Part L 2021 Compliance Check

Lastly, an additional compliance check has been carried out against the newly introduced version of the Building Regulations Part L 2021 via SAP 10, as the building will be adhering to the new regulations. The table below shows compliance with all metrics required.

House	ADL:2012 Emission Rate KG CO^2/m^2/year (TER)	ADL:2012 Fabric Energy Efficiency kWh/m^2/year (TFEE)	ADL:2021 Primary Energy Rate kWh_{PE}/m^2/year (TPER/DPER)
Targets	7.39	45.97	41.00
Dwelling	3.09	42.99	32.3
Reduction %	58.18 %	6.48 %	21.21 %

Annexe	ADL:2012 Emission Rate KG CO^2/m^2/year (TER)	ADL:2012 Fabric Energy Efficiency kWh/m^2/year (TFEE)	ADL:2021 Primary Energy Rate kWh_{PE}/m^2/year (TPER/DPER)
Targets	7.57	43.78	41.16
Dwelling	3.27	41.87	34.26
Reduction %	56.80 %	4.34 %	16.76 %

Table 7. SAP 10 Compliance

8. Summary

This statement has outlined the approach taken by the development to incorporate an energy-efficient design that surpasses the requirements of Part L 2012 and 2021 regulations. By combining an Air Source Heat Pump (ASHP) with efficient fabric design specifications and mechanical ventilation with heat recovery, it is possible to achieve a significant carbon emission reduction of 29.10% within 2012 regulations and 57.49% within 2021 regulations.

SAP Calculations

Appendices

9.1. Appendix A:

Fabric First SAP Reports

SUMMARY FOR INPUT DATA
Calculation Type: New Build (As Designed)

JOSTEC

Property Reference	24129 - House	Issued on Date	18/03/2024
Assessment Reference	Be Lean	Prop Type Ref	New Build
Property	Glenwood, Harthall Lane, Kings Langley, WD4 8JN		

SAP Rating	88 B	DER	12.79	TER	15.19
Environmental	86 B	% DER<TER	15.82		
CO_2 Emissions (t/year)	4.00	DFEE	44.47	TFEE	64.00
General Requirements Compliance	Pass	% DFEE<TFEE	30.51		

Assessor Details	Mr. Lee Robbins, Lee Robbins, Tel: 07711 185 809, lee@jostec.co.uk	Assessor ID	u322-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North West
Property Tenure	Unknown
Transaction Type	None of the above
Terrain Type	Suburban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	57.88 m	245.97 m²	3.08 m
1st Storey:	42.18 m	110.95 m²	2.70 m

7.0 Living Area: 116.95 m²

8.0 Thermal Mass Parameter: Precise calculation

Thermal Mass: 131.4 kJ/m²K

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
External Wall 1	Cavity Wall	Other	0.17	9.00	252.39	201.48

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Party Wall 1	Filled Cavity with Edge Sealing	Other	0.00	0.00	56.18

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Timber	Plasterboard on timber frame	9.00	465.18
Block	Dense block, plasterboard on dabs	75.00	98.96

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Roof 1 - Pitched Roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	155.98	155.98
Roof 2 - Void Space Above	External Slope Roof	Plasterboard, insulated slope	0.07	9.00	113.78	113.78

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	110.95

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Floor 1 - Ground Floor	Ground Floor - Solid	Slab on ground, screed over insulation	0.10	110.00	245.97

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	110.95

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Doors	BFRC data	Half Glazed Door	Triple Low-E Soft 0.05			0.40			0.80
Windows	BFRC data	Window	Triple Low-E Soft 0.05			0.40			0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Windows NE	Window	[1] External Wall 1	North East	Dark-coloured curtain or roller blind	0.00					16.77	100
Windows NW	Window	[1] External Wall 1	North West	Dark-coloured curtain or roller blind	0.00					14.01	100
Windows SE	Window	[1] External Wall 1	South East	Dark-coloured curtain or roller blind	0.00					18.03	100
Door NW	Half Glazed Door	[1] External Wall 1	North West							2.10	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	39.20	0.019	No
Independently assessed	E3 Sill	30.60	0.019	No
Independently assessed	E4 Jamb	51.26	0.019	No
Independently assessed	E5 Ground floor (normal)	57.88	0.086	No
Independently assessed	E6 Intermediate floor within a dwelling	54.43	0.038	No
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	6.44	0.240	No
Table K1 - Default	E11 Eaves (insulation at rafter level)	39.66	0.080	No
Independently assessed	E13 Gable (insulation at rafter level)	41.12	0.044	No
Independently assessed	E16 Corner (normal)	29.98	0.046	No
Independently assessed	E17 Corner (inverted – internal area greater than external area)	14.60	-0.078	No
Table K1 - Default	E25 Staggered party wall between dwellings	4.39	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	20.28	0.160	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.22	0.000	No
Table K1 - Default	P5 Party wall - Roof (insulation at rafter level)	21.58	0.080	No
Table K1 - Default	R4 Ridge (vaulted ceiling)	32.53	0.080	No
Table K1 - Default	R5 Ridge (inverted)	8.41	0.040	No
Table K1 - Default	R7 Flat ceiling (inverted)	15.12	0.040	No

Y-value	0.033	W/m²K

18.0 Pressure Testing Yes

Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				5
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System No

22.0 Lighting

Internal

Total number of light fittings	20	
Total number of L.E.L. fittings	20	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	No

23.0 Electricity Tariff Standard

24.0 Main Heating 1 Manufacturer

SUMMARY FOR INPUT DATA
Calculation Type: New Build (As Designed)

Description	Notional	
Percentage of Heat	100	%
Main Heating	BGW	
SAP Code	104	
Efficiency (Sedbuk 2009)	89.5	%
Model Name	Notional Boiler	
Manufacturer	Notional	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Burner Control	Modulating	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	
25.0 Main Heating 2	None	

Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901
29.0 Hot Water Cylinder	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£674	B 91	

SUMMARY FOR INPUT DATA
Calculation Type: New Build (As Designed)

JOSTEC

Property Reference	24129 - Annexe	Issued on Date	18/03/2024
Assessment Reference	Be Lean	Prop Type Ref	New Build
Property	Glenwood, Harthall Lane, Kings Langley, WD4 8JN		

SAP Rating	87 B	DER	13.04	TER	15.43
Environmental	86 B	% DER<TER	15.48		
CO_2 Emissions (t/year)	3.14	DFEE	43.30	TFEE	62.13
General Requirements Compliance	Pass	% DFEE<TFEE	30.30		

Assessor Details	Mr. Lee Robbins, Lee Robbins, Tel: 07711 185 809, lee@jostec.co.uk	Assessor ID	u322-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	South West
Property Tenure	Unknown
Transaction Type	None of the above
Terrain Type	Suburban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	43.50 m	178.99 m²	2.96 m
1st Storey:	33.55 m	95.34 m²	3.22 m

7.0 Living Area 84.25 m²

8.0 Thermal Mass Parameter Precise calculation

Thermal Mass 111.04 kJ/m²K

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
External Wall 1	Cavity Wall	Other	0.17	9.00	230.35	193.71

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Party Wall 1	Filled Cavity with Edge Sealing	Other	0.00	0.00	54.04

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Timber	Plasterboard on timber frame	9.00	415.08

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Roof 1 - Pitched Roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	147.76	147.76
Roof 2 - Void Space Above	External Slope Roof	Plasterboard, insulated slope	0.07	9.00	58.99	58.99

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	95.34

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Floor 1 - Ground Floor	Ground Floor - Solid	Slab on ground, screed over insulation	0.10	110.00	178.99

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	95.34

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Doors	BFRC data	Half Glazed Door	Triple Low-E Soft 0.05			0.40			0.80
Windows	BFRC data	Window	Triple Low-E Soft 0.05			0.40			0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Windows NE	Window	[1] External Wall 1	South West	Dark-coloured curtain or roller blind	0.00					16.79	100
Windows NW	Window	[1] External Wall 1	North West	Dark-coloured curtain or roller blind	0.00					5.56	100
Windows SE	Window	[1] External Wall 1	South East	Dark-coloured curtain or roller blind	0.00					12.19	100
Door SW	Half Glazed Door	[1] External Wall 1	South West							2.10	

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	26.15	0.019	No
Independently assessed	E3 Sill	17.65	0.019	No
Independently assessed	E4 Jamb	38.24	0.019	No
Independently assessed	E5 Ground floor (normal)	43.50	0.086	No
Independently assessed	E6 Intermediate floor within a dwelling	34.97	0.038	No
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	7.27	0.240	No
Table K1 - Default	E11 Eaves (insulation at rafter level)	40.13	0.080	No
Independently assessed	E13 Gable (insulation at rafter level)	36.23	0.044	No
Independently assessed	E16 Corner (normal)	21.20	0.046	No
Table K1 - Default	E25 Staggered party wall between dwellings	4.20	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	20.28	0.160	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.22	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	1.01	0.240	No
Table K1 - Default	P5 Party wall - Roof (insulation at rafter level)	20.61	0.080	No
Table K1 - Default	R4 Ridge (vaulted ceiling)	24.62	0.080	No
Table K1 - Default	R7 Flat ceiling (inverted)	8.88	0.040	No

Y-value: 0.036 W/m²K

18.0 Pressure Testing: Yes

Designed AP_{50}: 5.00 m³/(h.m²) @ 50 Pa

Property Tested ?:

As Built AP_{50}: m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather: Windows fully open

Cross ventilation possible: Yes

Night Ventilation: No

Air change rate: 8.00

Mechanical Ventilation

Mechanical Ventilation System Present: No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				5
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System: No

22.0 Lighting

Internal

Total number of light fittings: 14

Total number of L.E.L. fittings: 14

Percentage of L.E.L. fittings: 100.00 %

External

External lights fitted: No

23.0 Electricity Tariff: Standard

24.0 Main Heating 1: Manufacturer

Percentage of Heat: 100 %

Main Heating	BGW	
SAP Code	104	
Efficiency (Sedbuk 2009)	89.5	%
Model Name	Notional Boiler	
Manufacturer	Notional	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Burner Control	Modulating	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	
25.0 Main Heating 2	None	

Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901
29.0 Hot Water Cylinder	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£674	B 91	

Green Energy SAP Reports

SUMMARY FOR INPUT DATA
Calculation Type: New Build (As Designed)

JOSTEC

Property Reference	24129 - House	**Issued on Date**	18/03/2024
Assessment Reference	Be Green	**Prop Type Ref**	New Build
Property	Glenwood, Harthall Lane, Kings Langley, WD4 8JN		

SAP Rating	87 B	**DER**	10.66	**TER**	22.67
Environmental	88 B	**% DER<TER**	52.97		
CO_2 Emissions (t/year)	3.33	**DFEE**	44.47	**TFEE**	64.00
General Requirements Compliance	Pass	**% DFEE<TFEE**	30.51		

Assessor Details	Mr. Lee Robbins, Lee Robbins, Tel: 07711 185 809, lee@jostec.co.uk	**Assessor ID**	u322-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North West
Property Tenure	Unknown
Transaction Type	None of the above
Terrain Type	Suburban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	57.88 m	245.97 m²	3.08 m
1st Storey:	42.18 m	110.95 m²	2.70 m

7.0 Living Area 116.95 m²

8.0 Thermal Mass Parameter Precise calculation

Thermal Mass 131.4 kJ/m²K

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
External Wall 1	Cavity Wall	Other	0.17	9.00	252.39	201.48

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Party Wall 1	Filled Cavity with Edge Sealing	Other	0.00	0.00	56.18

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Timber	Plasterboard on timber frame	9.00	465.18
Block	Dense block, plasterboard on dabs	75.00	98.96

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Roof 1 - Pitched Roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	155.98	155.98
Roof 2 - Void Space Above	External Slope Roof	Plasterboard, insulated slope	0.07	9.00	113.78	113.78

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	110.95

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Floor 1 - Ground Floor	Ground Floor - Solid	Slab on ground, screed over insulation	0.10	110.00	245.97

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	110.95

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Doors	BFRC data	Half Glazed Door	Triple Low-E Soft 0.05			0.40			0.80
Windows	BFRC data	Window	Triple Low-E Soft 0.05			0.40			0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Windows NE	Window	[1] External Wall 1	North East	Dark-coloured curtain or roller blind	0.00					16.77	100
Windows NW	Window	[1] External Wall 1	North West	Dark-coloured curtain or roller blind	0.00					14.01	100
Windows SE	Window	[1] External Wall 1	South East	Dark-coloured curtain or roller blind	0.00					18.03	100
Door NW	Half Glazed Door	[1] External Wall 1	North West							2.10	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	39.20	0.019	No
Independently assessed	E3 Sill	30.60	0.019	No
Independently assessed	E4 Jamb	51.26	0.019	No
Independently assessed	E5 Ground floor (normal)	57.88	0.086	No
Independently assessed	E6 Intermediate floor within a dwelling	54.43	0.038	No
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	6.44	0.240	No
Table K1 - Default	E11 Eaves (insulation at rafter level)	39.66	0.080	No
Independently assessed	E13 Gable (insulation at rafter level)	41.12	0.044	No
Independently assessed	E16 Corner (normal)	29.98	0.046	No
Independently assessed	E17 Corner (inverted – internal area greater than external area)	14.60	-0.078	No
Table K1 - Default	E25 Staggered party wall between dwellings	4.39	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	20.28	0.160	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.22	0.000	No
Table K1 - Default	P5 Party wall - Roof (insulation at rafter level)	21.58	0.080	No
Table K1 - Default	R4 Ridge (vaulted ceiling)	32.53	0.080	No
Table K1 - Default	R5 Ridge (inverted)	8.41	0.040	No
Table K1 - Default	R7 Flat ceiling (inverted)	15.12	0.040	No

Y-value: 0.033 W/m²K

18.0 Pressure Testing: Yes

Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500482
Configuration	5
MVHR Duct Insulated	No
Manufacturer SFP	0.79
Duct Type	Rigid
MVHR Efficiency	93.00
Wet Rooms	5

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System	No	
22.0 Lighting		
Internal		
Total number of light fittings	20	
Total number of L.E.L. fittings	20	
Percentage of L.E.L. fittings	100.00	%
External		
External lights fitted	No	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Percentage of Heat	100	%
Database Ref. No.	102990	
Fuel Type	Electricity	
Main Heating	PER	
SAP Code	221	
In Winter	0.0	
In Summer	0.0	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
25.0 Main Heating 2	None	
Community Heating	None	
28.0 Water Heating	HWP From main heating 1	
Water Heating	Main Heating 1	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
SAP Code	901	
Immersion Only Heating Hot Water	No	
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	300.00	L

Loss	1.60	kWh/day
Pipes insulation	Fully insulated primary pipework	
31.0 Thermal Store	None	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£674	B 90	

SUMMARY FOR INPUT DATA
Calculation Type: New Build (As Designed)

JOSTEC

Property Reference	24129 - Annexe	Issued on Date	18/03/2024
Assessment Reference	Be Green	Prop Type Ref	New Build
Property	Glenwood, Harthall Lane, Kings Langley, WD4 8JN		

SAP Rating	87 B	DER	11.05	TER	22.89
Environmental	88 B	% DER<TER	51.72		
CO_2 Emissions (t/year)	2.73	DFEE	43.30	TFEE	62.13
General Requirements Compliance	Pass	% DFEE<TFEE	30.30		

Assessor Details	Mr. Lee Robbins, Lee Robbins, Tel: 07711 185 809, lee@jostec.co.uk	Assessor ID	u322-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	South West
Property Tenure	Unknown
Transaction Type	None of the above
Terrain Type	Suburban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	43.50 m	178.99 m²	2.96 m
1st Storey:	33.55 m	95.34 m²	3.22 m

7.0 Living Area 84.25 m²

8.0 Thermal Mass Parameter Precise calculation

Thermal Mass 111.04 kJ/m²K

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
External Wall 1	Cavity Wall	Other	0.17	9.00	230.35	193.71

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Party Wall 1	Filled Cavity with Edge Sealing	Other	0.00	0.00	54.04

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Timber	Plasterboard on timber frame	9.00	415.08

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
Roof 1 - Pitched Roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	147.76	147.76
Roof 2 - Void Space Above	External Slope Roof	Plasterboard, insulated slope	0.07	9.00	58.99	58.99

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor	9.00	95.34

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Floor 1 - Ground Floor	Ground Floor - Solid	Slab on ground, screed over insulation	0.10	110.00	178.99

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Plasterboard ceiling, carpeted chipboard floor	18.00	95.34

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Doors	BFRC data	Half Glazed Door	Triple Low-E Soft 0.05			0.40			0.80
Windows	BFRC data	Window	Triple Low-E Soft 0.05			0.40			0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Windows NE	Window	[1] External Wall 1	South West	Dark-coloured curtain or roller blind	0.00					16.79	100
Windows NW	Window	[1] External Wall 1	North West	Dark-coloured curtain or roller blind	0.00					5.56	100
Windows SE	Window	[1] External Wall 1	South East	Dark-coloured curtain or roller blind	0.00					12.19	100
Door SW	Half Glazed Door	[1] External Wall 1	South West							2.10	

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging Calculate Bridges

17.1 List of Bridges

SUMMARY FOR INPUT DATA
Calculation Type: New Build (As Designed)

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	26.15	0.019	No
Independently assessed	E3 Sill	17.65	0.019	No
Independently assessed	E4 Jamb	38.24	0.019	No
Independently assessed	E5 Ground floor (normal)	43.50	0.086	No
Independently assessed	E6 Intermediate floor within a dwelling	34.97	0.038	No
Table K1 - Default	E24 Eaves (insulation at ceiling level - inverted)	7.27	0.240	No
Table K1 - Default	E11 Eaves (insulation at rafter level)	40.13	0.080	No
Independently assessed	E13 Gable (insulation at rafter level)	36.23	0.044	No
Independently assessed	E16 Corner (normal)	21.20	0.046	No
Table K1 - Default	E25 Staggered party wall between dwellings	4.20	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	20.28	0.160	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.22	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	1.01	0.240	No
Table K1 - Default	P5 Party wall - Roof (insulation at rafter level)	20.61	0.080	No
Table K1 - Default	R4 Ridge (vaulted ceiling)	24.62	0.080	No
Table K1 - Default	R7 Flat ceiling (inverted)	8.88	0.040	No

Y-value: 0.036 W/m²K

18.0 Pressure Testing: Yes

Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500482
Configuration	5
MVHR Duct Insulated	No
Manufacturer SFP	0.79
Duct Type	Rigid
MVHR Efficiency	93.00
Wet Rooms	5

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System: No

22.0 Lighting

Internal		
Total number of light fittings	14	
Total number of L.E.L. fittings	14	
Percentage of L.E.L. fittings	100.00	%
External		
External lights fitted	No	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Percentage of Heat	100	%
Database Ref. No.	102990	
Fuel Type	Electricity	
Main Heating	PER	
SAP Code	221	
In Winter	0.0	
In Summer	0.0	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
25.0 Main Heating 2	None	
Community Heating	None	
28.0 Water Heating	HWP From main heating 1	
Water Heating	Main Heating 1	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
SAP Code	901	
Immersion Only Heating Hot Water	No	
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	300.00	L
Loss	1.60	kWh/day

Pipes insulation	Fully insulated primary pipework
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£163	B 88	

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£674	A 92	

SAP 10 SAP Reports

Summary for Input Data

elmhurst energy

Property Reference	24129 - Annexe	Issued on Date	18/03/2024
Assessment Reference	Be Green	Prop Type Ref	New Build
Property	Glenwood, Harthall Lane, Kings Langley, WD4 8JN		

SAP Rating	82 B	DER	3.27	TER	7.54
Environmental	96 A	% DER < TER			56.63
CO_2 Emissions (t/year)	0.83	DFEE	41.87	TFEE	43.78
Compliance Check	See BREL	% DFEE < TFEE			4.34
% DPER < TPER	16.47	DPER	34.26	TPER	41.02

Assessor Details	Mr. Lee Robbins	Assessor ID	U322-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southwest	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Which Floor	0	
2.0 Number of Storeys	2	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K

7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	43.50 m	178.99 m²	2.96 m
1st Storey:	33.55 m	95.34 m²	3.22 m
2nd Storey:	0.00 m	0.00 m²	0.00 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area 84.25 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Other	0.17	9.00	230.35	193.71	0.00	None	36.64	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Other	0.00	0.00	54.04	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Timber	Plasterboard on timber frame	9.00	415.08

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings

Roof 1 - Pitched Roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	147.76	147.76	None	0.00	Enter Gross Area	0.00
Roof 2 - Void Space Above	External Slope Roof	Plasterboard, insulated slope	0.07	9.00	58.99	58.99	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	95.34

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor 1 - Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.10	None	0.00	110.00	178.99

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	95.34

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Doors	BFRC, BSI or CERTASS data	Half Glazed Door	Triple Low-E Soft 0.05		None	0.40	Wood	1.00	0.80
Windows	BFRC, BSI or CERTASS data	Window	Triple Low-E Soft 0.05		None	0.40	Wood	1.00	0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Windows NE	Windows	External Wall 1	South West	16.79	0
Windows NW	Windows	External Wall 1	North West	5.56	0
Windows SE	Windows	External Wall 1	South East	12.19	0
Door SW	Doors	External Wall 1	South West	2.10	0

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	26.15	0.02	0.02	No
E3 Sill	Independently assessed	17.65	0.02	0.02	No
E4 Jamb	Independently assessed	38.24	0.02	0.02	No
E5 Ground floor (normal)	Independently assessed	43.50	0.09	0.09	No
E6 Intermediate floor within a dwelling	Independently assessed	34.97	0.04	0.04	No
E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	7.27	0.15	0.15	No
E11 Eaves (insulation at rafter level)	Table K1 - Default	40.13	0.15	0.15	No
E13 Gable (insulation at rafter level)	Independently assessed	36.23	0.04	0.04	No
E16 Corner (normal)	Independently assessed	21.20	0.05	0.05	No
E25 Staggered party wall between dwellings	Table K1 - Default	4.20	0.24	0.24	No
P1 Party wall - Ground floor	Table K1 - Default	20.28	0.32	0.32	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	7.22	0.00	0.00	No
P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	1.01	0.48	0.48	No
P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	20.61	0.48	0.48	No
R4 Ridge (vaulted ceiling)	Table K1 - Default	24.62	0.12	0.12	No
R7 Flat ceiling (inverted)	Table K1 - Default	8.88	0.12	0.12	No

Y-value 0.06 W/m²K

18.0 Pressure Testing Yes

Designed AP_{50} 5.00 m³/(h.m²) @ 50 Pa

Property Tested? Yes

Test Method Blower Door

As Built AP_{50} 15.00 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present Yes

Approved Installation No

Mechanical Ventilation data Type Database

Type Balanced mechanical ventilation with heat recovery

MV Reference Number 500482

Configuration 5

MVHR Duct Insulated	Uninsulated Ducts
Manufacturer SFP	0.79
Duct Type	Rigid
MVHR Efficiency	93.00
Wet Rooms	5
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	80.00	6	480	14

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	102990	
Fuel Type	Electricity	
SAP Code	221	
In Winter	298.87	
In Summer	198.11	
Model Name	flexoTHERM 11kW	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
PCDF Controls	0	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
FI Water	0.00	
Flue Type	None or Unknown	
Smoke Control Area	Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
Boiler Interlock	No	
Electric CPSU Temperature	0.00	

25.0 Main Heating 2	None
26.0 Heat Networks	None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None			0.00	0.00	0.00	0.00	0.00		
Heat source 2	None			0.00	0.00	0.00	0.00	0.00		
Heat source 3	None			0.00	0.00	0.00	0.00	0.00		
Heat source 4	None			0.00	0.00	0.00	0.00	0.00		
Heat source 5	None			0.00	0.00	0.00	0.00	0.00		

Summary for Input Data

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Baths connected to WWHRS	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Insulation Thickness	0	
Cylinder Volume	300.00	L
Loss	1.60	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store	None
Thermal Store Pipework	within a single casing

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Summary for Input Data

elmhurst energy

Property Reference	24129 - House	Issued on Date	18/03/2024
Assessment Reference	Be Green	Prop Type Ref	New Build
Property	Glenwood, Harthall Lane, Kings Langley, WD4 8JN		

SAP Rating	82 B	DER	3.09	TER	7.36
Environmental	96 A	% DER < TER			58.02
CO_2 Emissions (t/year)	1.01	DFEE	42.98	TFEE	45.97
Compliance Check	See BREL	% DFEE < TFEE			6.52
% DPER < TPER	20.88	DPER	32.30	TPER	40.82

Assessor Details	Mr. Lee Robbins	Assessor ID	U322-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northwest	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Which Floor	0	
2.0 Number of Storeys	2	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	57.88 m	245.97 m²	3.08 m
1st Storey:	42.18 m	110.95 m²	2.70 m
2nd Storey:	0.00 m	0.00 m²	0.00 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area 116.95 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Other	0.17	9.00	252.39	201.48	0.00	None	50.91	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Other	0.00	0.00	56.18	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Timber	Plasterboard on timber frame	9.00	465.18
Block	Dense block, plasterboard on dabs	75.00	98.96

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area	Shelter Code	Shelter Factor	Calculation Type	Openings

Summary for Input Data

						(m²)				
Roof 1 - Pitched Roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	155.98	155.98	None	0.00	Enter Gross Area	0.00
Roof 2 - Void Space Above	External Slope Roof	Plasterboard, insulated slope	0.07	9.00	113.78	113.78	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	110.95

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor 1 - Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.10	None	0.00	110.00	245.97

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	110.95

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Doors	BFRC, BSI or CERTASS data	Half Glazed Door	Triple Low-E Soft 0.05		None	0.40	Wood	1.00	0.80
Windows	BFRC, BSI or CERTASS data	Window	Triple Low-E Soft 0.05		None	0.40	Wood	1.00	0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Windows NE	Windows	External Wall 1	North East	16.77	0
Windows NW	Windows	External Wall 1	North West	14.01	0
Windows SE	Windows	External Wall 1	South East	18.03	0
Door NW	Doors	External Wall 1	North West	2.10	0

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	39.20	0.02	0.02	No
E3 Sill	Independently assessed	30.60	0.02	0.02	No
E4 Jamb	Independently assessed	51.26	0.02	0.02	No
E5 Ground floor (normal)	Independently assessed	57.88	0.09	0.09	No
E6 Intermediate floor within a dwelling	Independently assessed	54.43	0.04	0.04	No
E24 Eaves (insulation at ceiling level - inverted)	Table K1 - Default	6.44	0.15	0.15	No
E11 Eaves (insulation at rafter level)	Table K1 - Default	39.66	0.15	0.15	No
E13 Gable (insulation at rafter level)	Independently assessed	41.12	0.04	0.04	No
E16 Corner (normal)	Independently assessed	29.98	0.05	0.05	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	14.60	-0.08	-0.08	No
E25 Staggered party wall between dwellings	Table K1 - Default	4.39	0.24	0.24	No
P1 Party wall - Ground floor	Table K1 - Default	20.28	0.32	0.32	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	7.22	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	21.58	0.48	0.48	No
R4 Ridge (vaulted ceiling)	Table K1 - Default	32.53	0.12	0.12	No
R5 Ridge (inverted)	Table K1 - Default	8.41	0.12	0.12	No
R7 Flat ceiling (inverted)	Table K1 - Default	15.12	0.12	0.12	No

Y-value 0.06 W/m²K

18.0 Pressure Testing Yes

Designed AP_{50} 5.00 m³/(h.m²) @ 50 Pa

Property Tested? Yes

Test Method Blower Door

As Built AP_{50} 15.00 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present Yes

Approved Installation No

Mechanical Ventilation data Type Database

Type Balanced mechanical ventilation with heat recovery

Summary for Input Data

MV Reference Number	500482
Configuration	5
MVHR Duct Insulated	Uninsulated Ducts
Manufacturer SFP	0.79
Duct Type	Rigid
MVHR Efficiency	93.00
Wet Rooms	5
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	80.00	6	480	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	102990	
Fuel Type	Electricity	
SAP Code	221	
In Winter	299.09	
In Summer	198.16	
Model Name	flexoTHERM 11kW	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
PCDF Controls	0	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
FI Water	0.00	
Flue Type	None or Unknown	
Smoke Control Area	Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
Boiler Interlock	No	
Electric CPSU Temperature	0.00	

25.0 Main Heating 2	None
26.0 Heat Networks	None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None			0.00	0.00	0.00	0.00	0.00		

Heat source 2	None	0.00	0.00	0.00	0.00	0.00
Heat source 3	None	0.00	0.00	0.00	0.00	0.00
Heat source 4	None	0.00	0.00	0.00	0.00	0.00
Heat source 5	None	0.00	0.00	0.00	0.00	0.00

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Baths connected to WWHRS	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Insulation Thickness	0	
Cylinder Volume	300.00	L
Loss	1.60	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store	None
Thermal Store Pipework	within a single casing

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None