

LIDL BRITON FERRY

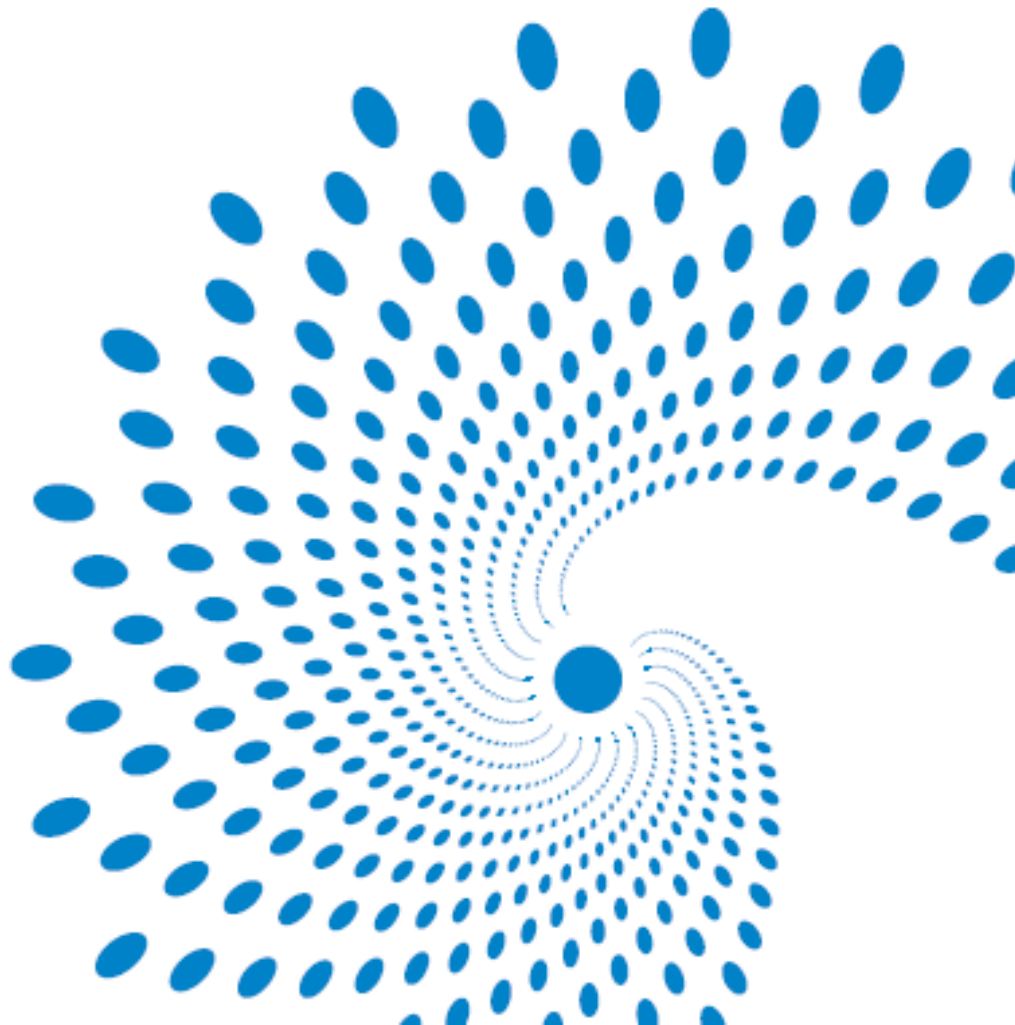
ENERGY USAGE & SUSTAINABILITY STATEMENT

Client:

Lidl Great Britain Ltd

Architect:

HTC Architects



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1.00 EXECUTIVE SUMMARY

The proposed development comprises of a new Lidl food retail store, located in Briton Ferry.

It is required to demonstrate:

- How the incorporation of passive design and energy efficient measures can contribute towards mitigating and adapting to climate change and reducing the development's carbon emissions and energy consumption.
- How the incorporation of good building design with a holistic approach to sustainability can enhance the development's sustainable credentials.
- How the incorporation of good building design with a holistic approach to sustainability can reduce the energy demand, carbon emissions and running costs.
- How the incorporation of passive and active design strategies can reduce the development's regulated emissions to the highest of standards, exceeding the minimum requirements of Part L2A 2013 (2016 Addendum) Building Regulations through the most technically feasible and financially viable environmental standards.
- How the incorporation of low and / or zero carbon technologies can contribute towards on-site energy generation and consumption to ensure compliance with Neath Port Talbot County Borough Councils Policy RE2 – Renewable and Low Carbon Energy in New Development.
- That carbon dioxide emissions associated with energy demand can be reduced in accordance with the energy hierarchy:
 - a) Minimising energy requirements.
 - b) Incorporating high efficiency systems and controls.
 - c) Incorporating low or zero carbon energy sources.
- That site waste management plans will be implemented and both construction site waste and operational waste will be suitably managed and reduced in line with Neath Port Talbot County Borough Councils Policy W3 Waste Management in New Developments.

This report shows that:

- The store's incorporation of 'passive' design strategies will take advantage of:
 - a) Natural daylighting thus, reducing dependency on electric lighting and the associated running costs and carbon emissions through natural contribution towards internal lighting requirements.

- b) Enhanced fabric efficiencies and thermal mass stabilise any temperature fluctuations within the building reducing heat gains and/or losses.

The store's incorporation of 'active' design strategies will take advantage of:

- Heat recovery ventilation to pre-heat incoming fresh air.
- Separate sub-metering to allow for all energy consumed to be monitored and any discrepancies to be easily identified and fixed thus minimising wasted energy.
- Low energy lighting with suitable controls provided.
- Building energy management system (BEMS) to manage all systems effectively, ensuring their efficiencies are achieved and maintained.

Combined Heat and Power (CHP) and De-centralised Energy Network (DEN) solutions have been reviewed and considered unviable for this store due to:

- Unsuitable energy consumption profiles for CHP (require high domestic hot water (DWS) consumption). CHP systems are well suited for buildings that have all year demand for heat. They require predictable and relatively constant base load for optimum performance, which can be found in applications with high domestic hot water loads. The store has a limited number of hot water outlets, therefore, connection to CHP plant would not be deemed viable, due to the lack of thermal demand.
- No suitable DEN within the vicinity of the proposed development.

Alternative Low or Zero Carbon (LZC) technologies have been reviewed with the following deemed to be both viable and advisable:

- Air Source Heat Pumps, or Aero-thermal Heat Pumps.
- Photovoltaic Panels
 - Panel Array – 840m²
 - Panel Efficiency – 20.7%
 - Panel Incline – 5.0°
 - Orientation – 315° from North
 - Annual Output – 154,782.79kWh/annum

The 'Baseline' building annual carbon emissions and energy consumption has been calculated as follows:

- Regulated Annual Carbon Dioxide Emissions: **53,108.12kgCO₂/annum.**

- Regulated Annual Energy Consumption: **133,378.74kWh/annum.**

The 'Be Lean', 'Be Clean', 'Be Green' actual building annual carbon emissions and energy consumption has been calculated as follows:

- Regulated Annual Carbon Dioxide Emissions: **-42,286.58kgCO₂/annum.**
- Regulated Annual Energy Consumption: **-81,465.77kWh/annum.**

These show a **179.62%** carbon dioxide reduction and a **161.07%** energy reduction, when assessed to Part L2A 2013 Building Regulations and accounting for the proposed passive, active and LZC strategies.

Furthermore, the introduction of roof mounted photovoltaic panels will provide an expected annual generation of 154,782.79kWh/annum. This represents >100% of the stores regulated energy consumption. It should be noted that the P.V. electrical generation may not correlate with the store's energy consumption profile, therefore, some of the on-site electrical energy generation may be exported back to the grid.

Policy W3 Waste Management in New Developments will be met through:

- Undertaking landform design and mass balance exercises to retain as much material on site and reduce disposable volumes
- Construction waste for the retail development will be sorted and recycled in-line with the relevant waste segregation and site waste management plans.
- During the operational phase of the retail store, a baler will be used for cardboard onsite, and other waste streams will be segregated as per Lidl's standard approach to waste management.

2.00 INTRODUCTION

DDA have been commissioned by Lidl GB Ltd to provide an energy statement to accompany their planning application for the proposed new build retail store, located in Briton Ferry.

We will be required within this report to demonstrate Lidl's commitments to sustainable development and how they intend to reduce their annual carbon emissions and energy consumption through the utilisation of; good practice engineering, passive, and active strategies and Low or Zero Carbon (LZC) technologies.

The following report will detail Lidl's design approach to reducing energy demand and associated emissions. It will demonstrate Lidl's commitment to go above and beyond the requirements of Part L2A minimum standards to ensure a high carbon reduction/off-set is achieved, as well as supply LZC technologies to contribute towards the store's annual regulated energy consumption.

2.01 ENERGY STATEMENT REQUIREMENTS

The objective of this report is to define and outline how the incorporation of sustainable building design, coupled with the incorporation of LZC technologies at an early stage of the design process can ensure compliance with relevant local and national planning policies, achieve building regulation compliance to a high standard and reduce the energy consumption, associated carbon emissions and running costs of a new build. The core design principals to be outlined within this report will be to:

- Reduce energy demand through the implementation of the energy hierarchy.
- Meet end-use energy demands efficiently and effectively.
- Supply LZC technologies to further reduce the development's energy demand, associated carbon emissions and utility costs.
- Enable effective energy management to ensure installed systems work to their maximum efficiencies.

The report will compare the energy usage and CO₂ emissions from a Notional Building (Building Regulation Part L 2013 compliant) to that of the proposed building including energy efficiency measures, decentralised energy, and renewable energy systems (where appropriate).

3.00 SITE CONTEXT

The proposed Lidl store is located in Briton Ferry.

As shown in Fig 1, the store is orientated with a heavily glazed façade facing North / North East. The emphasis on this orientation offers the advantage of natural daylighting contributions within the store, whilst ensure excessive solar gains are reduced. This reduces the dependency on electric lighting through the natural contribution towards internal lighting levels, whilst ensuring mechanical cooling loads are minimised.

The site receives little over shading or overlooking offering privacy to the store and maintained privacy to the commercial units surrounding the site.

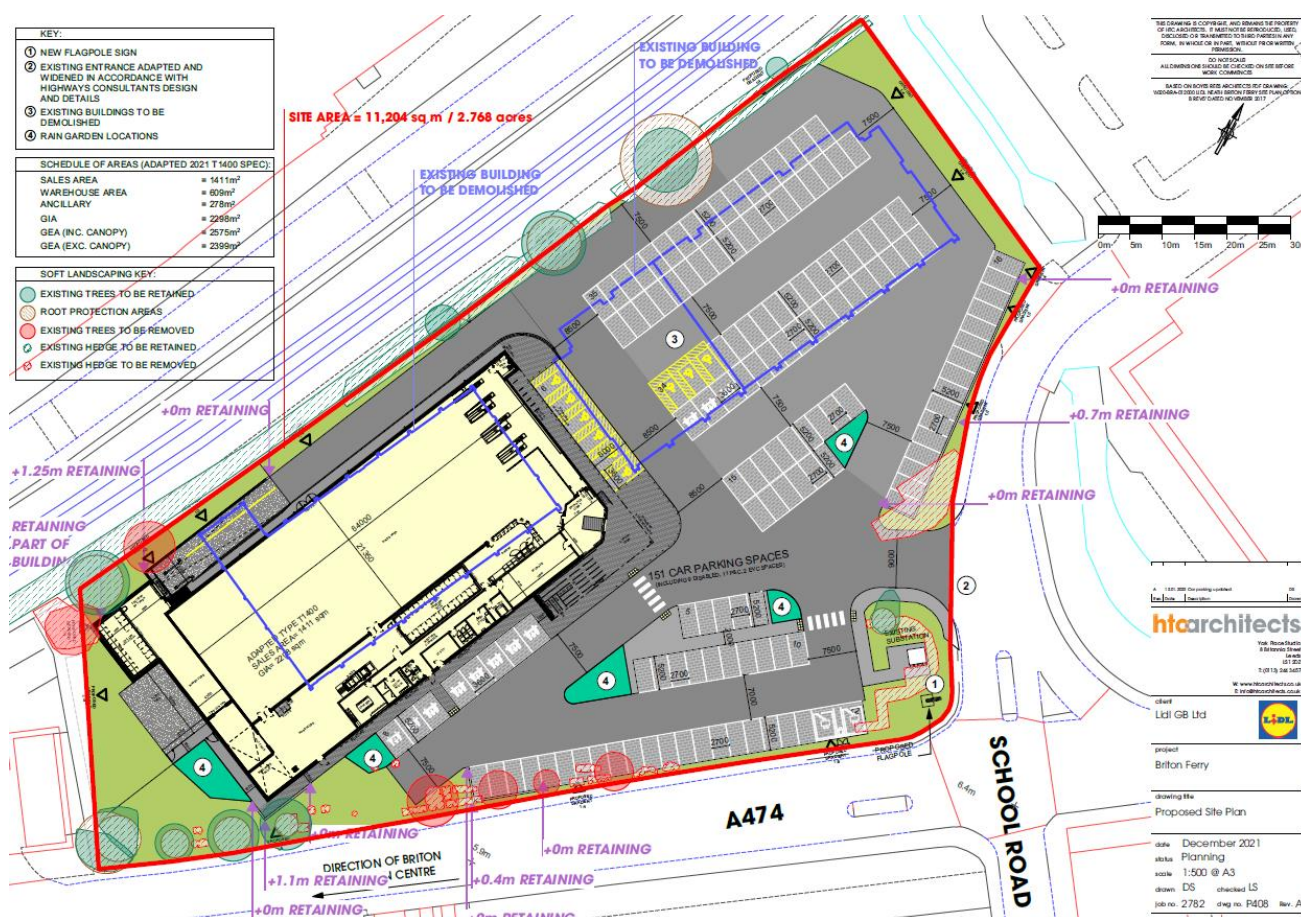


Figure 1 - Site Context

4.00 PLANNING POLICIES & REFERENCE DOCUMENTS

The following documents offer a review of the necessary planning policies and requirements to be adhered to, to ensure sustainable design standards are met and the relevant targets set by local and national authorities understood.

4.01 PART L2A, CONSERVATION OF FUEL & POWER 2013 (2016 EDITION)

Part L2A of the Building Regulations details minimum standards new build, non-domestic developments are required to meet, thus ensuring reduction in both carbon emissions and a developments dependency on grid supplied resources (gas and electricity).

4.02 NON-DOMESTIC BUILDING SERVICES COMPLIANCE GUIDE 2013:

HM Government guidance on minimum performance standards allowed on all fixed building services within new buildings and existing buildings undergoing renovation/upgrades.

4.03 FUTURE WALES – THE NATIONAL PLAN 2040

The Future Wales – National Plan 2040 is the national development plan associated with all developments within Wales. It sets out the direction for development within Wales, setting out key national priorities through the planning system. Its aims are to:

- Ensure the sustainability of developing a vibrant economy
- Achieving decarbonisation and climate resilience
- Developing strong ecosystems
- Improve the health and well-being of the communities

4.04 PLANNING POLICY WALES

Planning Policy Wales sets out the land use planning policies of the Welsh government.

The primary objective is to ensure the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by The Planning Wales Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation.

The Planning Policies Wales promotes action at all levels of the planning process to maximise and encourage its contribution to the well-being of Wales and its communities. It encourages a wider sustainable and

problem solving outlook which focuses on integrating and addressing multiple issues rather than on an approach which is fragmented.

4.05 NEATH PORT TALBOT COUNTY BOROUGH COUNCIL LOCAL DEVELOPMENT PLAN (2011-2026) ADOPTED JANUARY 2016

4.05.1 *Policy SP18 Renewable and Low Carbon Energy*

A proportionate contribution to meeting national renewable energy targets and energy efficiency targets will be made while balancing the impact of development on the environment and communities. This will be achieved by:

1. *Encouraging where appropriate, all forms of renewable energy and low carbon technology development;*
2. *Encouraging energy conservation and efficiency measures in all new major development proposals;*
3. *Ensuring that development will not have an unacceptable impact on the environment and amenity of local residents.*

4.05.2 *Policy RE2 Renewable and Low Carbon Energy in New Development*

Schemes that connect to existing sources of renewable energy, district heating networks and incorporate on-site zero / low carbon technology (including microgeneration technologies) will be encouraged. The following proposals will be required to submit an Energy Assessment to determine the feasibility of incorporating such a scheme and where viable, would be required to implement the scheme:

- a. Residential development for 100 or more dwellings;
- b. Development with a total floorspace of 1,000 sqm or more.

4.05.3 *Policy W3 Waste Management in New Developments*

Proposals for new built development will need to demonstrate that provision is made for the design, layout, storage and management of the waste generated by the development both during the construction phase and occupation. The following proposals will be required to produce Site Waste Management Plans:

- a. Residential development for 50 or more dwellings;
- b. Industrial or commercial development that would generate in excess of 1,000 tonnes of waste per annum;
- c. Development that would generate hazardous waste.

4.06 SUPPLEMENTARY PLANNING GUIDANCE: RENEWABLE AND LOW CARBON ENERGY – JULY 2017

4.06.1 Implementation of Policy RE2

Policy RE2 seeks to encourage the use of renewable or low carbon energy, including the connection to existing supplies, the provision and use of district heating networks and the use of on-site renewable / low carbon technology.

The Council is generally supportive of small scale proposals such as domestic solar panel installations or proposals to install renewable energy technologies in existing buildings. In some instances, express planning permission may not be required for such installations. Information about the need for planning permission is available from the Planning Portal. Detailed advice about the technologies available and their suitability for different situations is available from the Welsh Government.

Some types of renewable / low carbon energy installation may not be appropriate for sensitive buildings, sites or areas (e.g. Listed Buildings or Conservation Areas) and in all cases, careful consideration should be given to the design of installations and their effects on the appearance of a building or area. Further advice on design matters is available in the Council's Design SPG.

5.00 ENERGY HIERACHY

The Energy Statement has been prepared using the “fabric first” approach of the ‘Be Lean’, ‘Be Clean’, ‘Be Green’ Governmental energy hierarchy:

- **Be Lean** – reduce the need for energy.
- **Be Clean** – supply and use energy in the most efficient manner.
- **Be Green** – supply energy from renewable sources.



Figure 2 - Energy Hierarchy

Adhering to the principles of the Energy Hierarchy has several benefits:

- By reducing the energy requirement of the building, the potential renewable requirement shrinks in proportion. This has obvious cost benefits and will help reduce the building’s energy requirements and carbon emissions for the lifespan of the development.
- The sustainable credentials of each development are enhanced and are not validated by simply bolting on expensive renewable equipment. By focusing on fabric performance and the provision of efficient heating systems each building is intrinsically “green”.
- Provides reassurance to the end user the building is performing to its highest potential and all systems are working to their maximum efficiencies with minimal energy waste, thus reducing dependencies on natural resources (gas & electric) as well as minimising running costs.
- The incorporation of energy efficiency measures and a holistic approach to building design will ensure that the carbon emission from the building will be kept to a minimum.

6.00 ASSESSMENT METHODOLOGY & DYNAMIC SIMULATION SOFTWARE

6.01 CALCULATION PROCESS

To detail the benefits of adhering to the energy hierarchy, we must first create a baseline to compare against. This is done using a Dynamic Simulation Modelling software tool which follows a set methodology for calculating the buildings carbon emissions and associated energy use. Dynamic Simulation Modelling (DSM), as used for Part L Building Regulations compliance, has been carried out using the EDSL TAS software, Version 9.5.2, in accordance with CIBSE AM11.

The TAS software has been deemed appropriate for this project, as it allows a single model to be used for all required analysis relating to the building energy performance regarding passive and active strategies, energy efficient mechanical and electrical systems, and LZC technologies.

The baseline building has been determined in accordance with the Energy Assessment Guidance. The baseline building services have been simulated with all services for space and water heating from a gas fired boiler, space cooling coming from dedicated electric cooling units (where relevant) and LED lighting throughout.

6.02 TAS SOFTWARE

TAS is a governmentally approved software capable of analysing multiple environmental credentials of a building. By creating a virtual environment where, geometric form, thermal mass, interaction with local weather & climate, fabric performance, energy consumption and carbon emissions are analysed, different design strategy characteristics and benefits can be assessed and discounted (where necessary).

The TAS software analyses two buildings in parallel with each other, the first representing the notional building as defined by the National Calculation Method (NCM), and the second the building as proposed. The difference in CO₂ emissions and energy consumption between the models represents the CO₂ reduction achieved by the proposed low energy and low carbon design.

By modelling each area to be analysed, and inputting a series of parameters, the software can give projected annual loadings for heating and cooling requirements, carry out part L2A compliance checks through the SBEM tool as well as multiple other dynamic simulations.

6.03 NATIONAL CALCULATION METHODOLOGY

The National Calculation Method (NCM) is the methodology used for demonstrating compliance with Part L of the Building Regulations for buildings other than dwellings. Annual energy use and associated emissions for a

proposed building are calculated and compared with the energy use and emissions of a comparable notional building. Both calculations make use of standard sets of data for different activity areas (internal conditions) and common databases are used to calculate emission factors, weather data, and set variables of construction and service elements.

The NCM allows the actual calculation to be carried out either by an approved simulation software or by a simplified tool. For this report, the building has been assessed using the Dynamic Simulation Software, TAS.

6.03.1 Weather Data

External weather conditions and variables must be considered within the Dynamic Simulation software.

The UK Meteorological Office (MO) collects and analyses weather data across the UK. They account for multiple climate variables such as wind speed and direction, air pressure, relative humidity, air temperature etc. across 14 locations. The weather data variables are broken into two types of weather files: Design Summer Year (DSY) and Test Reference Year (TRY)

Design Summer Year (DSY): This set of data represents a warmer than typical year and is used when calculating maximum resultant temperatures, cooling loads, TM52 calculations etc. as it will give a worst-case scenario with regards to UK temperatures.

Test Reference Year (TRY): This set of data represents a typical/average year and is used for calculating average energy uses within buildings for steady state calculations and for Part L compliance.

For the purposes of this report, the Test Reference Year (TRY) has been used to calculate the development's energy and carbon emissions and compliance with Part L2A.

6.03.2 Internal Conditions

To determine the energy requirement of each zone, internal conditions are assigned to all relevant areas. An internal condition details the conditions to which each zone will be maintained and accounts for parameters such as occupancy gains, equipment gains, lighting, infiltration and ventilation, upper and lower temperatures. The NCM calculation methodology has pre-defined internal conditions which must be used to ensure consistent Part L2A calculations.

6.04 BUILDING GEOMETRY

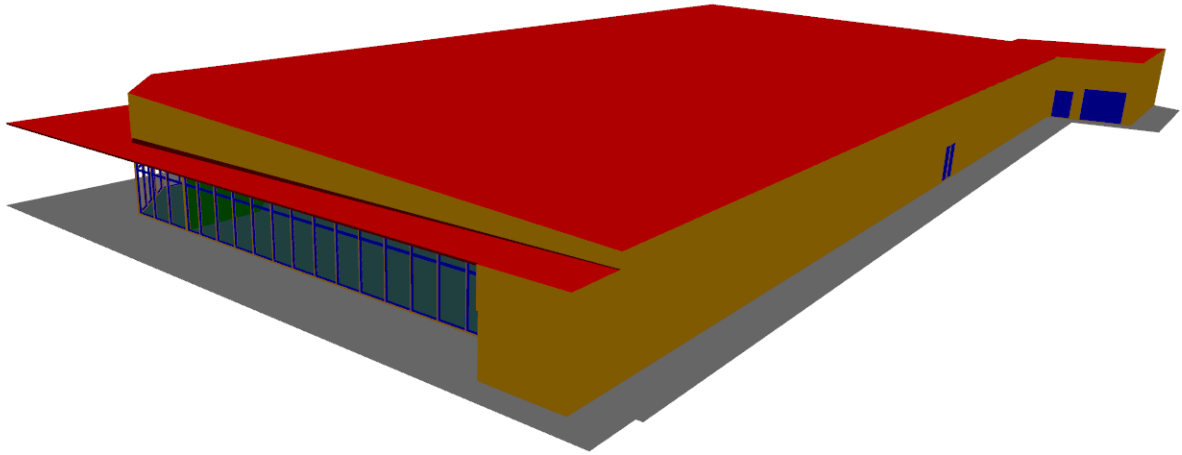


Figure 3 - North View

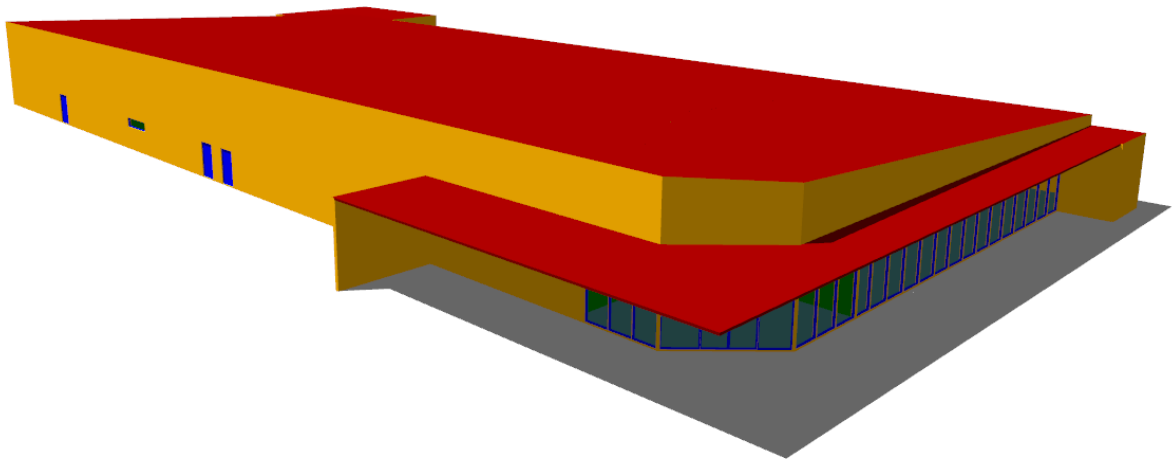


Figure 4 - East View

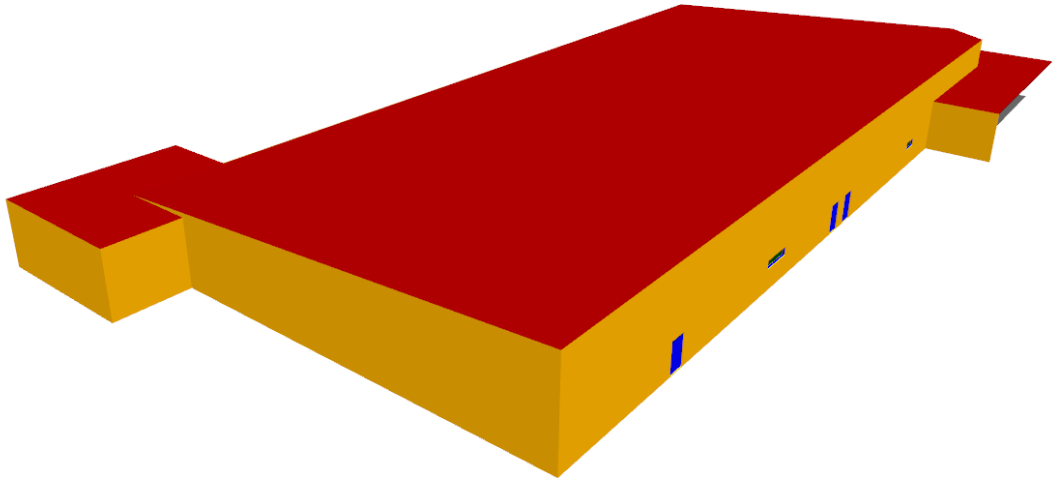


Figure 5 - South View

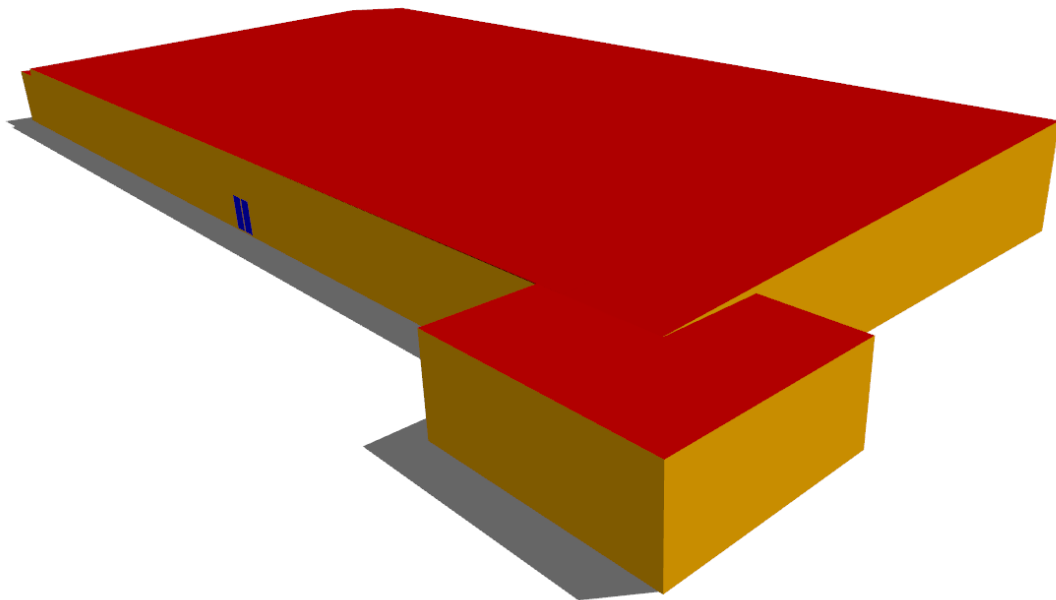


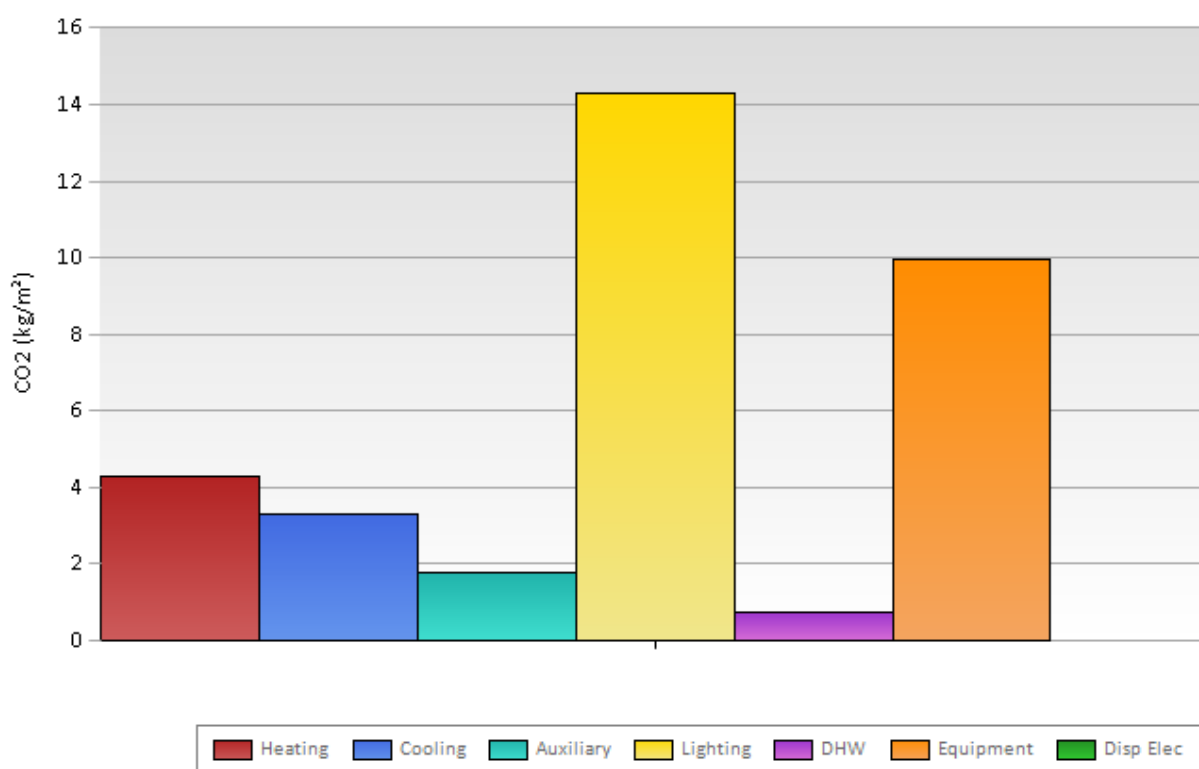
Figure 6 - West View

7.00 'PART L' – BASELINE PREDICTED ENERGY USAGE

The baseline against which each step of the energy hierarchy will be compared is the 'yard stick' determined by the Part L 2013 notional building.

The following section details the carbon emissions and annual energy consumption of the notional building. This offers a baseline for comparison which will be bettered by the actual design proposals put forward in this report.

7.01 ANNUAL CARBON DIOXIDE EMISSIONS OF THE BASELINE BUILDING

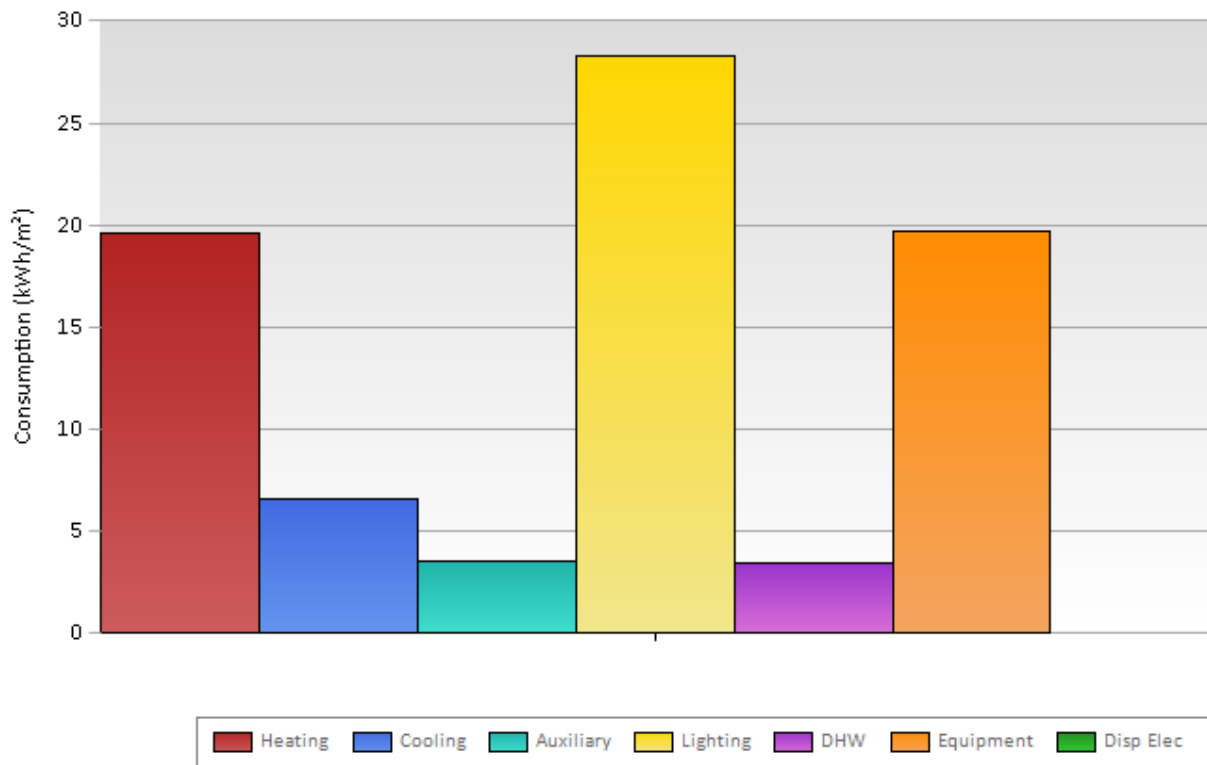


	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
CO2 (kg/m²)	4.30	3.32	1.77	14.31	0.74	9.97	0.00

Figure 7 - Annual Carbon Emissions - Baseline

Fig 7 above shows an annual baseline CO₂ emissions rate of 53,108.12kgCO₂/year of regulated emissions and 74,772.93kgCO₂/year inclusive of unregulated emissions.

7.02 ANNUAL ENERGY CONSUMPTION OF THE BASELINE BUILDING



	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
Consumption (kWh/m²)	19.64	6.55	3.50	28.28	3.41	19.70	0.00

Figure 8 - Annual Energy Consumption - Baseline

Figure 8 above shows an annual baseline energy consumption rate of 133,378.74kWh/year of regulated energy and 176,186.84kWh/year inclusive of unregulated emissions.

8.00 'BE LEAN' – PASSIVE & ACTIVE DESIGN STRATEGIES

This section of the report describes the passive and active energy reduction features which have been considered and incorporated into the design. These constitute the 'Lean' measures, and the associated BRUKL output document can be found in Appendix A of this report.

8.01 ORIENTATION AND SITE LOCATION

The proposed Lidl store is located in Briton Ferry.

The store is orientated with a heavily glazed side façade facing North / North East. The emphasis on this orientation offers the advantage of high levels of natural daylighting within the store, whilst ensuring excess solar gains are mitigated. This reduces mechanical cooling loads and the associated carbon emissions, in addition to reducing the stores dependency on electric lighting through the natural contribution towards lux levels.

The site receives little over shading or overlooking offering privacy to the store and maintained privacy to the commercial units surrounding the site. The development has good local transport links and is near residential properties, ensuring transport associated carbon emissions can be reduced.

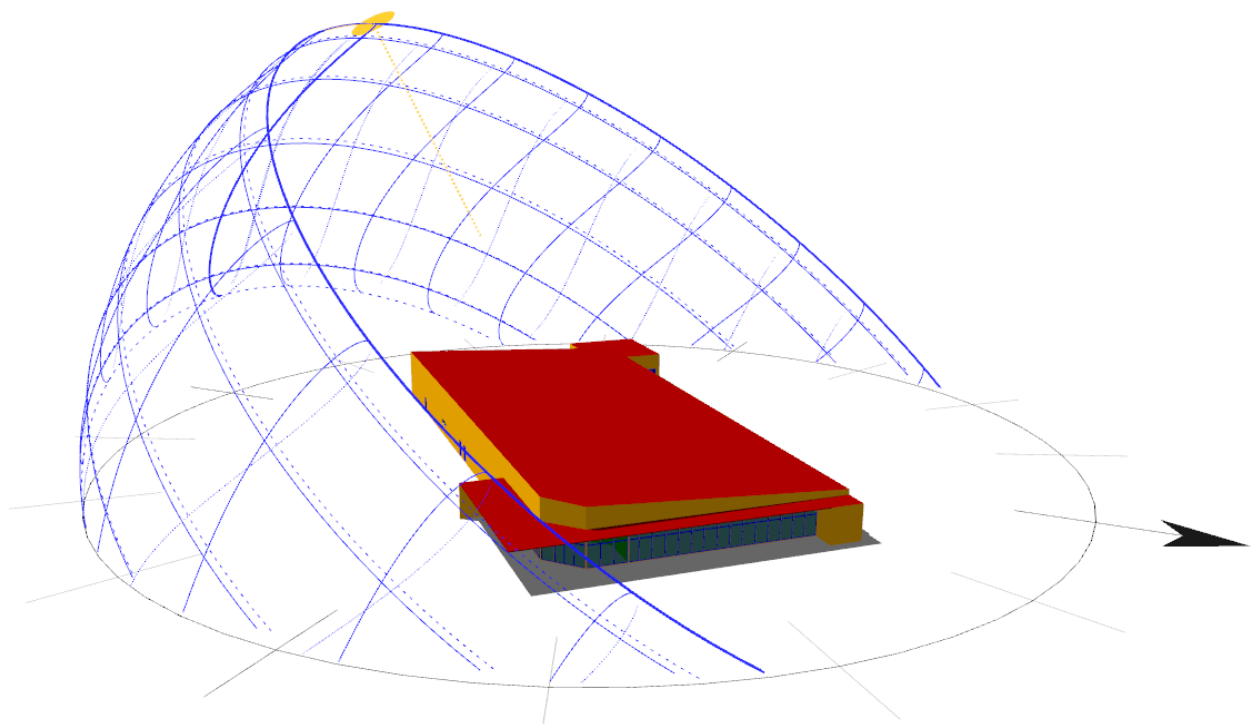


Figure 9 - Orientation & Sun Path Image

8.02 FABRIC PERFORMANCE AND THERMAL MASS

Focusing on the fabric thermal performance ensures the building has reduced conductive heat loss during winter months and reduced conductive heat gains during summer months. This allows the internal environmental conditions to be better managed with reduced reliance on mechanical systems. This will in turn reduce energy demand, running cost and emissions whilst offering enhanced occupancy satisfaction.

With enhanced glazing properties, solar penetration is controlled reducing the potential for excess solar gains, as well as excessive levels of heat loss during winter months. Lidl have specified a high-performance glazing system which significantly betters the minimum standards of Part L2A to minimise the heat loss and enhance the insulation properties, whilst minimising solar gains to avoid overheating. Automatic internal sun blinds will also be installed, to mitigate against the solar penetration and potential glare risk within the checkout zone during early morning when the sun is low and easterly.

The following table details the anticipated fabric efficiency standards to be incorporated into the design. They have been set and compared against the minimum standards of Part L2A for reference purposes and to demonstrate Lidl's intent to exceed minimum standards.

Exposed element	Part L2A Minimum Standards	Lidl Store Proposed U-values	Improvement over Part L2A
Roofs	0.25 W/m ² K	0.19 W/m ² K	26.92%
Walls	0.35 W/m ² K	0.25 W/m ² K	28.57%
Ground Floors	0.25 W/m ² K	0.25 W/m ² K	0.00%
Windows	2.20 W/m ² K	1.70 W/m ² K (g-value = 0.4)	22.72%
Vehicle access and similar large doors	1.50 W/m ² K	1.50 W/m ² K	0.00%
Pedestrian doors	2.2 W/m ² K	2.2 W/m ² K	0.00%
High usage entrance door	3.5 W/m ² K	1.7 W/m ² K	51.43%
Air Tightness Testing	10 m ³ /(h.m ²)@50Pa	4 m ³ /(h.m ²)@50Pa	60.00%

Figure 10 - U-value Comparison

As can be seen in the table above, the targeted 'U' values demonstrate a significant betterment over the minimum standards as detailed in the *Approved Document Part L2A, Table 3, Limiting Fabric Parameters* of

the Building Regulations. This demonstrates Lidl's commitment to going above and beyond to ensure a sustainable development.

8.03 THERMAL MASS

The concrete floor slab of the proposed Lidl Store has been specified to give a relatively high thermal mass which will assist in reducing internal temperature fluctuations due to external temperature variations, to give a more easily controlled environment inside the building. The building would be considered to have low to medium thermal mass.

8.04 NATURAL VENTILATION

Due to the deep floor plans, a natural ventilation strategy has not been adopted to the Sales Area. However, the mechanical ventilation strategy allows heat to be recovered from the stale air when it is extracted, thus tempering the fresh incoming air to reduce the heating coil loads. This is not something usually achievable with naturally ventilated strategies so advantages over passive strategies can be gained.

8.05 MECHANICAL VENTILATION

The Sales Area will be heated, cooled, and ventilated through the incorporation of a centralised air handling unit with heat recovery, with an efficiency of more than 80%. Energy efficient EC fans will be specified to reduce auxiliary loads and staged direct-expansion (DX) heating and cooling changeover coils, fed via Air Source Heat Pumps (an LZC technology) will provide the air distribution, heating, and cooling requirements.

All toilets shall be provided with extract ventilation. This will comprise of a mix between extract only, and mechanical ventilation with heat recovery (MVHR) units. Where extract only fans are provided, infra-red motion detectors will be installed ensuring they operate only when occupancy is detected. This reduces running time and ensures the fans are only used when necessary.

Where mechanical supply and extract is required, a MVHR unit will be installed. This ensures any fresh air entering the space is pre-treated by extracted air bringing it closer to the internal design temperature. This reduces the load on the heating/cooling system whilst still maintaining the necessary fresh air rates. This will also be controlled by PIR occupancy detectors.

8.05.1 Low Energy Fans

Low energy fans will be used with specific fan powers as good as or better than the limiting efficiencies detailed in the Non-Domestic Building Services Compliance Guide (2013).

8.05.2 Variable Speed Drives

Variable speed drives will be used to ensure fans operate no faster than required, thereby reducing energy consumption.

8.06 SUB-METERING

Separate sub-metering will be installed. This has obvious financial and sustainable benefits, allowing for financial verification with regards to consumption vs cost as well as allowing for consumption figures to be monitored and any out-of-range values easily identified, and energy wastage eliminated.

8.07 LOW ENERGY LIGHTING AND CONTROLS

A high proportion of glazing will significantly reduce the dependences and output requirements on electric lighting offering reduced energy demand and carbon emissions and enhanced occupancy comfort.

LED lamps will be provided throughout, both for internal spaces and the external car park. LED lamps have a very low energy consumption and have a life expectancy exceeding that of conventional light bulbs. This reduces both energy use and waste.

Infra-red motion sensor will be provided throughout the Warehouse and all Side Rooms, so that lights are only turned on when the rooms are occupied.

8.08 BUILDING ENERGY MANAGEMENT SYSTEM

A full building management system will be incorporated to ensure plant is controlled and operated efficiently.

8.09 BUILDING ENERGY PERFORMANCE

All the above systems will be designed in accordance with the 'Non-Domestic Building Services Compliance Guide', CIBSE recommendations and relevant British Standards. The incorporation of 'Good Practice' engineering design coupled with the provision of renewable systems (described below) will ensure that an energy efficient store is achieved, minimising the energy consumption and associated CO2 emissions through its life cycle.

8.10 WATER EFFICIENCY

Water is becoming an increasingly scarce resource, with new development generating a growing demand. To meet increased demand new water sources and associated infrastructure need to be in place.

Main cold-water consumption for the store will be reduced through water efficiency.

This will be achieved through the provision of efficient water fittings throughout the store, including services valves complete with flow restrictors, (also helping to reduce hot water demand), dual flush toilets, and low water consumption appliances where provided, as outlined below:

Fittings	Flow rate
Wash Hand Basin	0.049 litres/second
Sink (Kitchenette)	0.08 litres/second
Sink (Bakery, Sluice, Cleaners)	0.12 litres/second
Urinal	2 litres/bowl/hour
WC	4 litres
Dishwasher	12 litres/cycle

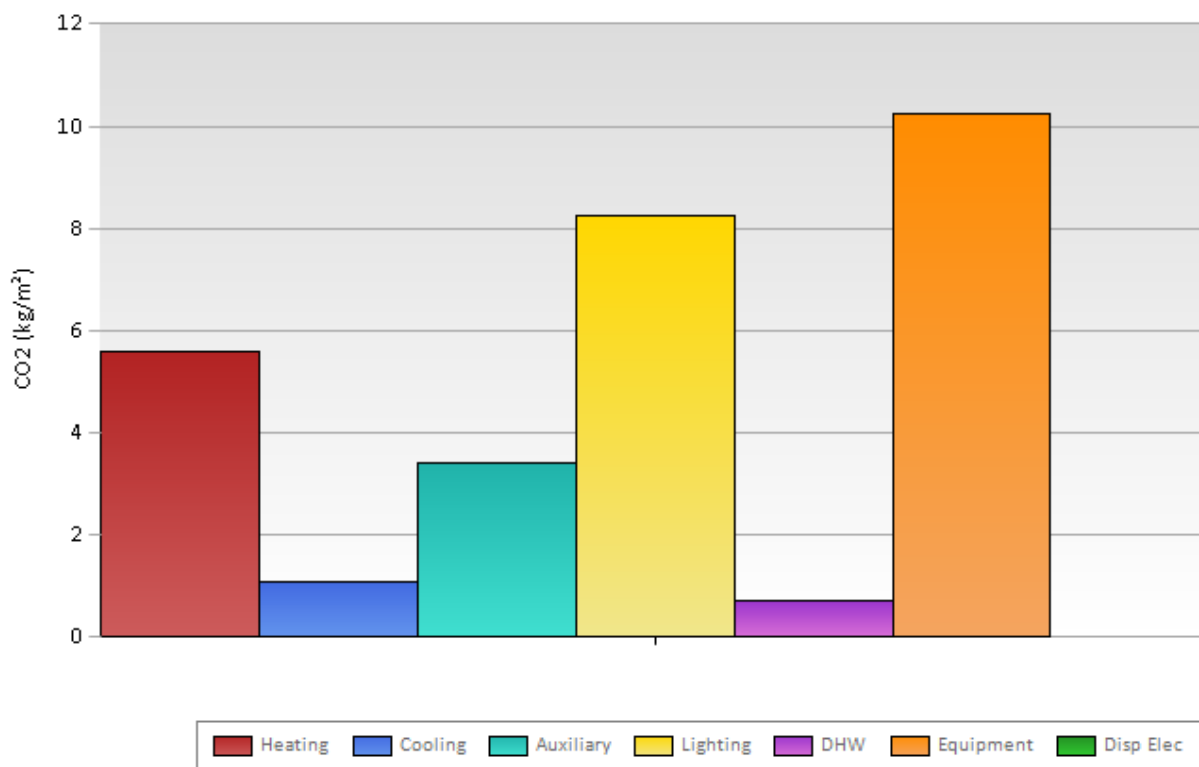
The store will incorporate water efficient fittings in line with equivalent BREEAM standards to reduce water consumption.

The incoming mains cold water supply will be separately metered, using a smart meter to allow Lidl and the local water authority to easily monitor water consumption. There will also be a water sub-meter in the utility room, which will be connected to the store building management system and will record and monitor store consumption.

9.00 'BE LEAN' – PREDICTED ENERGY USAGE

The following section details the predicted annual carbon dioxide emissions and energy consumption based on the TAS model for the 'Be Lean' measures of the Energy Hierarchy.

9.01 PREDICTED ANNUAL CARBON DIOXIDE EMISSIONS OF THE ACTUAL BUILDING

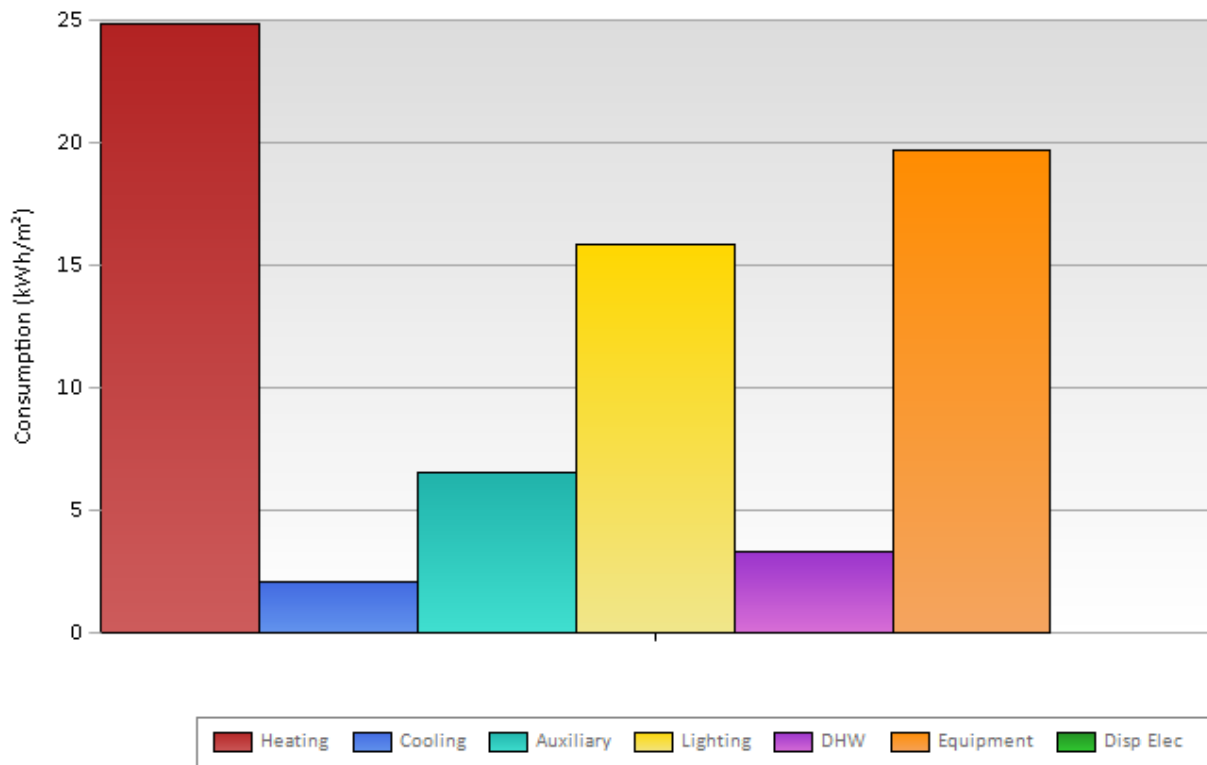


	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
CO2 (kg/m²)	5.58	1.09	3.39	8.25	0.71	10.23	0.00

Figure 11 - Annual Carbon Dioxide Emissions - Be Lean

Figure 11 shows an annual CO₂ emissions rate of 41,330.46kgCO₂/year of regulated emissions and 63,560.25kgCO₂/year inclusive of unregulated emissions. This represents a **22.18%** and **14.99%** carbon dioxide reduction respectively over the 2013 baseline detailed within section 7.0.

9.02 PREDICTED ANNUAL ENERGY CONSUMPTION OF THE ACTUAL BUILDING



	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
Consumption (kWh/m²)	24.90	2.10	6.53	15.89	3.30	19.70	0.00

Figure 12 - Annual Energy Consumption - Be Lean

Figure 12 above shows an annual energy consumption requirement of 114,560.56kWh/year of regulated energy and 157,368.66kWh/year inclusive of unregulated energy. This shows an annual energy consumption increase of **14.11%** and **10.68%** respectively over the 2013 baseline detailed within section 7.0.

10.00 'BE CLEAN' – DECENTRALISED LOW CARBON TECHNOLOGIES

A low or zero carbon technology is defined as something which either; produces energy through an endless, renewable source with low or zero carbon emission throughout its operation, or one in which uses a specific energy source i.e., electricity and provides a significantly higher output to input ratio.

Detailed below are the types of low or zero carbon technologies considered for implementation on this development. A series of centralised and decentralised systems have been analysed and viability stated to offer justification for use or omission.

10.01 COMBINED HEAT AND POWER (CHP)

Combined Heat and Power (CHP) is the on-site generation of electricity and the recovery of the normally wasted heat produced during this process.

- The operation of CHP plant can offer significant CO₂ emission rate reductions when compared to conventional methods of energy generation and use.
- Most large conventional power stations currently generate electricity at 30-50% efficiency (due to waste heat and transmission/distribution loss).
- 'Good quality' CHP schemes achieve overall efficiencies of 70-85% by making use of waste heat and eliminating transmission losses.

The efficient use of CHP typically depends on finding a use for the heat generated by the process. Issues to consider include:

- If heat is not used, then the system is effectively just an electricity generator and electricity will be greener and cheaper if sourced from the national grid.
- If excess electricity is generated on site this can be exported (sold) back to the grid whereas excess heat needs to be rejected (wasted). Exported electricity can count towards reducing the site's CO₂ emissions.
- Exported electricity will typically not be financially attractive as exports tend to coincide with low demand periods on the national grid. The cost of producing the electricity on site can be higher than the prices received for the exported electricity.

10.01.1 Viability

The introduction of a CHP unit will reduce running costs and carbon dioxide emissions associated with the operation of the building when compared to employing a conventional generator and/or boiler. However, the CHP plant should always operate as the lead heat source to maximise savings.

CHP systems require steady, constant loads all year round for best performance, with high running hours. This type of running schedule will usually be found in applications with high domestic hot water loads such as hotels, hospitals, care homes etc. Food retail stores have an inherently low hot water demand and therefore a CHP plant would not be deemed viable due to the lengthy amount of the year where the CHP engine would be sitting idle due to lack of thermal demand.

It can therefore be concluded that the possibility of introducing a combined heat and power system is both un-sustainable and un-economically viable on this project.

10.02 DECENTRALISED ENERGY NETWORKS (DEN)

10.02.1 Heat Density

Based on the heat density map below from The Department for Business, Energy and Industrial Strategy, the surrounding area has a moderate heat density surrounding the site and associated with the surrounding area. Much of the associated heat density is residential, with a small contribution from small scale industrial or commercial heat load. The low heat density associated with commercial or industrial units renders the possibilities of introducing a district heating network to the area low due to the high cost and low return potential.

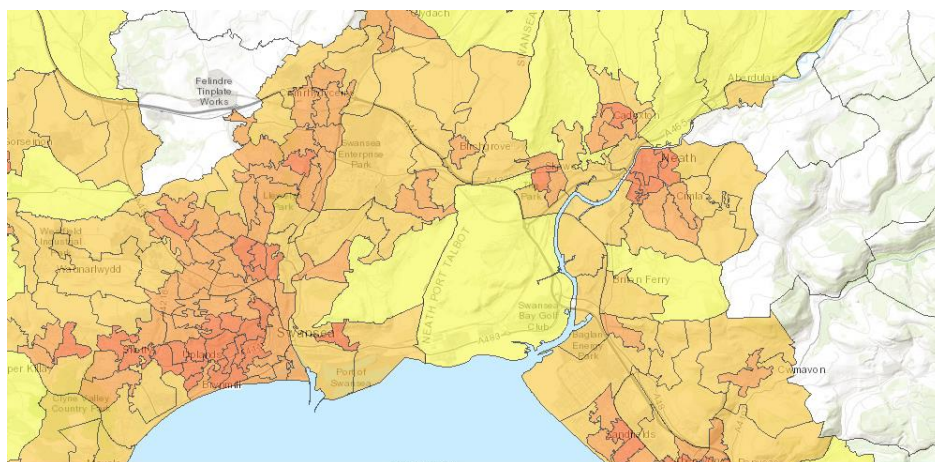


Figure 13 -The Department for Business, Energy & Industrial Strategy Heat Density Map

10.02.2 Existing Networks

The below map from The Department for Business, Energy and Industrial Strategy shows there are no current district heating schemes within the area.

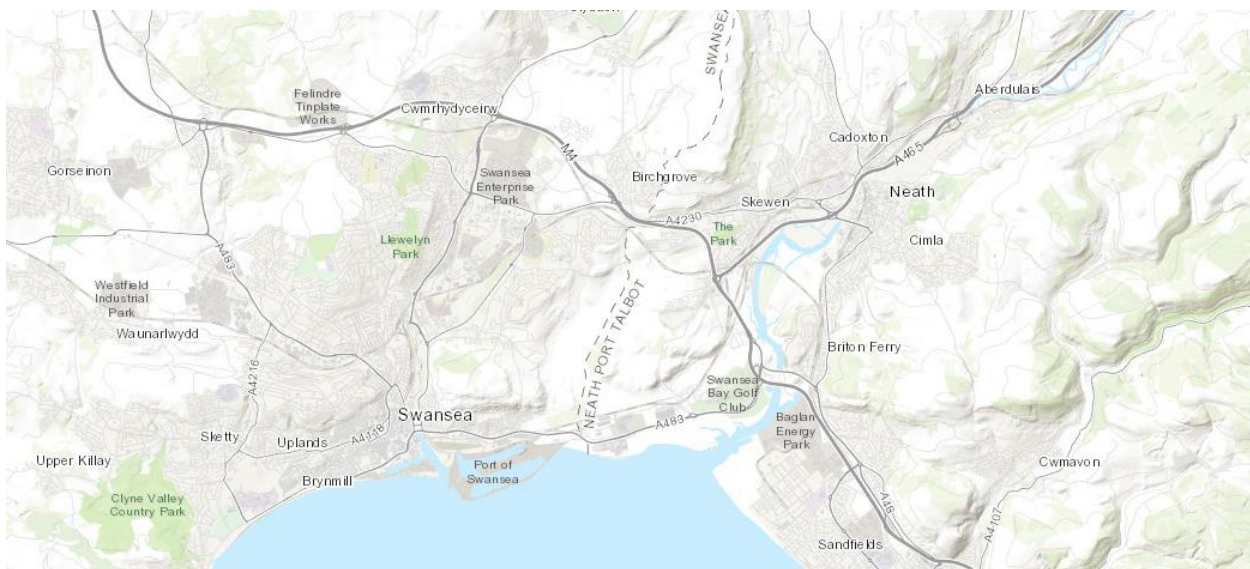


Figure 14 - The Department for Business, Energy & Industrial Strategy Current District Heating Schemes

10.02.3 Viability

As detailed in the above Heat Map, there are no current district heating networks, so the building services design strategy cannot be focused on the connection to a decentralised system.

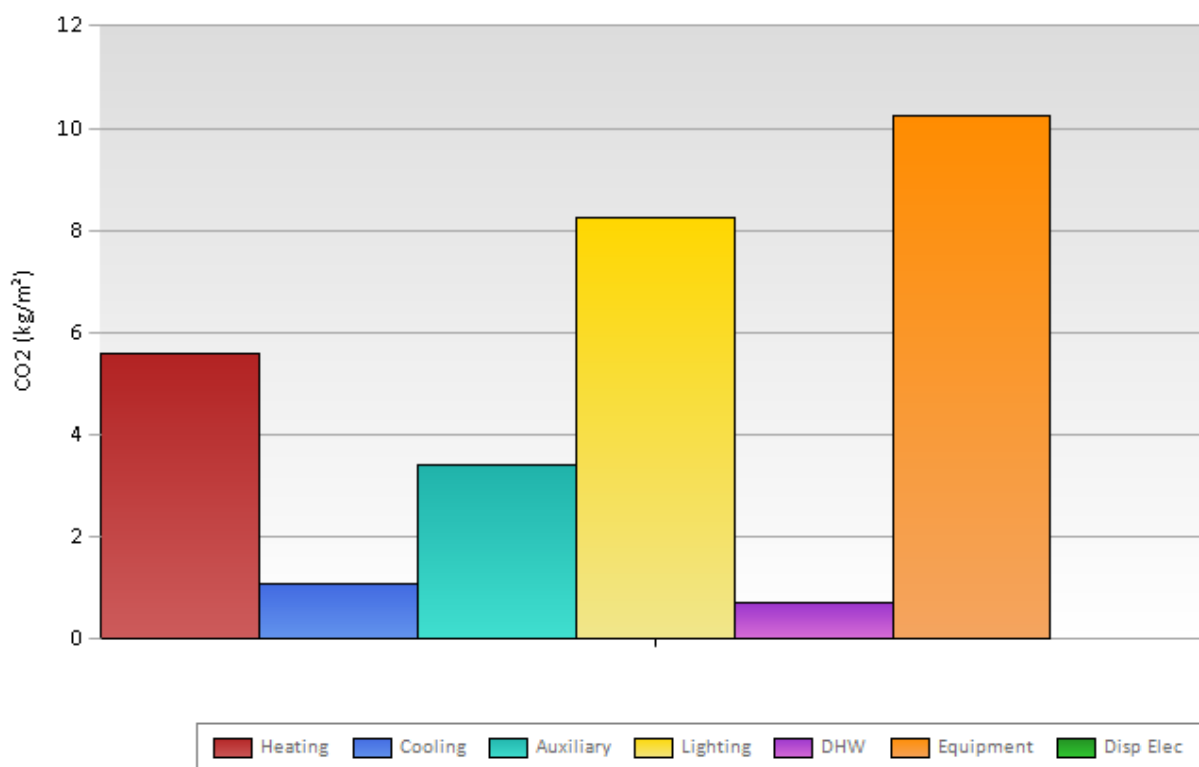
It should be noted that Neath has been deemed a District Heat Network Priority Area (refer to The Future Wales – National Plan 2040 for reference). This means the area has been marked as a potentially suitable area for a district energy network and feasibility studies are to be undertaken to ascertain the benefits and suitability of such a system. At present, there are no district heat networks within the area, and any future networks are being assessed for feasibility and as such, would not be operational for many years.

For this reason, it is not deemed suitable to base the building services design strategy around future connections to a district energy network.

11.00 'BE LEAN' AND 'BE CLEAN' PREDICTED ENERGY USAGE

The following section details the predicted annual carbon emissions and energy consumption based on the TAS model of the building once all passive and active, lean, and clean design strategies have been allowed for.

11.01 PREDICTED ANNUAL CARBON DIOXIDE EMISSIONS OF THE ACTUAL BUILDING

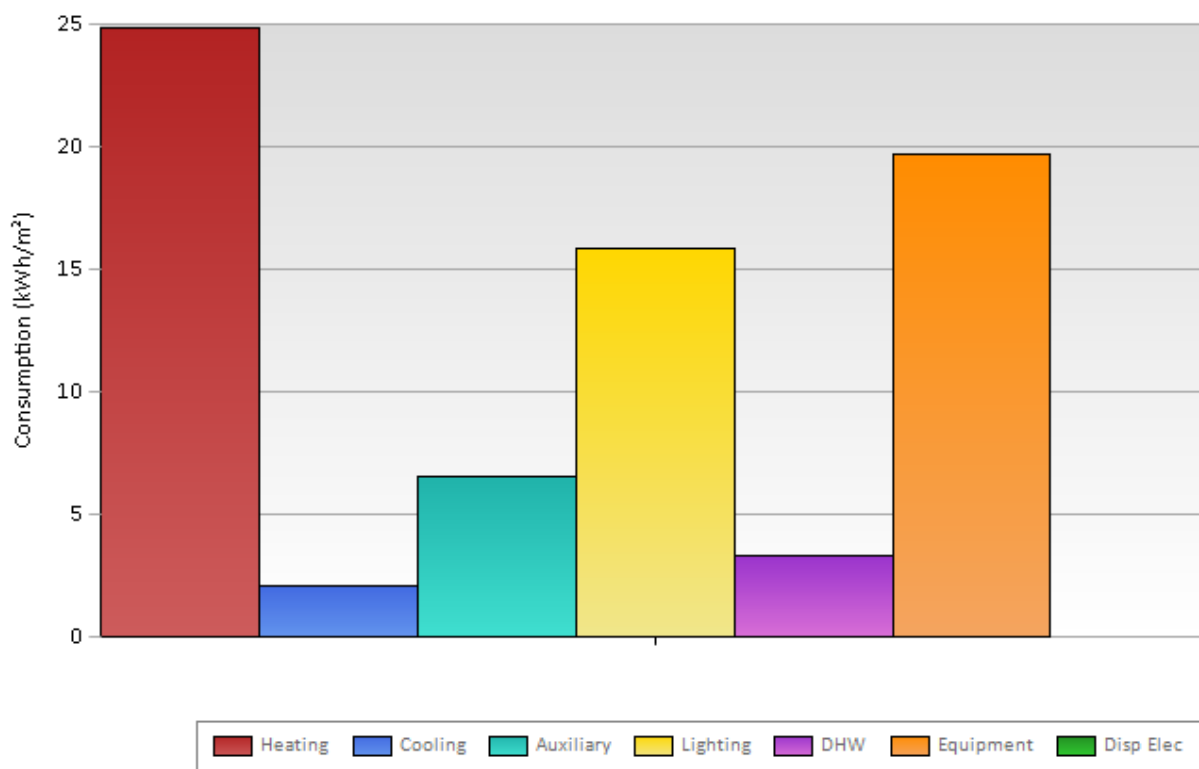


	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
CO2 (kg/m²)	5.58	1.09	3.39	8.25	0.71	10.23	0.00

Figure 15 - Annual Carbon Dioxide Emissions - Be Clean

Figure 15 shows an annual CO₂ emissions rate of 41,330.46kgCO₂/year of regulated emissions and 63,560.25kgCO₂/year inclusive of unregulated emissions. This represents a **22.18%** and **14.99%** carbon dioxide reduction respectively over the 2013 baseline detailed within section 7.0. The results are the same as the 'Be Lean' stage, as no decentralised systems can currently be incorporated into the design strategy.

11.02 PREDICTED ANNUAL ENERGY CONSUMPTION OF THE ACTUAL BUILDING



	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
Consumption (kWh/m²)	24.90	2.10	6.53	15.89	3.30	19.70	0.00

Figure 16 - Annual Energy Consumption - Be Clean

Figure 16 shows an annual energy consumption requirement of 114,560.56kWh/year of regulated energy and 157,368.66kWh/year inclusive of unregulated energy. This shows an annual energy consumption increase of **14.11%** and **10.68%** respectively over the 2013 baseline detailed within section 7.0. The results are the same as the 'Be Lean' stage, as no decentralised systems can currently be incorporated into the design strategy.

12.00 'BE GREEN' – LOW OR ZERO CARBON TECHNOLOGIES

A low or zero carbon technology is defined as something which either; produces energy through an endless, renewable source with low or zero carbon emission throughout its operation, or one which uses a specific energy source i.e., electricity and provides a significantly higher output to input ratio.

Due to the unviable incorporation of Combined Heat and Power (CHP), and current lack of existing district heating networks, the development will be required to incorporate "Individual building renewable systems" to ensure compliance with local and national planning requirements.

12.01 SOLAR THERMAL

Solar thermal collectors utilise solar radiation to heat water for use in water heating of a building. The radiation is converted using a solar collector, of which there are two main types available: Flat Plate and Evacuated Tube collectors. Evacuated tube systems occupy a smaller area and are more efficient, but also generally more expensive. Flat plate systems are cheaper to install but generally less efficient.

The solar coverage indicates the percentage of the annual domestic hot water energy requirement that can be covered by a solar water heating system. The higher the solar coverage, the more conventional energy usage can be offset, but this can cause excess heat generation in the peak summer months and generally lower the average collector efficiency. Therefore, solar coverages of 40-70% are recommended for domestic applications and up to 40% in non-domestic buildings.

Solar thermal systems in the UK normally operate with a backup fuel source, such as gas or electricity. The solar system pre-heats the water up to a maximum hot water temperature. If there is not enough solar power available to fully meet the required hot water load, then the backup fuel system fires up to meet this short fall.

The optimum orientation for a solar collector in the UK is a south facing surface, tilted at an angle of 30° from the horizontal.

For the solar water heating system to run safely and efficiently, a series of temperature sensors are connected to a digital solar controller to switch the system on or off according to the solar energy available.

12.01.1 Viability

Solar thermal panels are suited to buildings with a high and consistent hot water demand. Lidl Stores inherently have a low hot water demand and therefore, a solar thermal array would not be deemed viable or cost effective.

12.02 AIR SOURCE HEAT PUMP (ASHP)

Air source heat pumps exchange heat between the outside air and a building to provide space heating in winter and cooling in the summer months. The efficiency of these systems is inherently linked to the ambient air temperatures. Air source heat pumps operate best in environments with long, mild, mid-season periods, as the heating efficiency drops at lower ambient temperature in winter.

Unlike some other sources of renewable energy, heat pumps do require electricity to pump and compress refrigerants through the system. However, heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pump systems can supply as much as 4kW of thermal energy for just 1kW of electrical energy input, which is why they are recognised as a renewable technology under the Renewable Energy Directive 2009/28/EU.

12.02.1 Viability

ASHP's have been deemed a suitable way of offering space heating to the Sales Area, Warehouse and Side Rooms.

The Sales Area will be conditioned using an internal centralised intelligent AHU, with staged direct expansion heating and cooling changeover coils, fed via a two pipe VRF system.

For the Warehouse and Side Rooms, a three pipe VRF system with heat recovery capabilities will be utilised, which will work with ceiling mounted cassettes, or wall mounted units.

- Seasonal Coefficient of Performance: ≥ 3.0
- Seasonal Energy Efficiency Ratio: ≥ 3.0

The efficiencies detailed above exceed minimum national standards, ensuring the heating and cooling provided is of the highest standards available on the market for the selected type of Air Source Heat Pump.

12.03 PHOTOVOLTAICS (PV)

Photovoltaic solar cells convert solar energy directly into electricity. The cells consist of two layers of silicon with a chemical layer between. The incoming solar energy charges the electrons held within the chemical. The energised electrons move through the cell into a wire creating an electrical current.

A range of Photovoltaic products and colours are available, varying in efficiency and cost. These include Monocrystalline, Polycrystalline, Thin Film and Hybrid Panels. Hybrid Panels are the most energy efficient and Thin Film the least.

All the above technologies can be installed in roof and wall mounted arrays or as integrated building members, giving the additional benefit of offsetting the cost of other construction materials, such as weatherproof roof membranes or integrated into glazed wall constructions.

12.03.1 Viability

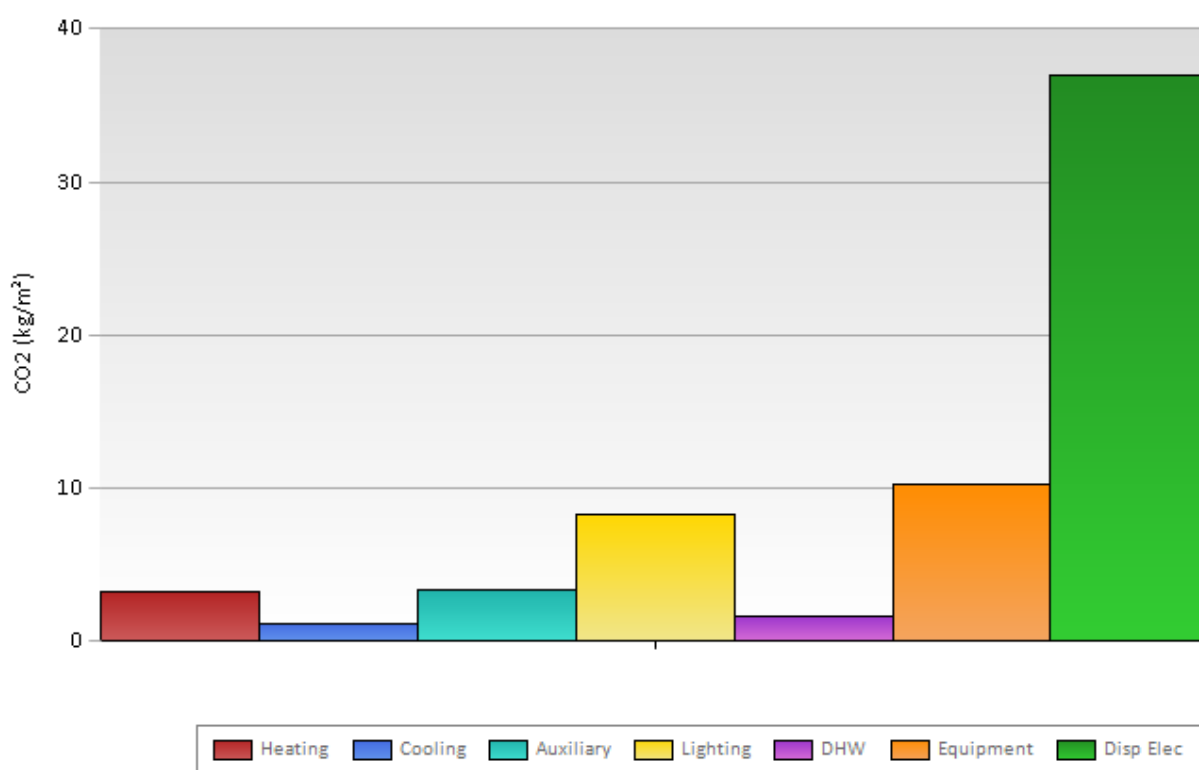
Photovoltaic panels have been deemed a suitable way of offering significant on-site energy generation to reduce the requirement for imported electrical energy. P.V. panels will be incorporated into the building services strategy:

- Panel Array – 840m²
- Panel Efficiency – 20.7%
- Panel Incline – 5.0°
- Orientation – 315° from North
- Annual Output – 154,782.79kWh/annum

13.00 'BE LEAN', 'BE CLEAN' AND 'BE GREEN' – PREDICTED ENERGY USAGE

The following section details the predicted annual carbon emissions and energy consumption based on the TAS model of the building once all passive and active design strategies detailed in section 8.00, 9.00, 10.00, 11.00 and 12.00 have been allowed for.

13.01 PREDICTED ANNUAL CARBON EMISSIONS OF THE ACTUAL BUILDING

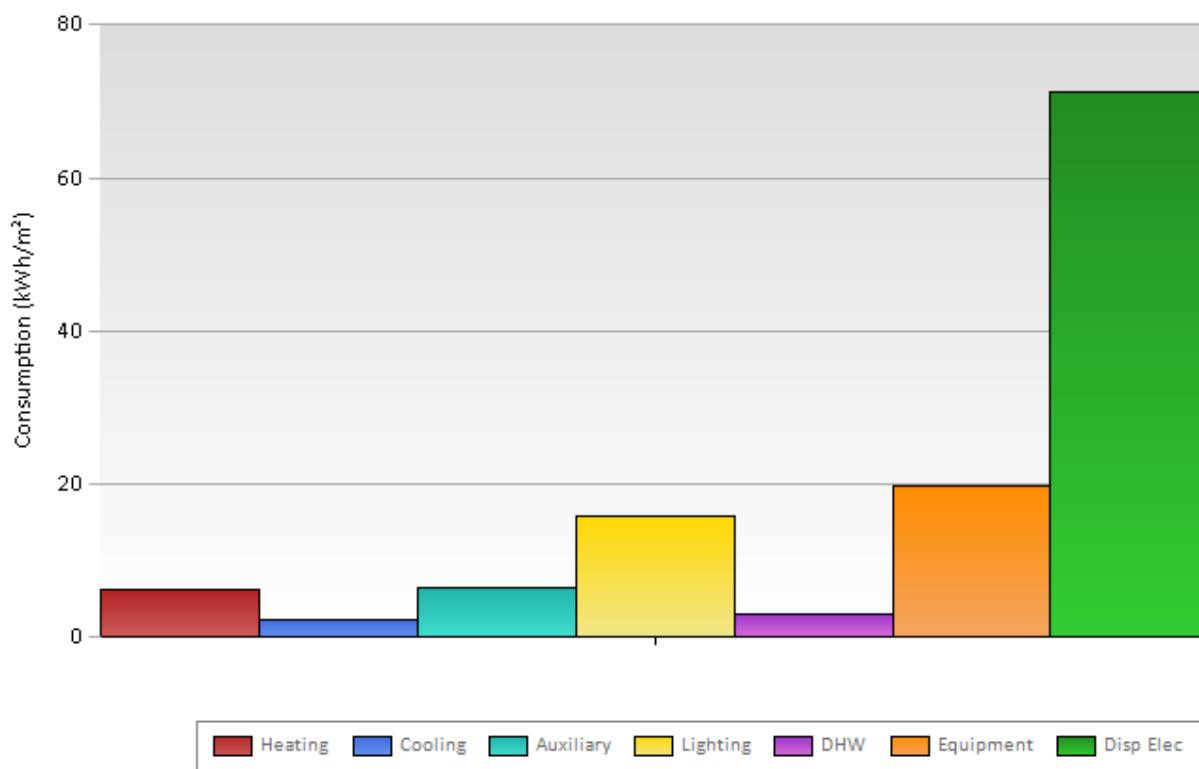


	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
CO2 (kg/m²)	3.24	1.09	3.37	8.25	1.56	10.23	36.97

Figure 17 - Annual Carbon Dioxide Emissions - Be Green

Figure 17 shows an annual CO₂ emissions rate of -42,286.58kgCO₂/year of regulated emissions and -20,056.79 kgCO₂/year inclusive of unregulated emissions. This represents a **179.62%** and **126.82%** carbon dioxide reduction respectively over the 2013 baseline detailed within section 7.0.

13.02 PREDICTED ANNUAL ENERGY CONSUMPTION OF THE ACTUAL BUILDING



	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
Consumption (kWh/m²)	6.25	2.10	6.49	15.89	3.01	19.70	71.23

Figure 18 - Annual Energy Consumption - Be Green

Figure 18 above shows an annual energy consumption requirement of -81,465.77kWh/year of regulated energy and -38,657.67kWh/year inclusive of unregulated energy. This shows an annual energy consumption reduction of **161.07%** and **121.94%** respectively over the 2013 baseline detailed within section 7.0.

The renewable technology energy generation contribution is expected to be, 154,782.79kWh/annum. This represents more than 100% of the stores anticipated annual energy consumption. It should be noted, the stores energy consumption profile may not correlate with the on-site energy generation, therefore, some of the electrical energy generated by the P.V. panels may be sent back to the grid, not used on site.

14.00 POLICY W3 WASTE MANAGEMENT IN NEW DEVELOPMENTS

Neath Port Talbot Local Development Plan, Policy W3 Waste Management in New Developments will be met through:

- Undertaking landform design and mass balance exercises to retain as much material on site and reduce disposable volumes being sent to landfill. This will reduce on-site waste production as well as limit the number of waste removal transport vehicles and their associated emissions.
- Construction waste for the retail development will be sorted and recycled in-line with the relevant waste segregation and site waste management plans. This will ensure high percentages of recycled and re-used “wate” thus minimising landfill requirements.
- During the operational phase of the retail store, a baler will be used for cardboard onsite, and other waste streams will be segregated as per Lidl’s standard approach to waste management.
- Lidl process their waste centrally at their regional distribution centre – this is their standard approach across their entire portfolio of stores.
- The store will be accessed via an enclosed loading bay on the north western elevation, so that all deliveries of goods to the food store, and the collection of waste from it, will be carried out within the building. There will be no movement or storage of waste in any outside area.
- Lidl food stores are typically served by 1 to 2 HGV deliveries per day and these deliveries take waste back to the regional distribution centre on their return journey, helping to reduce the number of traffic movements at Lidl’s sites and reducing emissions as a consequence.

15.00 CONCLUSION

The report has demonstrated the proposed Lidl Store in Briton Ferry will:

Incorporate passive design strategies to take advantage of:

- Natural daylighting through careful building and glazing orientation. This will offer a reduced dependency on electric lighting through the contribution of natural lighting to achieve the required Lux levels.
- Enhanced fabric efficiencies and thermal mass have been allowed for to help stabilise any temperature fluctuations within the building reducing heat gains and/or losses.

Incorporate active design strategies to reduce energy consumption by:

- Introduce heat recovery ventilation to pre-heat incoming fresh air. This will reduce the energy loads associated with fresh air heat loss/gains.
- Introduce separate sub-metering to allow for all energy consumed to be monitored and any discrepancies easily identified and fixed thus minimising wasted energy.
- Low energy lighting will be installed with suitable controls to ensure lights are not left on unnecessarily. Suitable controls will eliminate human error.
- Building energy management system (BEMS) will be designed and installed to manage all systems effectively, ensuring their efficiencies are maintained and achieved.

The Part L 2013 baseline annual carbon emissions and energy consumption has been calculated as follows:

- Regulated Annual Carbon Dioxide Emissions: **53,108.12kgCO₂/annum.**
- Regulated Annual Energy Consumption: **133,378.74kWh/annum.**

Combined Heat and Power and De-centralised Energy Network (DEN) solutions have been reviewed and discounted to be unviable for this store due to:

- Unsuitable energy consumption profiles for CHP (require high DWS consumption).
- No suitable De-centralised Energy Networks (DEN) in the vicinity of the development.

Alternative Low or Zero Carbon (LZC) technologies have been analysed with the following deemed to be both viable and advisable:

- Air Source Heat Pumps, or Aero-thermal Heat Pumps.

- Photovoltaic Panels
 - Panel Array – 840m²
 - Panel Efficiency – 20.7%
 - Panel Incline – 5.0°
 - Orientation – 315° from North
 - Annual Output – 154,782.79kWh/annum

The 'Be Green' actual building annual carbon emissions and energy consumption has been calculated as follows:

- Regulated Annual Carbon Dioxide Emissions: **-42,286.58kgCO₂/annum.**
- Regulated Annual Energy Consumption: **-81,465.77kWh/annum.**

These show a **179.62%** carbon dioxide reduction and a **161.07%** energy reduction, when assessed to Part L2A 2013 Building Regulations and accounting for the proposed passive, active and LZC strategies.

The expected annual energy generation through low and / or zero carbon technologies will be 154,782.79kWh/annum. This represents >100% of the stores anticipated annual energy consumption. It should be noted that the P.V. electrical generation may not correlate with the store's energy consumption profile, therefore, some of the on-site electrical energy generation may be exported back to the grid.

Policy W3 Waste Management in New Developments will be met through:

- Undertaking landform design and mass balance exercises to retain as much material on site and reduce disposable volumes
- Construction waste for the retail development will be sorted and recycled in-line with the relevant waste segregation and site waste management plans.
- During the operational phase of the retail store, a baler will be used for cardboard onsite, and other waste streams will be segregated as per Lidl's standard approach to waste management.

APPENDIX A – ‘BE LEAN’ BRUKL OUTPUT DOCUMENT

Project name

Lidl Briton Ferry - Be Lean**As designed****Date:** Fri Apr 22 16:27:40 2022**Administrative information****Building Details****Address:** Lidl Store, Briton Ferry, ,**Certification tool****Calculation engine:** TAS**Calculation engine version:** "v9.5.2"**Interface to calculation engine:** TAS**Interface to calculation engine version:** v9.5.2**BRUKL compliance check version:** v5.6.b.0**Certifier details****Name:** Andrew Parry**Telephone number:** 01924 265757**Address:** RCM Business Centres, Dewsbury Road, Ossett, Wakefield, WF5 9ND**Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target**

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24.4
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24.4
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	19
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.25	External Wall
Floor	0.25	0.25	0.25	Ground Floor
Roof	0.25	0.19	0.19	Roof
Windows***, roof windows, and rooflights	2.2	1.7	1.7	Admin Window - Glazing
Personnel doors	2.2	2.2	2.2	Solid Door - Door
Vehicle access & similar large doors	1.5	1.49	1.49	Roller Shutter
High usage entrance doors	3.5	1.7	1.7	Main Entrance Door - Door
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs. ** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. *** Display windows and similar glazing are excluded from the U-value check. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- VRF with Mech. Vent - Sales Floor (Lidl Sales Floor - RetWareSales 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3	-	1.91	0.83
Standard value	0.91*	2.6	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- VRF with Nat Vent. (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.11	-	-	-
Standard value	0.91*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- VRF with Mech. Vent (4 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.11	-	1.5	0.8
Standard value	0.91*	2.6	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

4- Extract Only (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0.5	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

5- Mechanical Ventilation (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0.75	0.8
Standard value	N/A	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

6- Mechanical Ventilation (Cloakroom - Store 3)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	1.5	0.8
Standard value	N/A	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Gas Fired Boiler

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.91	0
Standard value	0.9*	N/A

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
Lidl Sales Floor - RetWareSales 1	-	-	-	1.9	-	-	-	-	-	-	-	N/A
Customer WC - Toilet 1	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Staff WC 1 - Toilet 2	-	-	-	0.8	-	-	-	-	-	-	-	N/A
Staff WC 2 - Toilet 3	-	-	-	0.8	-	-	-	-	-	-	-	N/A
Meeting Room - Office 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Cash Office - Office 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
DRS - Store 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Cloakroom - Store 3	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Bakery - FoodPrep 1	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Staff Room - EatDrink 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Admin Corridor - Circulation 2	-	-	-	0.8	-	-	-	-	-	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
Lidl Sales Floor - RetWareSales 1	-	160	100	7889
Customer WC - Toilet 1	-	85	-	40
Staff WC 1 - Toilet 2	-	85	-	23
Staff WC 2 - Toilet 3	-	85	-	23
Meeting Room - Office 1	140	-	-	56
Cash Office - Office 2	140	-	-	59
DRS - Store 1	170	-	-	29
Utility - Store 2	140	-	-	10
Cloakroom - Store 3	105	-	-	14
BOH Warehouse - Store 4	160	-	-	210
Bakery - FoodPrep 1	-	125	-	392

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Staff Room - EatDrink 1		-	105	22	68
Entrance Lobby - Circulation 1		-	105	-	76
Admin Corridor - Circulation 2		-	105	-	82
IT Room - 24HrMisc		140	-	-	14

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Lidl Sales Floor - RetWareSales 1	NO (-93%)	NO
Meeting Room - Office 1	NO (-87%)	NO
Cash Office - Office 2	N/A	N/A
DRS - Store 1	N/A	N/A
BOH Warehouse - Store 4	N/A	N/A
Staff Room - EatDrink 1	NO (-87%)	NO
IT Room - 24HrMisc	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	2173	2173
External area [m ²]	5909	5909
Weather	CAR	CAR
Infiltration [m ³ /hm ² @ 50Pa]	4	6
Average conductance [W/K]	1572	1759
Average U-value [W/m ² K]	0.27	0.3
Alpha value* [%]	3.73	3.73

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

Building Use

% Area Building Type

100	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	24.9	19.64
Cooling	2.1	6.55
Auxiliary	6.53	3.5
Lighting	15.89	28.28
Hot water	3.3	3.41
Equipment*	19.7	19.7
TOTAL **	52.73	61.38

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	108.47	150.37
Primary energy* [kWh/m ²]	110.89	142.79
Total emissions [kg/m ²]	19	24.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	20.8	29.2	6.5	2.7	11.4	0.89	3	0.91	3	
Notional	24.3	124.2	8.3	9.6	5.6	0.82	3.6	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	268.1	23.7	83.5	2.1	2.7	0.89	3.11	0.91	3.11	
Notional	103.1	30.4	35	2.4	1.4	0.82	3.6	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	304.9	3.8	95	0.3	10	0.89	3.11	0.91	3.11	
Notional	240.9	32.2	81.7	2.5	6	0.82	3.6	----	----	
[ST] No Heating or Cooling										
Actual	25.2	0	7	0	11.7	1	0	1	0	
Notional	27.6	0	9.4	0	9.4	0.82	0	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
Actual	52.4	0	14.6	0	5.6	1	0	1	0	
Notional	29.3	0	9.9	0	7.9	0.82	0	----	----	

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.25	External Wall
Floor	0.2	0.25	Ground Floor
Roof	0.15	0.19	Roof
Windows, roof windows, and rooflights	1.5	1.7	Over Main Door - Glazing
Personnel doors	1.5	2.2	Solid Door - Door
Vehicle access & similar large doors	1.5	1.49	Roller Shutter
High usage entrance doors	1.5	1.7	Main Entrance Door - Door
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

APPENDIX B – ‘BE GREEN’ BRUKL OUTPUT DOCUMENT

Project name

Lidl Briton Ferry - Be Green**As designed****Date:** Fri Apr 22 16:15:52 2022**Administrative information****Building Details****Address:** Lidl Store, Briton Ferry, ,**Certification tool****Calculation engine:** TAS**Calculation engine version:** "v9.5.2"**Interface to calculation engine:** TAS**Interface to calculation engine version:** v9.5.2**BRUKL compliance check version:** v5.6.b.0**Certifier details****Name:** Andrew Parry**Telephone number:** 01924 265757**Address:** RCM Business Centres, Dewsbury Road, Ossett, Wakefield, WF5 9ND**Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target**

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.9
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.9
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	-19.5
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.25	External Wall
Floor	0.25	0.25	0.25	Ground Floor
Roof	0.25	0.19	0.19	Roof
Windows***, roof windows, and rooflights	2.2	1.7	1.7	Admin Window - Glazing
Personnel doors	2.2	2.2	2.2	Solid Door - Door
Vehicle access & similar large doors	1.5	1.49	1.49	Roller Shutter
High usage entrance doors	3.5	1.7	1.7	Main Entrance Door - Door
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs. ** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. *** Display windows and similar glazing are excluded from the U-value check. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- VRF with Mech. Vent - Sales Floor (Lidl Sales Floor - RetWareSales 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	3	-	1.91	0.83
Standard value	2.5*	2.6	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

2- VRF with Nat Vent. (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.95	3.11	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

3- VRF with Mech. Vent (4 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.95	3.11	-	1.5	0.8
Standard value	2.5*	2.6	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

4- Extract Only (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0.5	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

5- Mechanical Ventilation (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0.75	0.8
Standard value	N/A	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

6- Mechanical Ventilation (Cloakroom - Store 3)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	1.5	0.8
Standard value	N/A	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Direct Electric Water Heater

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
Lidl Sales Floor - RetWareSales 1		-	-	-	1.9	-	-	-	-	-	-	N/A
Customer WC - Toilet 1		-	-	0.5	-	-	-	-	-	-	-	N/A
Staff WC 1 - Toilet 2		-	-	-	0.8	-	-	-	-	-	-	N/A
Staff WC 2 - Toilet 3		-	-	-	0.8	-	-	-	-	-	-	N/A
Meeting Room - Office 1		-	-	-	1.5	-	-	-	-	-	-	N/A
Cash Office - Office 2		-	-	-	1.5	-	-	-	-	-	-	N/A
DRS - Store 1		-	-	-	1.5	-	-	-	-	-	-	N/A
Cloakroom - Store 3		-	-	-	1.5	-	-	-	-	-	-	N/A
Bakery - FoodPrep 1		-	-	0.5	-	-	-	-	-	-	-	N/A
Staff Room - EatDrink 1		-	-	-	1.5	-	-	-	-	-	-	N/A
Admin Corridor - Circulation 2		-	-	-	0.8	-	-	-	-	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
Lidl Sales Floor - RetWareSales 1	-	160	100	7889
Customer WC - Toilet 1	-	85	-	40
Staff WC 1 - Toilet 2	-	85	-	23
Staff WC 2 - Toilet 3	-	85	-	23
Meeting Room - Office 1	140	-	-	56
Cash Office - Office 2	140	-	-	59
DRS - Store 1	170	-	-	29
Utility - Store 2	140	-	-	10
Cloakroom - Store 3	105	-	-	14
BOH Warehouse - Store 4	160	-	-	210
Bakery - FoodPrep 1	-	125	-	392
Staff Room - EatDrink 1	-	105	22	68

General lighting and display lighting		Luminous efficacy [lm/W]		
Zone name		Luminaire	Lamp	Display lamp
	Standard value	60	60	22
Entrance Lobby - Circulation 1		-	105	-
Admin Corridor - Circulation 2		-	105	-
IT Room - 24HrMisc		140	-	-
				General lighting [W]
				76
				82
				14

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Lidl Sales Floor - RetWareSales 1	NO (-93%)	NO
Meeting Room - Office 1	NO (-87%)	NO
Cash Office - Office 2	N/A	N/A
DRS - Store 1	N/A	N/A
BOH Warehouse - Store 4	N/A	N/A
Staff Room - EatDrink 1	NO (-87%)	NO
IT Room - 24HrMisc	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	2173	2173
External area [m ²]	5909	5909
Weather	CAR	CAR
Infiltration [m ³ /hm ² @ 50Pa]	4	6
Average conductance [W/K]	1572	1759
Average U-value [W/m ² K]	0.27	0.3
Alpha value* [%]	3.73	3.73

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

Building Use

% Area Building Type

100	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	6.25	7.01
Cooling	2.1	6.55
Auxiliary	6.49	3.46
Lighting	15.89	28.28
Hot water	3.01	3.41
Equipment*	19.7	19.7
TOTAL **	33.73	48.72

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	71.23	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	108.47	150.37
Primary energy* [kWh/m ²]	103.56	138.24
Total emissions [kg/m ²]	-19.5	23.9

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	20.8	29.2	1.7	2.7	8.9	3.5	3	3.5	3	
Notional	24.3	124.2	2.8	9.6	4.4	2.43	3.6	----	----	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	268.1	23.7	18.9	2.1	0	3.95	3.11	3.95	3.11	
Notional	103.1	30.4	11.8	2.4	0	2.43	3.6	----	----	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	304.9	3.8	21.4	0.3	7.8	3.95	3.11	3.95	3.11	
Notional	240.9	32.2	27.5	2.5	4.8	2.43	3.6	----	----	
[ST] No Heating or Cooling										
Actual	25.2	0	7	0	11.7	1	0	1	0	
Notional	27.6	0	9.4	0	9.4	0.82	0	----	----	
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	52.4	0	14.6	0	4.3	1	0	1	0	
Notional	29.3	0	9.9	0	6.6	0.82	0	----	----	

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.25	External Wall
Floor	0.2	0.25	Ground Floor
Roof	0.15	0.19	Roof
Windows, roof windows, and rooflights	1.5	1.7	Over Main Door - Glazing
Personnel doors	1.5	2.2	Solid Door - Door
Vehicle access & similar large doors	1.5	1.49	Roller Shutter
High usage entrance doors	1.5	1.7	Main Entrance Door - Door
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4