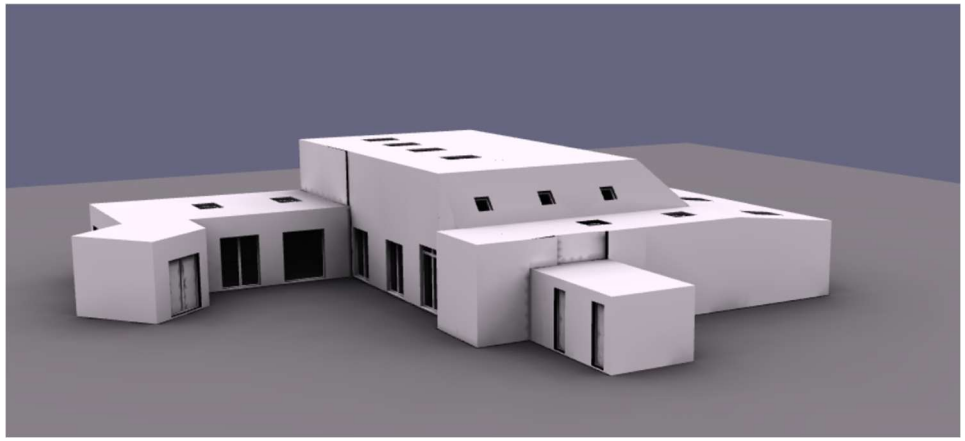
NYMNPA
21/12/2021

Part L2A Input Report
Towbar Express Office
Egton

Dec 2021
Revision A



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1.0 Introduction

This report demonstrates the As-Designed stage compliance with the requirements of Building Regulations Approved Document Part L2A (2013), Conservation of Fuel and Power in Non-Domestic Buildings, for Towbar Express Office at Egton, North Yorkshire. The report also demonstrates compliance with the renewable energy requirements for planning.

1.1 Assessor Details

Name:	P Thornton
Assessor Number:	LCEA 125717
Accreditation Scheme: CIBSE Certification	
Qualifications:	LCC Building Design, LCC Simulation, LCEA EPC Level 5
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2.0 Requirements for Part L2A Compliance

2.1 General

To demonstrate compliance with the requirements for Approved Document L2A 2013 there are five separate criteria that must be met.

2.2 Criterion 1 - Achieving the BER

A standard assessment methodology is used for all types of non-domestic building based upon calculating carbon dioxide emissions for the building using a modelling tool – Simplified Building Energy Model (SBEM) or Dynamic Simulation Modelling (DSM).
A Notional building is created by the modelling tool of the same size and shape as the actual building but with specified properties for fabric, mechanical and electrical systems and plant efficiencies. A Target CO_2 Emission Rate (TER) is generated from the Notional building. An actual Building CO_2 Emission Rate (BER) is generated for the proposed building using the same methodology but with the actual proposed properties. Compliance is met where the BER is less than or equal to the TER.

2.3 Criterion 2 - Limits on Design Flexibility

As the method for calculating the BER allows considerable design flexibility Approved Document Part L2A 2013 imposes worst case design limits for the building fabric and fixed building services via reference to the 2013 Non-Domestic Building Services Compliance Guide. Compliance is met by equalling or improving upon these design limits.

2.4 Criterion 3 - Limiting the Effects of Solar Gains in Summer

It is a requirement to demonstrate that solar gains have been limited during the summer period to either reduce the need for air conditioning; or to reduce the installed capacity of any air conditioning system that is installed. Results are detailed within the BRUKL document.

2.5 Criterion 4 – Building Performance Consistent with BER

It must be shown through further calculation at the as built stage that the actual performance of the building is consistent with the calculated BER.

The calculation should incorporate changes made between design and construction / installation.

2.6 Criterion 5 – Provisions for Energy Efficient Operation of the Building

The owner of the building should be provided with sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

3.0 Input Data

3.1 Weather Data

The CIBSE Test Reference Year (TRY) weather file for Leeds has been used for this Part L analysis. This is the closest, and most appropriate, weather file for this project and consists of hourly data for twelve typical months, selected from approximately 20-year data sets (typically 1983-2004), and smoothed to provide a composite, but continuous, 1-year sequence of data. The TRY weather file is used for all Part L2 and EPC calculations.

3.2 Air Permeability

An air permeability of 5.0$m^{-3}.hr^{-1}.m^{-2}$ @ 50Pa has been assumed for this building.

3.3 Internal Conditions

Each internal zone has been assigned an internal condition relating to the activity associated with it. The internal conditions for this project are “B1 Office” as taken from the National Calculation Method (NCM) activities database (v5.2.7), issued by the Department of Communities and Local Government (DCLG) for Part L2 and EPC analysis. These are the most appropriate internal conditions for the building use and occupancy profile.

3.4 Lighting

Lighting is provided by high efficiency LED luminaires and as detailed below. In areas served by PIR controls a default parasitic power of 0.1W/m^2 has been applied. Where Relux power data is not available, the lighting efficacy has been used.
Electric power factor is assumed to be <0.90.

Lighting and Controls				
Area	Installed Power (W/m^2)	Luminaire Efficacy (Lm/W)	Auto Presence Detection	Daylight Control
Office	-	85	Absence	Yes

Lighting and Controls				
Area	Installed Power (W/m^2)	Luminaire Efficacy (Lm/W)	Auto Presence Detection	Daylight Control
Circulation	-	85	Yes	Yes
Reception	-	85	No	Yes
Store	-	85	Yes	No
WC	-	85	Yes	No
Kitchen	-	85	Yes	No
Server	-	85	Yes	No
Plant	-	85	Yes	No

3.5 Ventilation

The building is predominately ventilated using Natural Ventilation Heat Recovery (NVHR) units, opening windows and mechanical extract to the WCs spaces. As the NVHR units predominately operate in natural ventilation mode, with boost for high internal temperatures and CO_2 levels, they are considered as natural ventilation units for Part L2A compliance.

Ventilation Services			
Area	Ventilation System Type	Heat Recovery Efficiency (%)	Efficiency (W/l/s)
All Areas (Other Than Noted Below)	Natural	n/a	n/a

Ventilation Services			
Area	Ventilation System Type	Heat Recovery Efficiency (%)	Efficiency (W/l/s)
WC	Extract	n/a	0.3
Kitchen	Extract	n/a	0.5

3.6 Heating & Cooling

The building is predominately heated by Air Source Heat Pumps (ASHP) serving perimeter radiators. Storerooms are unheated. Mechanical cooling is provided to the sever room only.

Heating & Cooling Systems			
Type	Cooling Efficiency (SEER)	Heating Efficiency (SCOP)	Distribution Efficiency (%)
ASHP	n/a	3.34	92.5
Split DX	4.5	4.5	100

3.8 Domestic Hot Water

The domestic hot water is generated by the ASHP system from a 150 litre cylinder with an immersion heater to elevate the water temperature to 60ºC.

Domestic Hot Water Services					
Generator Type	System %	Generator Efficiency (%)	Distribution Efficiency (%)	Storage Capacity (Litres)	Storage Insulation (Mm)
ASHP	70	334	95	150	50
Immersion	30	100	100		

3.9 Building Fabric

The following main tabulated constructions have been taken from Integra Ground Floor GA Plan. The thermal performance ('U' value) is calculated within the thermal modelling software based on the construction make-up and materials used.

Item	Construction Make Up	U-Value (W/m2K)	Thermal Mass (Time Constant -Hours)
External Wall	Concrete, thermal insulation, air gap, plasterboard	0.3	15.5
Internal Wall	Plasterboard, concrete, plasterboard	1.8	4.6
Roof	Tile, insulation, air gap, plasterboard	0.25	1.4
Ground Floor	Plywood, Insulation, Plywood, Insulation, Substrate	0.22	210
Windows / Door Glazing	Doubled Glazed Units (G Value 0.4, Light Trans 0.71)	1.53	0
Rooflight	Doubled Glazed Units (G Value 0.55, Light Trans 0.61)	1.7	0
Door / Glazing Frame	Notional Frame Material	2.2	1.4
Solid Door	Notional Door	2.18	0.89

4.0 Results

4.1 Part L2A BRUKL

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Towbar Express Office — As designed

Date: Mon Dec 20 09:21:09 2021

Administrative information

Building Details

Address: Towbar Express, High Street, Egton, York, YO

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: P Thornton

Telephone number: 07584041926

Address: 54 Blossom Street, York, YO24 1AP

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	18.3
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	18.3
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	16.3
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.34	2.15	Internal Wall 0.5-exposed
Floor	0.25	0.22	0.22	Ground Floor
Roof	0.25	0.25	0.25	Roof
Windows***, roof windows, and rooflights	2.2	1.75	1.92	Rooflight 0.6x0.6
Personnel doors	2.2	2.06	2.18	External Door (solid)
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

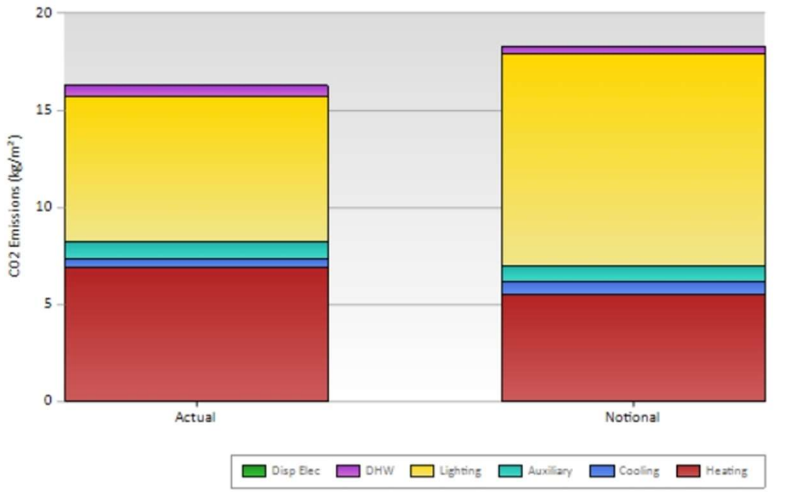
* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (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	5

4.2 CO_2 Emissions by Sector

Tas UK Building Regulations Studio

Annual CO2 Emissions Comparison



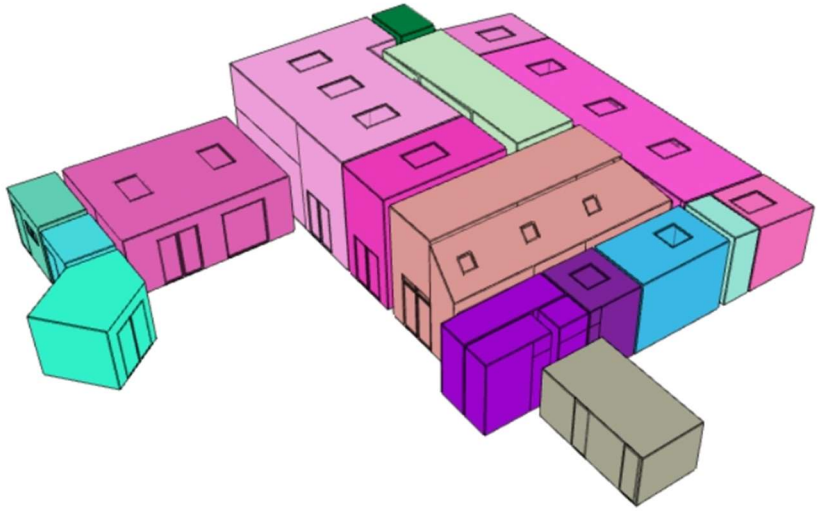
	Actual	Notional
Heating (kgCO2/m²)	6.89	5.56
Cooling (kgCO2/m²)	0.44	0.62
Auxiliary (kgCO2/m²)	0.86	0.80
Lighting (kgCO2/m²)	7.52	10.89
DHW (kgCO2/m²)	0.58	0.41
Displaced Electricity (kgCO2/m²)	0.00	0.00
*Equipment (kgCO2/m²) **	*24.21*	*23.60*
Total (kgCO2/m²)	16.29	18.28
Total Floor Area (m²)	297.34	297.34

** Energy used by equipment does not contribute to total value - it is presented here for comparison only*

5.0 TAS Floor Plans and 3D Images

5.1 Ground Floor Thermal Zones

5.2 Thermal Zones in 3D

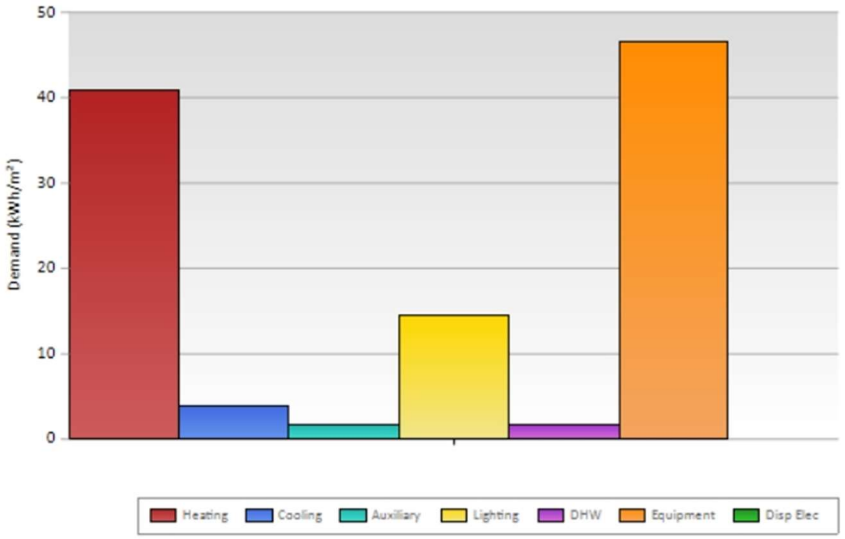


6.0 Renewable Energy for Planning

There is a planning requirement to achieve 10% of the building CO_2 emissions from a renewable energy source. This building is proposing to use an Air Source Heat Pump (ASHP) for the heating and domestic hot water generation. The dynamic simulation uses the SBEM engine to calculate the carbon emissions from each building energy use, these are shown in Section 4.2. The methodology from the North York Moors National Park Authority planning document has been used to demonstrate compliance (including amended carbon factor):

Tas UK Building Regulations Studio

Actual Annual Demand



	Heating	Cooling	Auxiliary	Lighting	DHW	Equipment	Displaced Electricity
Demand (kWh/m²)	41.02	3.81	1.67	14.49	1.74	46.64	0.00

Proposed CO_2 emissions	16.29kg.CO_2.m^{-2} (from SBEM) x 297m^2	= 4838.1kgCO_2
10% Requirement	10% of 4838.1kgCO_2	= 483.81 kgCO_2
Renewable Energy Demand (kWh)	ASHP (Heating) 41.02kWh.m^{-2} x 297m^2	= 12182.9kWh
	ASHP (DHWS) 1.74kWh.m^{-2} x 297m^2	= 516.8kWh
	Total	= 12699.7kWh
Planning Carbon Factor	0.194 (kWh to kg.CO^{-2})	= 2463.7kgCO_2
Renewable contribution	2463.7kgCO_2 / 4838.1kgCO_2 x 100	= **50.9%**