

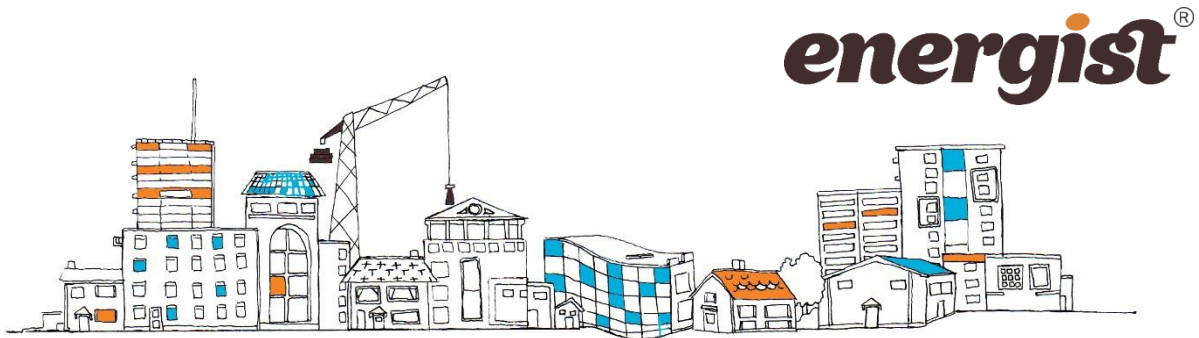
PV Justification Statement

C510 - Bicester

On behalf of Marbank Construction Ltd

Revision B

Date: 28th October 2021



REVISION HISTORY

Revision	Issue Date	Description	Issued By	Checked By
A	19/08/2021	Original Document	AP	JP
B	28/10/2021	Spec Changes	AP	DB

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

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1. EXECUTIVE SUMMARY

This PV Justification Statement has been produced by Energist UK on behalf of Marbank Construction Ltd ('the Applicant').

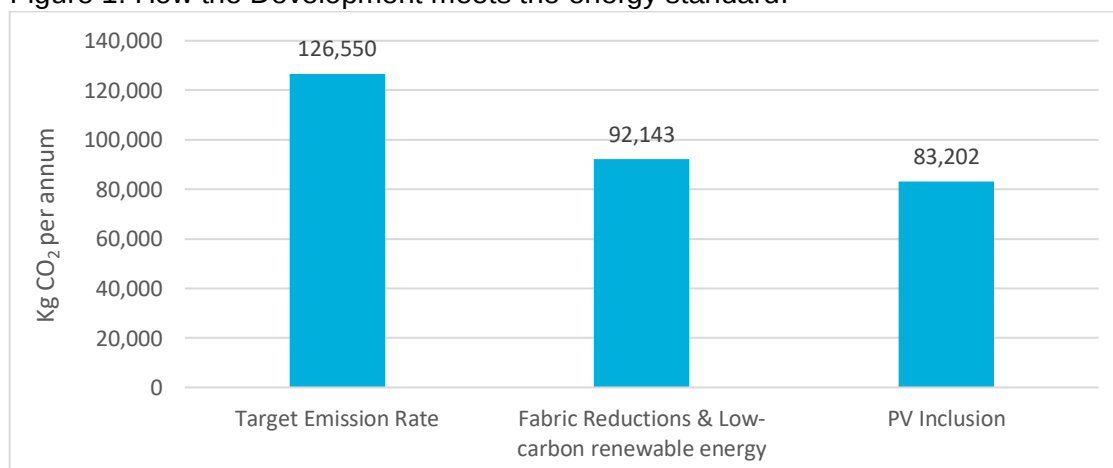
It will set out the measures planned by the Applicant to achieve energy reductions at the proposed development site: Morley, Bicester ('the Development') demonstrating compliance with:

- i) Condition 11: *Prior to the first occupation of the development, a scheme for the provision of solar PV to serve the development shall be submitted to and approved in writing by the Local Planning Authority. The solar PV shall be provided in accordance with the approved details prior to the first occupation of the unit they serve and retained as such thereafter.*
Reason - *To support the delivery of renewable and low carbon energy in accordance with Government guidance contained within the National Planning Policy Framework.*

Table 1: Measures incorporated to deliver the energy standard.

Fabric first: Demand-reduction measures	• Energy-efficient building fabric and insulation to all heat loss walls and roofs. • High-efficiency double-glazed windows throughout. • Quality of build will be confirmed by achieving good air-tightness results throughout. • Efficient-building services including high-efficiency heating systems. • Low-energy lighting throughout the building.
Fabric Reductions & Low-carbon renewable energy	• The units will be fitted with a possible provision for ASHP with a COP efficiency of 400% feeding convectors.
PV Inclusion Additional Energy Demand	• A PV array of approximately 120sqm, depending on the system being used, (in unshaded south facing position) will be installed in this phase to meet the on-site energy reduction requirement.

Figure 1: How the Development meets the energy standard.



The calculated reduction in CO₂ emissions and the percentage reduction in CO₂ over ADL 2013 is demonstrated in Table 2.

Table 2: CO₂ emissions and percentage reduction over ADL 2013.

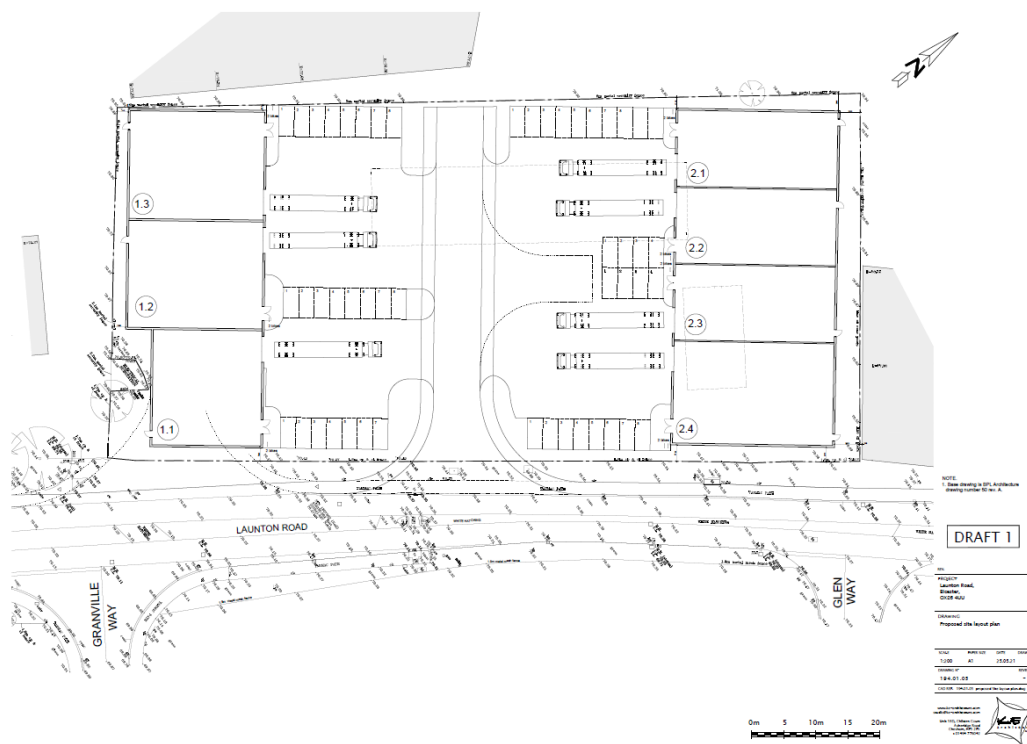
	CO ₂ emissions	
	Kg/CO ₂ per annum	% Reduction
Target Emission Rate: Compliant with ADL 2013	126,550	-
Fabric Reductions & Low-carbon renewable energy	92,143	27.19%
PV Inclusion	83,202	7.07%
Total savings	43,348	34.25%

2. INTRODUCTION

2.1 Site Description

This PV Justification Statement has been prepared for the non-residential development at C510 - Bicester.

The Development consists of two separate shell and core blocks containing seven separate units.



Map 1: Site location for C510 - Bicester.

Source: KE Architecture, 2021.

2.2 Purpose of the Statement

This Statement sets out how the Applicant intends to meet:

- i) Condition 11: 5% Reduction in Energy through the use of PV

The way in which the Applicant meets the overall energy standard at C510 - Bicester will be set out in this Statement as follows:

- **Baseline energy demand:** The Development's Target Emission Rate (TER) will be calculated to establish the minimum on-site standard for compliance with ADL 2013.
- **Fabric Reductions & Low-carbon renewable energy:** Enhanced Fabric specifications as well as low-carbon and renewable energy technologies will be assessed for their suitability and viability in relation to the Development. Solutions will be put forward for the development and the resulting CO₂ emission savings presented.
- **PV Technology and renewable energy:** Photovoltaic technologies will be assessed in order to meet the additional reduction requirements at this Development.

2.3 Methods

Energist UK has used SBEM 5.6b methodology to calculate the energy demand for the (non-residential/commercial) elements of the Development. The whole proposed building at C510 - Bicester has been modelled as part of the energy assessment.

3. BASELINE ENERGY DEMAND

3.1 Introduction

In order to measure the effectiveness of demand-reduction measures, it is first necessary to calculate the baseline energy demand, and this has been done using SBEM 5.6ba methodology. This can also be referred to as the Target Emission Rate (TER.)

The resulting ADL 2013 Baseline for C510 - Bicester has been calculated using Part L model designs which have been applied to the Applicant's Development details. The baseline energy demand, represents the maximum kWh energy permitted for the Development in order to comply with ADL 2013

3.2 The Development Baseline

The resulting TER, representing the total maximum CO₂ emissions permitted for the Development, has been calculated as 126,550 kg/CO₂ per annum. To ensure compliance with ADL 2013, CO₂ emissions should not exceed this figure.

3.3 The Development - Reduced Energy Demand & Low-Carbon Technology

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

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

The Applicant's design specification and intended demand-reduction measures for the Development have been modelled using the same SBEM 5.6b methodology as before. This allows us to assess the effectiveness of demand-reduction measures as a percentage reduction in CO₂ emissions over the Baseline.

The total calculated CO₂ emissions for C510 - Bicester is 92,143 Kg/CO₂ per annum, which is a reduction of 27.19% or 34,407 Kg/CO₂ per annum over the Baseline.

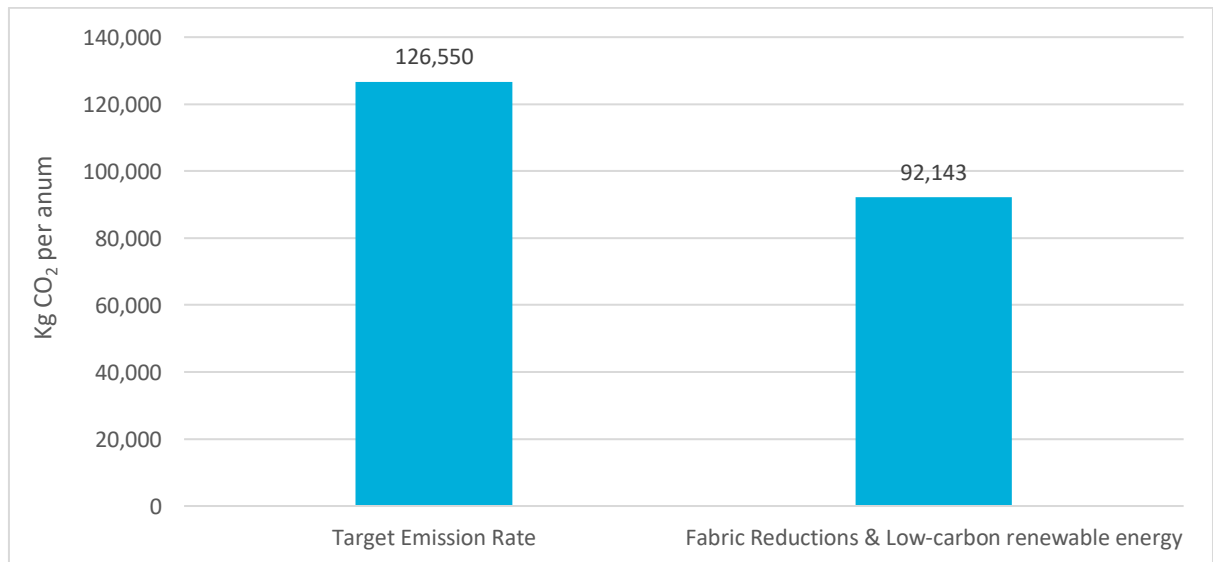
3.4 Conclusion

By incorporating sustainable design and energy-reduction design measures at C510 - Bicester, the Applicant will reduce CO₂ emissions by 27.19% over the Baseline for ADL 2013. This is illustrated in Table 3 and in Figure 2 below.

Table 3: The CO₂-emissions baseline and fabric-first, demand-reduction measures.

	CO ₂ emissions	
	Kg/CO ₂ per annum	% Reduction
Target Emission Rate: Compliant with ADL 2013	126,550	-
Fabric Reductions & Low-carbon renewable energy	92,143	27.19%

Figure 2: Baseline and fabric-first CO₂-emissions summary.



4. LOW-CARBON AND RENEWABLE ENERGY

4.1 Introduction

The Applicant adopts a fabric-first approach alongside possible provision for ASHPs as the priority solution for this Development and steps have been taken to reduce energy demand through high-quality sustainable design.

The planned integration of efficient building fabric and building services has been modelled and is predicted to lead to an enhancement over Part L of the Building Regulations 2013.

In order to achieve the additional reduction requirements, the developer will also look to utilise PV as an additional reduction measure.

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

5. CONCLUSIONS

The Applicant demonstrates commitment to delivering the energy standard at C510 - Bicester as follows:

- The Development has been designed to generate a total reduction in CO₂ emissions of 34.25% over the TER ADL 2013.
- This energy standard is delivered through a fabric-first approach to design and low-carbon and renewable energy, as well as PV Panels to the roof.

A combination of demand-reduction measures, energy-efficiency measures and low-carbon and renewable energy will deliver the Applicant's target for on-site reduction in CO₂ emissions.

The following measures, summarised here in Table 4, are incorporated in the development proposals.

Table 4. Measures incorporated to deliver the energy standard.

Fabric first: Demand-reduction measures	• Energy-efficient building fabric and insulation to all heat loss walls and roofs. • High-efficiency double-glazed windows throughout. • Quality of build will be confirmed by achieving good air-tightness results throughout. • Efficient-building services including high-efficiency heating systems. Low-energy lighting throughout the building.
Fabric Reductions & Low-carbon renewable energy	The units will be fitted with a possible provision for ASHP with a COP Efficiency of 400% feeding convectors.
PV Inclusion Additional Energy Demand	A PV array of approximately 120sqm, depending on the system being used (in unshaded south facing position) will be installed in this phase to meet the on-site energy reduction requirement.

Figure 3: How the Development delivers the energy standard.

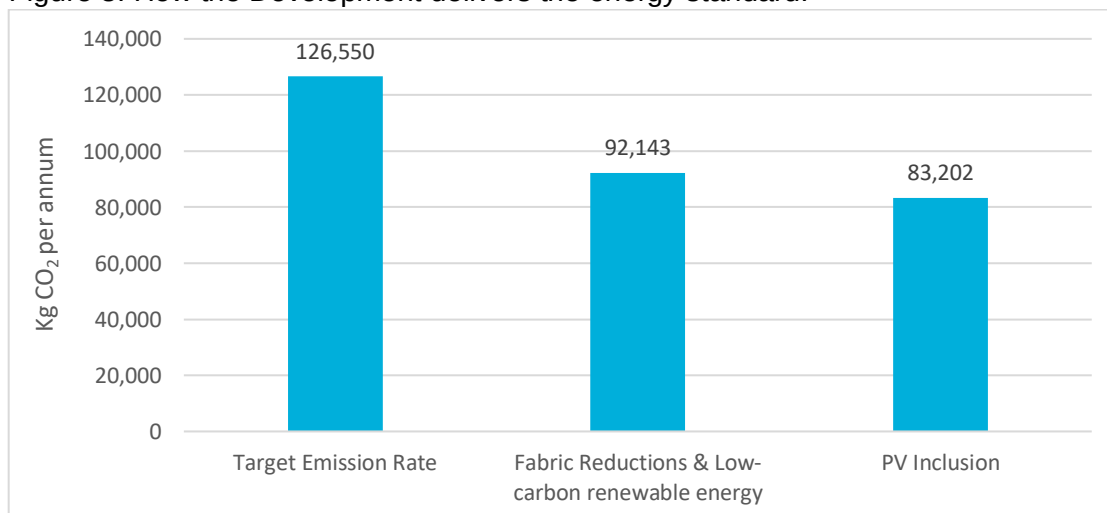


Table 5: How the Development reduces CO₂ emissions.

	CO ₂ emissions	
	Kg/CO ₂ per annum	
Target Emission Rate: Compliant with ADL 2013	126,550	Target Emission Rate: Compliant with ADL 2013
Fabric Reductions & Low-carbon renewable energy	92,143	Fabric Reductions & Low-carbon renewable energy
PV Inclusion	83,202	PV Inclusion
Total savings	43,348	

6. APPENDICES

APPENDIX 1: LIST OF ABBREVIATIONS

ADL 2013	Approved Document Part L of Buildings Regulations 2013
ASHP	Air Source Heat Pump
BER	Building Emission Rate
CHP	Combined Heat & Power
DER	Dwelling Emission Rate
DHN	District Heat Network
DHW	Domestic Hot Water
ESCO	Energy Services Company
GSHP	Ground Source Heat Pump
LPA	Local Planning Authority
PV	Photovoltaics
SAP	Standard Assessment Procedure
SBEM	Simplified Building Energy Model
TER	Target Emission Rate