Energy Efficiency & Resource Conservation Statement

for

CJS3 Ltd

at

Cuerden Hall

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EXECUTIVE SUMMARY

APPROACH

The energy strategy for the development has been developed based upon the application of an energy hierarchy. This method deals with reducing the requirement for energy, the efficient use of energy and then the integration of low or zero carbon technologies in sequential order. This approach inherently offers best value for money against carbon savings.

TARGETS

Two key energy planning targets have been identified for the development:

- Achieve a reduction in carbon over the Current Building
- Provide energy for the development from Low Carbon or Renewable Energy Technologies

BE LEAN

The energy demand of the building has been reduced passively by improving the building fabric and reducing unwanted infiltration. Actively, the energy required to service the building has then been further reduced using efficient lighting.

BE CLEAN

The current oil heating and domestic hot water system will be upgraded to be served by an increasingly efficient LPG boiler.

BE GREEN

The introduction of 96m^2 of PV panels will provide energy from Low or Zero Carbon sources.

Overall, the development achieves a 61% reduction in carbon emissions against the current building and provides energy from a Low or Zero Carbon source.

1.0 INTRODUCTION

Cuerden Hall lies within the landscape of Cuerden Valley Nr Preston. It is proposed that the 18th century Grade II listed building will be subject to full interior remodelling and renovation, including a “roof over” extension in a courtyard area. The large-scale single occupancy residential building will comprise living and private guest accommodation, vehicle garage area, swimming pool and leisure facilities, along with separate (from the main building) guest and staff accommodation within existing cottages, workshops and stables.

To facilitate the development, the existing basement will be partly infilled/remodelled to accommodate new leisure pool, plant and equipment. Demolition/remodelling will take place in a phased manner to suit construction activity on site.

Figure 1 Cuerden Hall

This report analyses the anticipated energy and carbon emission performance for the proposed development and the energy contribution low or zero carbon technologies can provide.

2.0 PLANNING POLICY

2.1 Local Planning Policy

The relevant extracts from the Central Lancashire Adopted Core Strategy – Local Development Framework (July 2012) are presented below.

2.1.1 *Extract from Central Lancashire Adopted Core Strategy – Local Development Framework (July 2012)*

Policy 27: Sustainable Resources and New Developments

Incorporate sustainable resources into new development through the following measures:

All new dwellings will be required to meet Level 3 (or where economically viable, Level 4) of the Code for Sustainable Homes. This minimum requirement will increase to Level 4 from January 2013 and Level 6 from January 2016. Minimum energy efficiency standards for all other new buildings will be 'Very Good' (or where possible, in urban areas, 'Excellent') according to the Building Research Establishment's Environmental Assessment Method (BREEAM).

Subject to other planning policies, planning permission for new built development will only be granted on proposals for 5 or more dwellings or non-residential units of 500 sq metres or more floorspace where all of the following criteria are satisfied:

(a) Evidence is set out to demonstrate that the design, orientation and layout of the building minimises energy use, maximises energy efficiency and is flexible enough to withstand climate change;
(b) Prior to the implementation of zero carbon building through the Code for Sustainable Homes for dwellings or BREEAM for other buildings, either additional building fabric insulation measures, or appropriate decentralised, renewable or low carbon energy sources are installed and implemented to reduce the carbon dioxide emissions of predicted energy use by at least 15%;
(c) Appropriate storage space is to be provided for recyclable waste materials and composting;
(d) If the proposed development lies within a nationally designated area, such as a Conservation Area or affects a Listed Building, it will be expected to satisfy the requirements of the policy through sensitive design unless it can be demonstrated that complying with the criteria in the policy, and the specific requirements applying to the Code for Sustainable Homes and BREEAM, would have an unacceptable adverse effect on the character or appearance of the historic or natural environment.

The integration of the principles above into other types of development will also be encouraged.

Policy 28: Renewable and Low Carbon Energy Schemes

Proposals for renewable and low carbon energy schemes will be supported and planning permission granted where the following criteria are met:

a) The proposal would not have an unacceptable impact on landscape character and visual appearance of the local area, including the urban environment.

b) The reason for the designation of a site with statutory protection would not be compromised by the development;

c) Any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;

d) Any significant adverse effects of the proposal are considered against the wider environmental, social and economic benefits, including scope for appropriate mitigation, adaptation and/or compensatory provisions

2.2 Part L Requirements

The proposed development is a change of use from a non-residential building to a residential building and so will need to comply with the latest version of Part L1B of the Building Regulations. The current version of Part L in England was released in 2013.

Energy calculations are required to ensure the energy performance of the converted property is no worse than the original building.

2.3 Summary of the Carbon / Energy Reduction Targets

The key minimum energy targets for the development are therefore:

- Achieve a reduction in carbon from the Current Building
- Provide energy for the development from Low Carbon or Renewable Energy

3.0 ENERGY STRATEGY

Our approach to the development of the energy strategy is based upon the application of an energy hierarchy (see Figure 2).

This method deals with reducing the requirement for energy, the efficient use of energy and then the integration of low or zero carbon technologies in sequential order. This approach inherently offers best value for money against carbon savings.

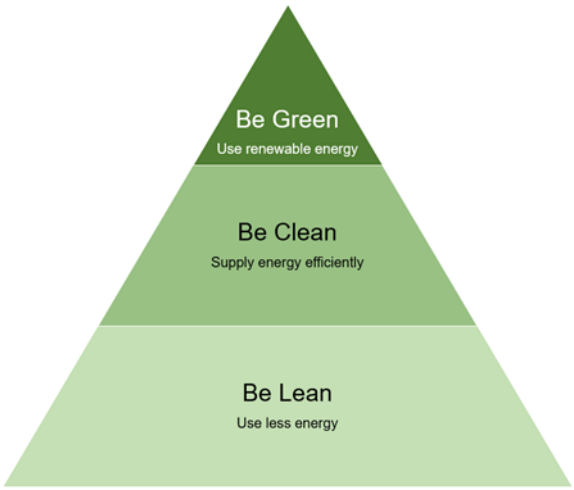

Figure 2 Energy Strategy Approach

3.1 Be Lean

The energy demand is reduced through the optimum design of the building fabric. The following are developed to achieve this:

- Optimise passive design
- Reduce infiltration
- Improved building fabric

A selection of passive design requirements for the development are presented in Table 1.

Table 1 Building Fabric Properties

Element	Current	Proposed	Improvement
External Wall U-value	1.01-1.54 W/m²K	1.01-1.54 W/m²K	0%
Ground Floor U-value	0.58 W/m²K	0.22-0.37 W/m²K	36-62%
Glazing U-value	4.96 W/m²K	2.57[1] W/m²K	48%
Roof U-value	2.50 W/m²K	0.11-0.53 W/m²K	79-96%
Door U-value	3.0 W/m²K	1.80[1] W/m²K	40%
Infiltration	2 ACH	1ACH	50%

[1] Limited area due to feasibility

3.2 Be Clean

The energy required to service the building is reduced through the use of energy efficient systems. This includes the implementation of:

- Efficient lighting
- High efficiency heat generation
- Optimised zoning and controls

A selection of efficient services targets for the development is presented in **Error! Reference source not found.**.

The current oil heating and domestic hot water system will be upgraded to be served by an increasingly efficient LPG boiler.

Table 2 Efficient Services

Element	Performance
LPG Boiler	89%
Lighting Efficacy	LED Light Fittings Throughout >100 lumens/circuit Watt

3.3 Be Green

Be Green looks at generating a proportion of the energy required from renewable sources, it is proposed that 96m^2 on monocrystalline Silicon PV is installed onto the existing garage saw roof.

4.0 METHODOLOGY

Detailed energy modelling has been undertaken in order to establish the baseline regulated * carbon emissions of the current building and the carbon emissions savings achieved through the provision of energy efficiency measures.

*Regulated carbon emissions are related to fixed building services systems including: space heating, cooling, fans and pumps, lighting and domestic hot water. It excludes non fixed items such as equipment and catering appliances.

In carrying out the assessment, TGA utilised a dynamic simulation software package, Virtual Environment (VE) version 2019 software suite from Integrated Environmental Solutions (IES).

The CIBSE 'Test Reference Year' (TRY) weather file for Manchester is used. The TRY consists of hourly data for twelve typical months, selected from approximately 20-year data sets, and smoothed to provide a composite, but continuous, 1 year sequence of data. They enable the likely energy consumption of buildings to be assessed by simulation under typical weather conditions.

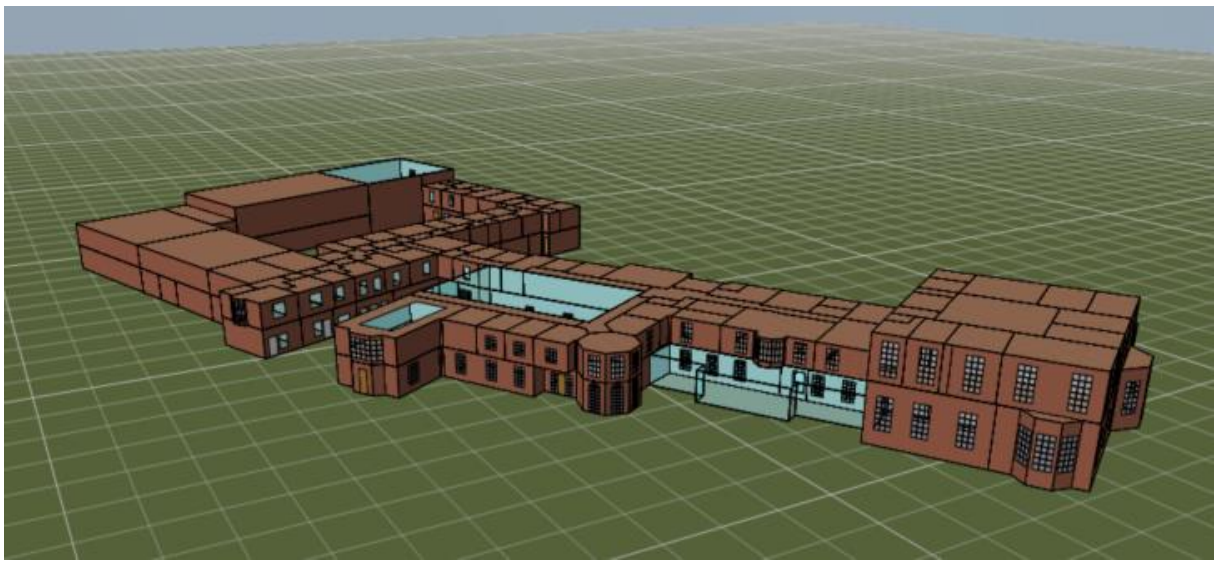

Figure 3 IESVE Energy Model

5.0 RESULTS

5.1 Be Lean

The 'Be Lean' building achieves a carbon emission rate of 108.19 kg.CO_2/m^2, a saving of 35% over the existing building (Table 3 and Figure 4).

There are no Low or Zero Carbon Technologies, therefore 0% of the energy for the proposed development is provided from Low Carbon Energy.

The Be Lean design therefore achieves the first energy target (Table 4).

Table 3 Be Lean Results

	Current Emission Rate (kg.CO_2)	Emissions (kg.CO_2)	% Reduction in CO_2 Emissions	Total Energy (kWh/ Annum)	LZC Energy (kWh/ Annum)	% LZC Energy
Be Lean	166.2	108.19	35%	2,978,052	0	0%

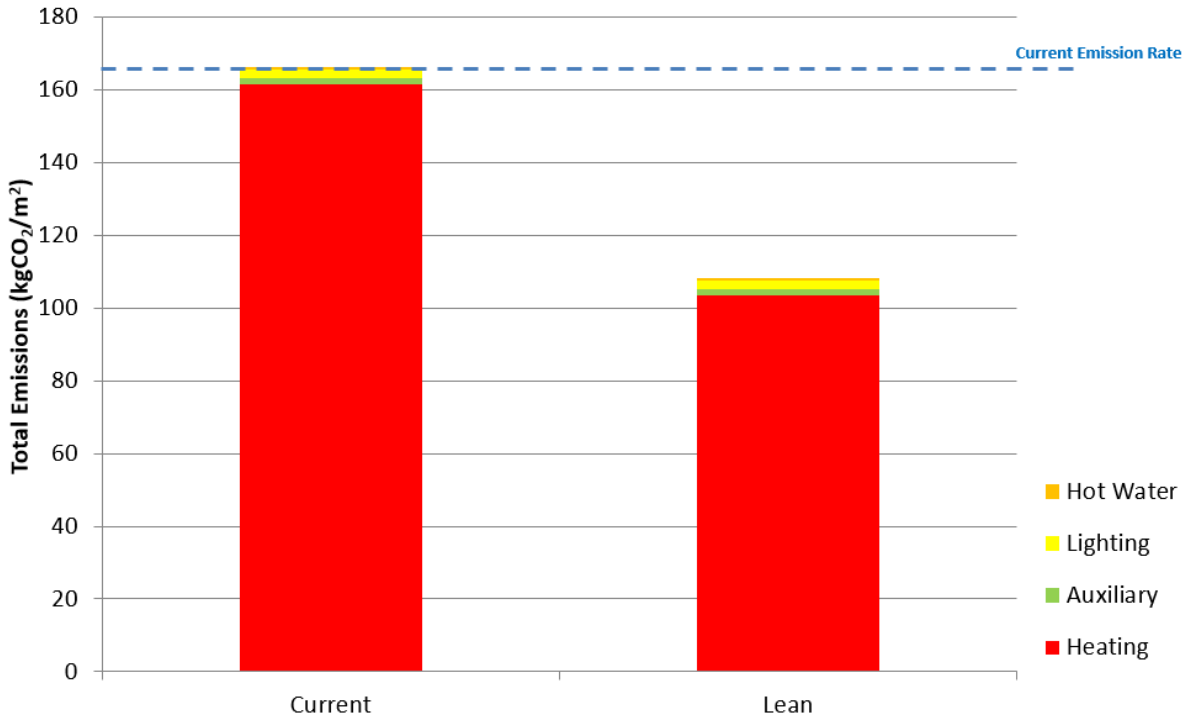

Figure 4 Carbon Emissions of the Be Lean Building vs the Current Building

Table 4 Summary of Targets for Be Lean Energy Efficient Design

Target	Achieved
Achieve a reduction in carbon over Current Building	✓
Provide energy for the development from Low Carbon or Renewable Energy	✗

5.2 Be Clean

The Be Clean building achieves a carbon emission rate of 65.6 kg.CO_2/m^2, a saving of 60% over the existing building (Table 5 and Figure 5).

The 'Be Clean' building provides no energy from a Low or Zero Carbon source.

This demonstrates the Be Clean approach achieves the first energy target (Table 6).

Table 5 Be Clean Results

	Current Emission Rate (kg.CO_2/m^2)	Emissions (kg.CO^2/m_2)	% Reduction in CO_2 Emissions	Total Energy (kWh/ Annum)	LZC Energy (kWh/ Annum)	% LZC Energy
Be Lean	166.2	108.19	35%	2,978,052	0	0%
Be Clean	166.2	65.6	60%	1,927,127	0	0%

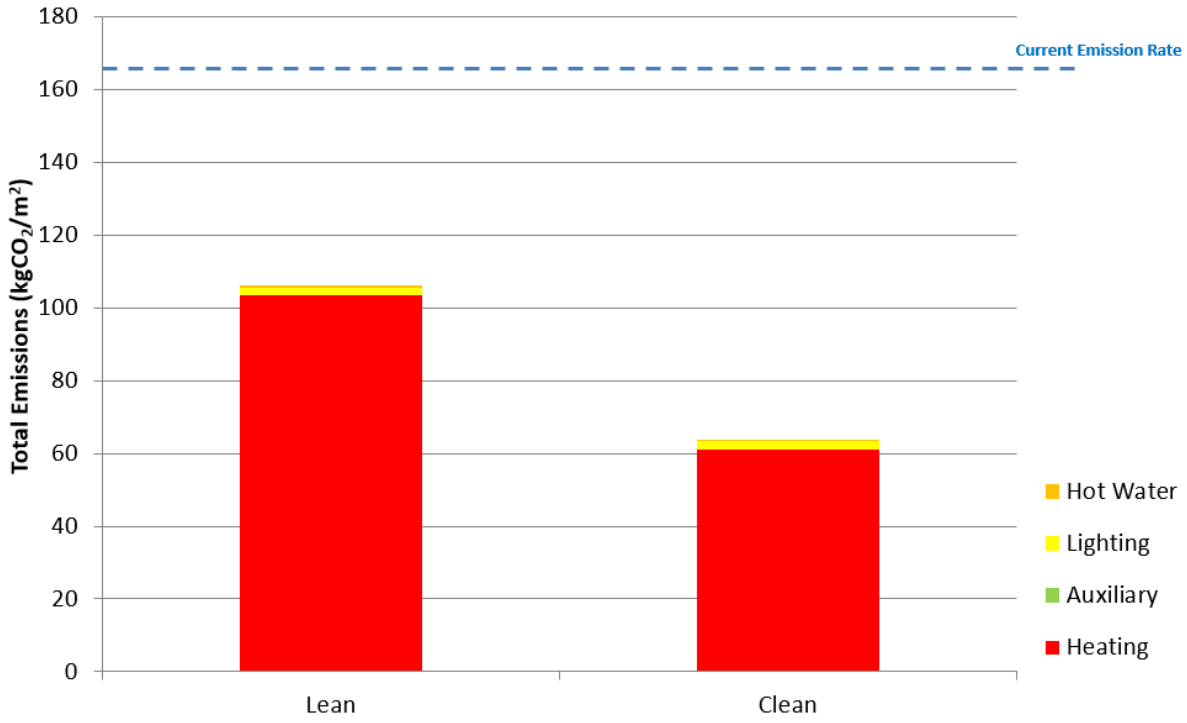

Figure 5 Carbon Emissions of the Be Clean vs the Lean Building

Table 6 Summary of Targets for Be Clean Energy Efficient Design

Target	Achieved
Achieve a reduction in carbon over Current Building	✓
Provide energy for the development from Low Carbon or Renewable Energy	✗

5.3 Be Green

The Be Clean building achieves a carbon emission rate of 64.1 kg.CO_2/m^2, a saving of 61% over the existing building (Table 7).

A small proportion of the building energy comes from Zero Carbon Technologies.

This demonstrates the Be Green approach achieves both of the energy targets.

Table 7 Be Green Results

	TER ($kg.CO_2/m^2$)	BER/DER ($kg.CO^2/m_2$)	% Reduction in CO_2 Emissions	Total Energy (kWh/ Annum)	LZC Energy (kWh/ Annum)	% LZC Energy
Be Clean	166.2	65.6	60%	1,927,127	0	0%
Be Green	166.2	64.1	61%	1,927,127	15,886	1.0%

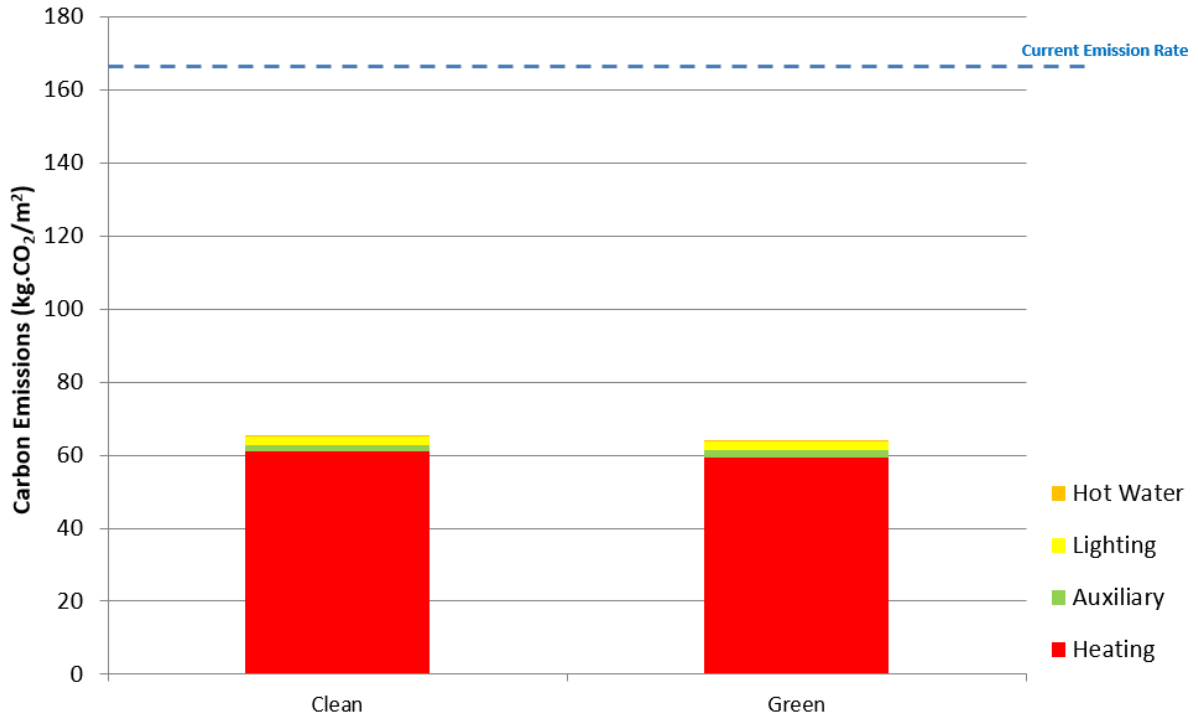

Figure 6 Carbon Emissions of the Be Clean Building vs the Be Green Building

Table 8 Summary of Targets for Be Green Energy Efficient Design

Target	Achieved
Achieve a reduction in carbon over Current Building	✓
Provide energy for the development from Low Carbon or Renewable Energy	✓

6.0 DISCUSSION & CONCLUSION

There are two key energy targets for the development:

- Achieve a reduction in carbon over the Current Building
- Provide energy for the development from Low Carbon or Renewable Energy

Applying Be Lean design measures reduce the energy consumption and carbon emissions of the development, providing a 35% saving in Carbon emissions over the current building.

Incorporating Be Clean design measures provides a 60% saving in Carbon emissions over the current building.

Introducing Be Green design principles provide a small improvement in the emission rate over the current building and additional energy from Low or Zero Carbon sources.

Overall, the development achieves a 61% improvement against the current building and provides 1% of energy from a Low or Zero Carbon source.