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Energy Statement

Stout House / 1A Regency Lawn
4th April 2024

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Revision Log

Section	Revision	Issue	Date
	Issue 1	1	05/04/2024

1 Introduction

This report gives a detailed overview of energy consumption and CO_2 emissions of the proposed Stout House. The aim is to show, that the development will achieve a reduction in regulated CO_2 emissions compared to Building Regulations Part L to make this development sustainable and environmentally friendly.

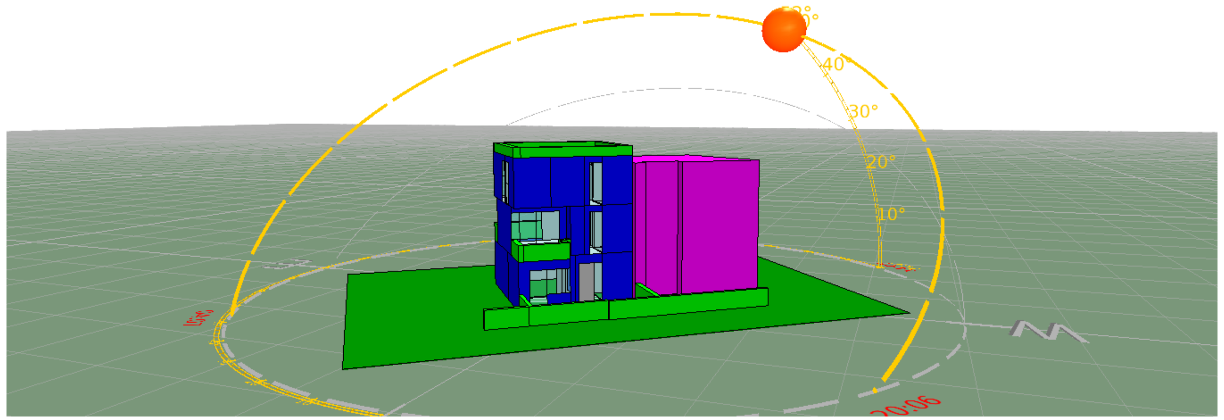


Figure 1: Visual representation of the house in IES VE environmental software.

This Energy Assessment follows the standard approach using the Baseline, Be Lean (addressing the fabric efficiency), Be Clean (addressing the heating systems), and Be Green (including Low or Zero Carbon technology)

2 Executive Summary

2.1 Carbon reduction

As a result, an 92% reduction in regulated CO_2 will be achieved by a combination of passive measures, efficient services, and renewable sources.

Be lean, improvements to the fabric demonstrated savings of up to 31% in comparison to the notional baseline. This was achieved by reducing the u-values of the fabric from 0.18 to 0.15 in walls, 0.13 and 0.12 to 0.11 for the ground floor and roof and 1.2 to 0.81 in windows.

Be clean, using more efficient mechanical systems proved carbon savings of 80% compared to the notional baseline and an additional 49% when compared to the ‘be lean’ scenario.

Be Green, using renewable energy technology proved carbon savings of 92% when compared to the notional baseline and an additional 12% when compared to the ‘be clean’ scenario.

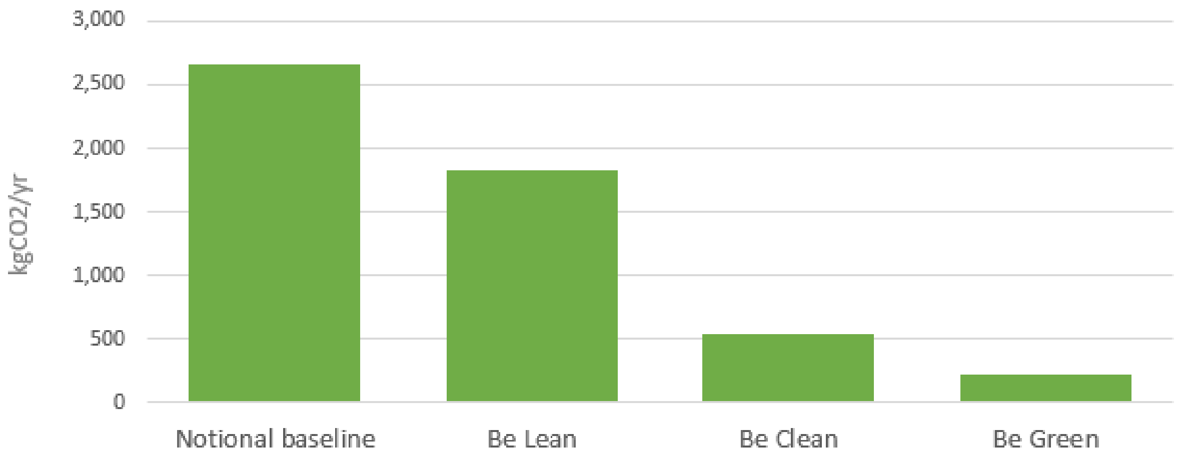


Figure 2: Regulated CO2 comparison between the baseline, efficient baseline, and proposal.

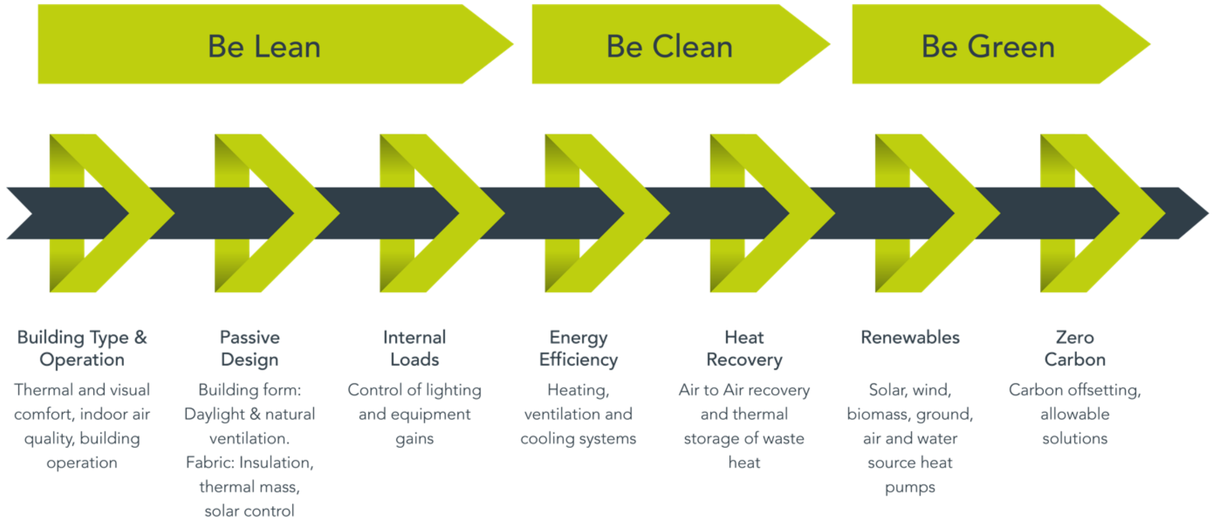
3 Energy Hierarchy and methodology

When designing a building, it is advisable to follow an energy hierarchy. The primary aim is to make the building as energy efficient as possible to reduce the demand for energy, and thus the demand of energy from renewable sources.

Building Regulations Part L aims to reduce emissions from new buildings when compared to those built to 2010 regulations. This can be achieved by making improvements to the fabric of the building by increasing levels of insulation, increasing air tightness, addressing thermal bridging issues and the use of efficient heating & appliances compared to a standard gas boiler. CO_2 emissions can be further reduced by using renewable energy sources.

To reduce the carbon emissions of the proposed development, the principle is to follow the energy hierarchy:

- Be Lean – create an energy efficient building.
- Be Clean – address the heating infrastructure.
- Be Green – include Low or Zero Carbon (LZC) technology to further reduce the efficiency.



3.1 Be Lean

3.1.1 Energy efficiency first

Before any renewable technologies are considered it is good practice to reduce the overall energy demand of a dwelling by using low energy design techniques.

Low energy design involves the consideration and implementation of measures that will increase the dwelling fabric energy efficiency. This can be achieved by improving levels of insulation, reducing the level thermal bridging, use of low-energy lighting & appliances and the use of passive solar design.

Main Fabric Efficiency Improvements

- Increased insulation to main external elements (roof, walls, floor, openings)
- Increase the efficiency of openings (windows, doors, etc.)
- Reduced thermal bridging.
- Improved air tightness
- Energy efficient lighting & improved controls (especially important in commercial installations)

Other areas for improvement:

- Controlled ventilation
- Energy efficiency applications (Cooker, washing machine, fridges, etc.)

By decreasing the total energy demand by 18% first, the 46% CO_2 reduction from LZC sources is also reduced ensuring a smaller renewable energy unit is required, had these efficiencies not been made.

3.2 Be Clean

The largest proportion of energy demand of a typical dwelling is from space and water heating thus when addressing the heating infrastructure, we look at, where appropriate, district heating systems, community heating systems and various heat pumps.

3.3 Be Green

Include renewable energy sources to further reduce the CO_2 emissions by 46%.

3.3.1 What are Renewable Energy Sources?

Renewable sources of energy are those which are continually available in the environment. Examples of renewable energy sources are Solar Radiation, Wind, Hydropower, Geo-thermal and biomass.

Up until now the UK has produced most of its energy needs from the burning of fossil fuels (coal, oil, natural gas). This has led to the depletion of these resources as well as to the production of vast quantities of greenhouse gases, created as these fuels are burnt to provide energy. Renewable energy sources emit no greenhouse gases, or in the case of biomass, are considered as carbon neutral over their lifecycle.

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4 Findings

4.1 Factors affecting the SAP Calculations

The house has been assessed using the SAP 10 methodology based on:

- The elements of structure
- The heating and hot water system
- The internal lighting
- The renewable technologies used in the home.

Data is entered relating to:

- Type of dwelling
- Floors
- Walls
- Roofs
- Openings (windows, doors, roof lights)
- Ventilation
- Main and secondary space heating
- Hot water generation
- Renewable technologies, including photovoltaic panels and solar water heating.
- Energy efficient lighting

4.2 Brief Development Overview

The results presented in this report have been obtained from full SAP 10 assessment of the proposed houses using the following specification:

Plot	Notional baseline	Be Lean	Be Clean	Be Green
External wall U-value (W/m2.K)	0.18	0.15	0.15	0.15
Ground floor U-value (W/m2.K)	0.13	0.11	0.11	0.11
Roof U-value (W/m2.K)	0.11	0.11	0.11	0.11
Windows and rooflights U-value (W/m2.K)	1.2	0.81	0.81	0.81
Air permeability (m³/(h.m²) @ 50 Pa)	5	5	5	5
Heating system	Boiler with radiators or underfloor heating - Mains gas	Efficient gas boiler	"Heat pump with radiators or underfoor - Electric Ground-to-water heat pump"	Heat pump with radiators or underfoor - Electric: Vaillant fexoTHERM 19kW VWF 197/4
Domestic hot water	161.6L	161.6L	161.6L	161.6L
Ventilation system	MVHR	MVHR	MVHR	MVHR
Energy generation	None	None	None	Photovoltaic array 15.54kW
Proportion of low-energy lighting	75%	100%	100%	100%
Reduction in CO2 against the baseline		31%	80%	92%

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5 Energy Hierarchy Calculations

5.1 Notional Baseline

Notional baseline is the first calculation scenario, where all specification is compliant with Part L1 Building regulations.

Residential			Regulated energy consumption breakdown				Total electricity	CO_2 emissions
	Floor area, m2	Space heating, kWh/yr.	DHW, kWh/yr.	Lighting, kWh/yr.	Fans and electric keep-hot	Aux, kWh/yr.	kWh/yr.	KgCO2/yr.
	130	8072.61	5653.64	385.58	728.76	0	14,841	2,654

5.2 Be Lean

As the first step, improvements in building fabric are added to the calculations which resulted in a slight improvement of 31% against notional baseline.

Residential			Regulated energy consumption breakdown				Total electricity	CO_2 emissions
	Floor area, m2	Space heating, kWh/yr.	DHW, kWh/yr.	Lighting, kWh/yr.	Fans and electric keep-hot	Aux, kWh/yr.	kWh/yr.	KgCO2/yr.
	130	4807.62	4444.51	377.7	728.76	0	10,359	1,822

5.3 Be Clean

As the second step, improvements in heating system are added to the calculations which resulted in an improvement of 80% against notional baseline.

Residential			Regulated energy consumption breakdown				Total electricity	CO_2 emissions
	Floor area, m2	Space heating, kWh/yr.	DHW, kWh/yr.	Lighting, kWh/yr.	Fans and electric keep-hot	Aux, kWh/yr.	kWh/yr.	KgCO2/yr.
	130	2,002	2,733	377.7	598.66	0	5,711	543

5.4 Be Green - Proposed Development

In the final stage of the assessment, the renewable system is included in the calculation. This is an air source heat pump, which will provide all space heating via low temperature radiators or underfloor heating. The ground source heat pump shall be a MCS certified unit NIBE Energy Systems Ltd or equivalent approved by SAP assessor. This resulted in an improvement of 92% against notional baseline.

Residential			Regulated energy consumption breakdown				Total electricity	CO_2 emissions
	Floor area, m2	Space heating, kWh/yr.	DHW, kWh/yr.	Lighting, kWh/yr.	Fans and electric keep-hot	Aux, kWh/yr.	kWh/yr.	KgCO2/yr.
	130	2,002	2,733	377.7	598.66	-3590.57	2,121	222

6 Conclusion

This report provides a detailed overview of the proposed development at Stout House, Surrey, with a focus on energy consumption and CO_2 emissions, demonstrating the project's commitment to sustainability by achieving a significant 92% reduction in regulated CO_2 emissions compared to Building Regulations Part L.

Be lean, improvements to the fabric demonstrated savings of up to 31% in comparison to the notional baseline. This was achieved by reducing the u-values of the fabric from 0.18 to 0.15 in walls, 0.13 and 0.12 to 0.11 for the ground floor and roof and 1.2 to 0.81 in windows.

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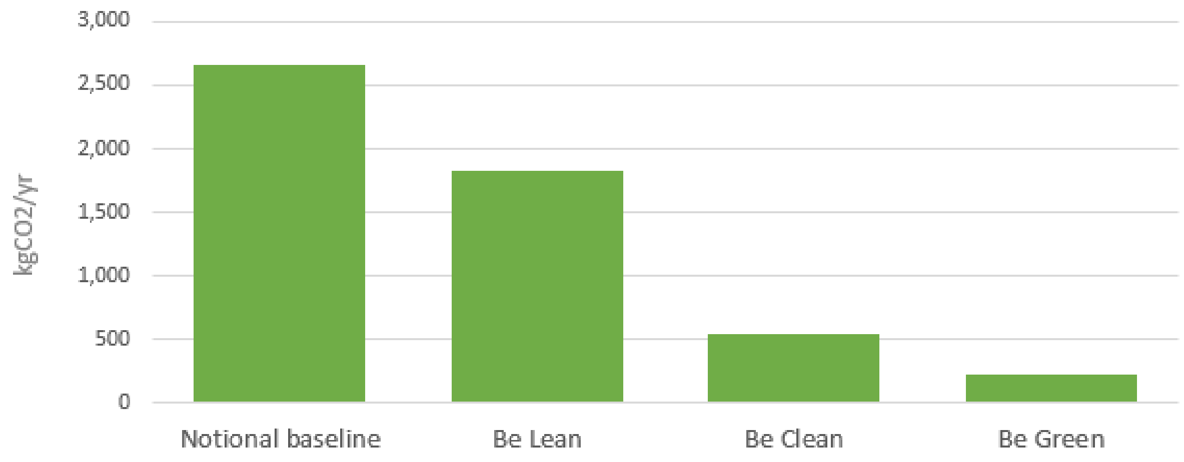

Figure 3: Regulated CO2 comparison between the baseline, efficient baseline, and proposal.

The report concludes with a breakdown of findings, showcasing a substantial improvement in energy efficiency and a notable reduction in CO_2 emissions through the strategic implementation of energy hierarchy principles, as shown in the image below.

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