

Energy Statement

Project:	New Build House at 161 Old Hall Lane, Manchester, M14 6HJ
Date:	04/05/2021

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Executive Summary

- Demolition of existing dwelling and the construction of a detached three storey, 6.no bedroom detached dwelling.
- Enhanced fabric efficiency - high levels of insulation will be installed to achieve the following U Values:
 - Floors = 0.12-0.22
 - External Walls = 0.17-0.31
 - Roofs = 0.11-0.17
 - Glazing = 1.40
- Good levels of air tightness - target rate of 5.00 m³/h.m² for each dwelling
- Space heating via mains gas system boiler, emitted via UFH and radiators
- Hot water via hot water cylinder with low standing heat loss
- Ventilation via system 1 (intermittent extract fans)
- Low energy lighting throughout
- 4.50 kWp solar PV array (south facing at 30 degrees - mounted on brackets on the flat roof)

Step	Energy Demand (kWh / year)	Reduction	CO ₂ Emissions (tonnes / year)	Reduction
Baseline	20338.29		4.66	
Be Lean	20281.11	57.18	4.65	0.01
Be Clean	19478.42	802.69	4.48	0.17
Be Green	15592.13	3886.29	2.46	2.02
TOTAL		4746.16		2.20
% Reduction		23.34		47.21

- By following the theory of the energy hierarchy outlined within this statement, the proposed dwelling's energy demand is reduced by 4746.16 kWh/year, when compared to the baseline. This is equivalent to 23.34% improvement. CO₂ emissions are reduced by 2.20 tonnes/year which is equivalent to a 47.21% reduction when compared to the baseline.

1. General

This energy statement has been prepared by SAPeasy Ltd. in support of the following planning application:

Application number: 130095/FO/2021
Proposal: Erection of proposed detached dwelling
Location: 161 Old Hall Lane, Manchester, M14 6HJ

The statement provides an initial assessment of the energy requirements of the proposed development using approved standard calculation methods (SAP 2012), reviews the various options for renewable technologies and demonstrates how the planning condition (see below) will be met by implementing appropriate fabric efficiency measures and renewable and/or low energy technologies.

2. Planning Condition

The following condition is to be discharged:

A detailed Energy/Sustainability Statement to meet the requirements of Manchester City Council policies EN4, EN6 and relevant supporting documents to the Core Strategy including comments on:

- *Calculation of baseline energy consumption & CO2 emissions using full SAP calculations*
- *Implementation of the energy hierarchy (be lean, be clean, be green)*
- *Calculation of energy consumption & CO2 emissions at each stage of energy hierarchy*
- *Calculation of final energy consumption & CO2 emissions*
- *Calculation of reduction in emissions achieved*
- *Meet any set target of generating CO2 reduction from on site renewable energy generation*
- *Energy use*
- *Water consumption*

2.1 Policy EN4

Reducing CO₂ Emissions by Enabling Low and Zero Carbon development

The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO₂ emissions, and rising fossil fuel prices, through the following actions:

- All development must follow the principle of the Energy Hierarchy, being designed:
 - To reduce the need for energy
 - Use energy more efficiently within the building
 - Supply energy from renewable sources

2.2 Policy EN6

Target Framework for CO₂ reductions from low or zero carbon energy supplies

An energy statement is required to set out the projected regulated energy demand and associated CO₂ emissions for the development. Table 12.1 sets out the CO₂ emissions reduction targets. This particular building will fall under Target 3: Micro generation area, which requires a +15% increase on Part L 20210.

3. Development

The development involves the demolition of the existing buildings and the construction of a new three storey detached dwelling. The dwelling will comprise 6.no bedrooms with a total floor area of ~330m², as well as an integrated garage.

Construction will be traditional, comprising beam and block flooring, masonry cavity walls, and dormer roofs.

Space heating is provided via mains gas system boiler with underfloor heating and radiators. Hot water is supplied via a cylinder with a low standing heat loss.

Ventilation is to be system 1 -intermittent extract fans.

The whole development will be built to exceed the requirements of the 2013 version of Approved Document L1A of the Building Regulations.

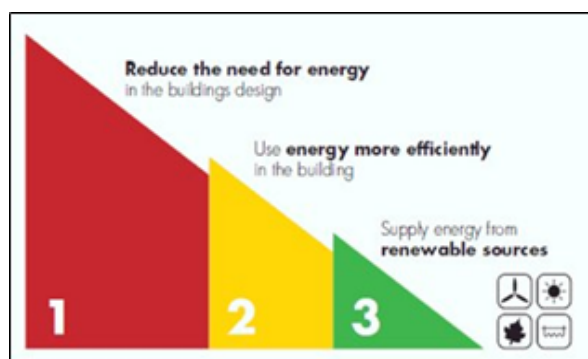
4. Baseline Energy Demand

The baseline energy requirements for this development have been calculated as per the minimum requirements of 2013 Approved Document L1A of the Building Regulations. The following energy demand and CO₂ emissions were calculated:

Baseline		
Energy Demand	Target Emissions Rate (TER)	CO ₂ Emissions
20338.29 kWh/year	14.13 kgCO ₂ /year/m ²	4.66 tonnesCO ₂ /year

5. The Energy Hierarchy

The theory of the energy hierarchy is shown in the diagram below:



Research by the Building Research Establishment (BRE) has found improvement to building fabric and services to be the most cost effective way of reducing energy consumption.

Following this research BRE have concluded that improvements to building fabric and services should be implemented first with additional renewable energy installations to follow.

Enhancing the thermal performance of the building envelope helps to future-proof the structure and yields the greatest CO₂ savings. Adding renewable technologies will then yield maximum emissions reductions with lower long-term costs for the developer.

5.1 Reduce the need for energy (“Be Lean”)

The proposed development will incorporate efficient levels of insulation above those required by Approved Document L1A of the Building Regulations.

Thermal Element	U Value	Proposed Specification*
Ground Floor	0.12	75mm screed on 150mm PIR insulation on beam and block
Exposed First Floor (& Garage Ceiling)	0.22	200mm mineral wool insulation between joists
External Walls	0.18	Outer finish, 100mm “full fill” PIR insulation, 100mm lightweight block inner leaf
Dormer Walls	0.17	100mm PIR insulation between studs, 50mm PIR insulation internally lined
Walls to Garage	0.31	100mm lightweight block, internally lined with 50mm PIR insulation
Flat Roofs	0.17	120mm PIR insulation on warm deck
Rafter (Sloping) Roofs	0.16	100mm PIR insulation between rafters, 50mm PIR insulation internally lined
Joisted (Loft) Roofs	0.11	400mm loft roll insulation
Glazing & Doors	1.40	Double glazed units
Lantern	1.40	Double glazed roof lantern
Air Leakage	5.00 m ³ /h.m ²	An air pressure test is required upon completion
Thermal Bridging	-	Care shall be taken to ensure the continuity of insulation in all junctions / details

****This specification is subject to change.***

This specification ensures that the Dwelling Fabric Energy Efficiency (DFEE) is better than the Target Fabric Energy Efficiency (TFEE) by 20.27%.

TFEE	DFEE	% Variance
59.21	47.21	20.27

The following energy demand and CO₂ emissions were calculated after the “Be Lean” step:

“Be Lean”		
Energy Demand	Dwelling Emissions Rate (DER)	CO ₂ Emissions
20281.11 kWh/year	14.09 kgCO ₂ /year/m ²	4.65 tonnesCO ₂ /year

5.2 Use energy more efficiently (“Be Clean”)

Energy is used efficiently by incorporating/installing low energy M&E within the development.

Space heating

- Highly efficient mains gas system boiler (SAP efficiency of at least 89%)
- Emitted via underfloor heating and radiators
- Advanced controls incorporating independently controlled time/temperature zones

Hot water

- 300 litre (STC) hot water cylinder with a low standing heat loss of 2.50 kWh/day or less

Ventilation

- System 1 ventilation system - Intermittent extract fans in kitchen and each wet room
 - Efficient models so to reduce energy consumption

Lighting

- All lighting will be low energy (i.e. LED)

The following energy demand and CO₂ emissions were calculated after the “Be Clean” step:

“Be Clean”		
Energy Demand	Dwelling Emissions Rate (DER)	CO ₂ Emissions
19478.42 kWh/year	13.57 kgCO ₂ /year/m ²	4.48 tonnesCO ₂ /year

5.3 Supply energy from renewable sources (“Be Green”)

“This statement must address the guidance within Chapter 4 of the “Guide to Development in Manchester” and policies EN4 and EN6 of the Core Strategy for the City of Manchester, confirm the proposals for the provision of onsite renewable energy to provide 20% of final site energy demand and CO₂ reduction”

Consideration of low carbon, renewable and/or decentralised energy technologies

Renewable energy technologies can generally be divided into two areas, those that generate electricity and those that generate heat for space heating and domestic hot water.

- Air Source Heat Pumps (ASHP)

ASHP's require an external unit(s) which draws large volumes of air through a network of heat exchangers. The extracted heat subsequently warms water which is then used within the central heating. It is generally considered that ASHP's work better with low temperature emitters - such as underfloor heating.

An internal cylinder would also be required for domestic hot water storage.

An ASHP would be feasible for this property, although it would need to be adequately sized. The external unit may also require further planning permission.

- Ground Source Heat Pump (GSHP)

GSHP's work similarly to ASHP's but extract the heat from the ground via boreholes or trenches. Like with an ASHP, low temperature emitters are best suited and an internal hot water cylinder would be required.

A GSHP would be infeasible for this property due to space constraints for the boreholes/trenches. Cost would also be prohibitive.

- Solar Hot Water

Solar thermal panels harness the sun's energy to heat domestic hot water. They work most efficiently when orientated due south at 30-40 degrees. An internal storage cylinder would also be required.

Solar thermal panels would be feasible for this property - although there is no due south sloping roofs, there are a lot of flat roofs on which the panels could be mounted on brackets.

- Solar Photovoltaics (PV)

Solar PV panels harness the sun's energy to produce electricity. They work most efficiently when orientated due south at 30-40 degrees. The panels are fed into a consumer unit and any unused electricity can be fed back into the mains grid. However, battery storage technology is every improving, so it is now possible to store the electricity generated throughout the day, for use throughout the night.

Although there are no sloping roofs facing due south, there are a lot of flat roofs on which the panels can be installed. Mounting them on bracks would be most effective.

This development will incorporate solar photovoltaic panels in order to satisfy the requirements of Policies EN4 and EN6 - and to ensure 20% of the final predicted energy use and CO₂ reduction is via renewable energy.

A 4.50kWp array mounted 30 degrees has been specified. This would likely be suited to be installed on the flat dormer roof.

The following energy demand and CO₂ emissions were calculated after the "Be Green" step:

"Be Green"		
Energy Demand	Dwelling Emissions Rate (DER)	CO ₂ Emissions
15592.13 kWh/year	7.45 kgCO ₂ /year/m ²	2.46 tonnesCO ₂ /year

6. Table of Results

Step	Energy Demand (kWh / year)	Reduction	CO ₂ Emissions (tonnes / year)	Reduction
Baseline	20338.29		4.66	
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TOTAL		4746.16		2.20
% Reduction		23.34		47.21

6.1 Conclusion

As the table shows, by following the theory of the energy hierarchy the proposed dwelling reduces the energy demand by 4746.16 kWh/year, when compared to the baseline. This is equivalent to 23.34% improvement. CO₂ emissions are reduced by 2.20 tonnes/year which is equivalent to a 47.21% reduction when compared to the baseline.

Therefore the requirements of Policies EN4 and EN6 are satisfied.