verte

better buildings, better lives

Energy Strategy

72-80 Leather Lane

Version 2

03 March 2017

Verte Ltd

5 Torrens St, London, United Kingdom EC1V 1NQ

Mobile: +44 7910 575279

Email. admin@verteltd.com - Website. www.verteltd.com

Contents

Background

This Energy Strategy has been prepared by Verte on behalf of Hatton Garden Properties to provide a commentary on the sustainable energy issues for the proposed development at 72-80 Leather Lane. It sets out the energy efficiency and carbon reduction measures that will be incorporated into a number of the dwellings forming part of the development.

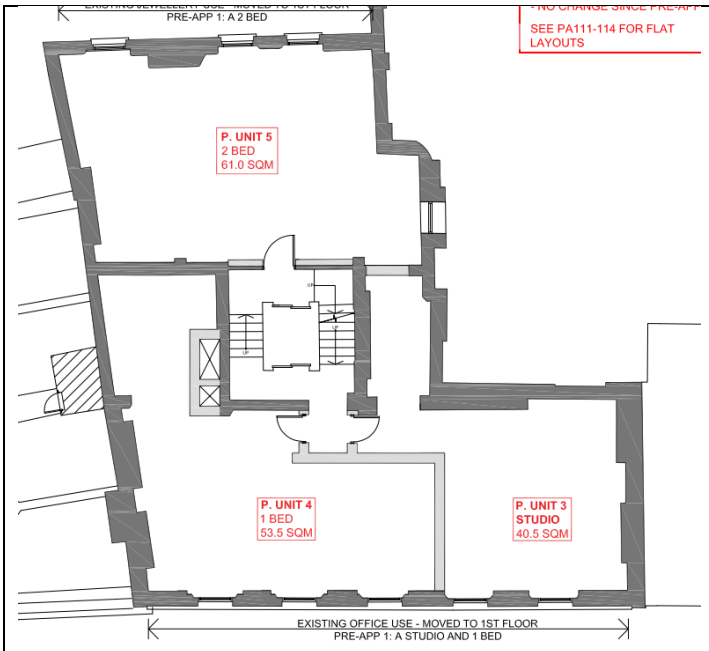
The building

The application site is 72-80 Leather Lane. The building is currently used as a mixed-use jewellery workshop with dwellings on the upper floors. This energy strategy covers the dwellings on the third floor which are formed because of a change of use, and the new build dwellings at the rear of the fifth floor, and on the sixth and seventh floor. A total of three new dwellings are formed by change of use, and three by extending the building.

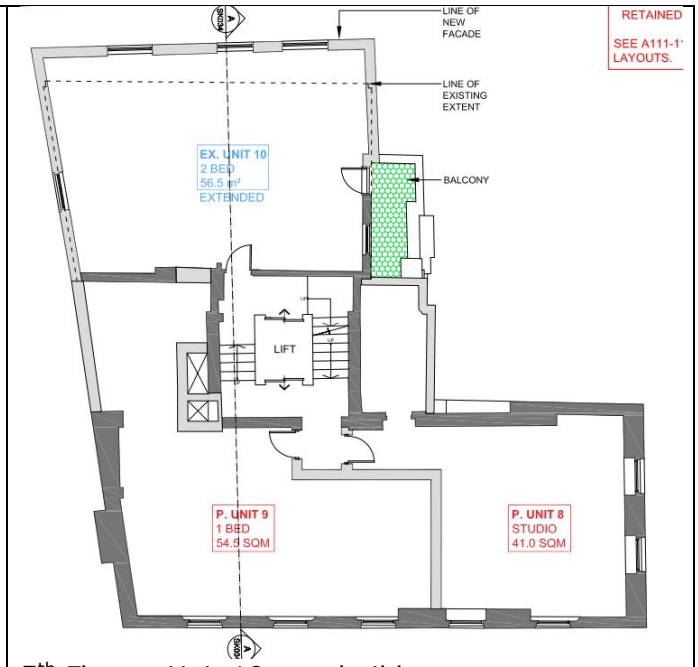
The existing dwellings that are undergoing refurbishment are not included in this Energy Statement.

The total net internal area of the newly dwellings is approximately 363m².

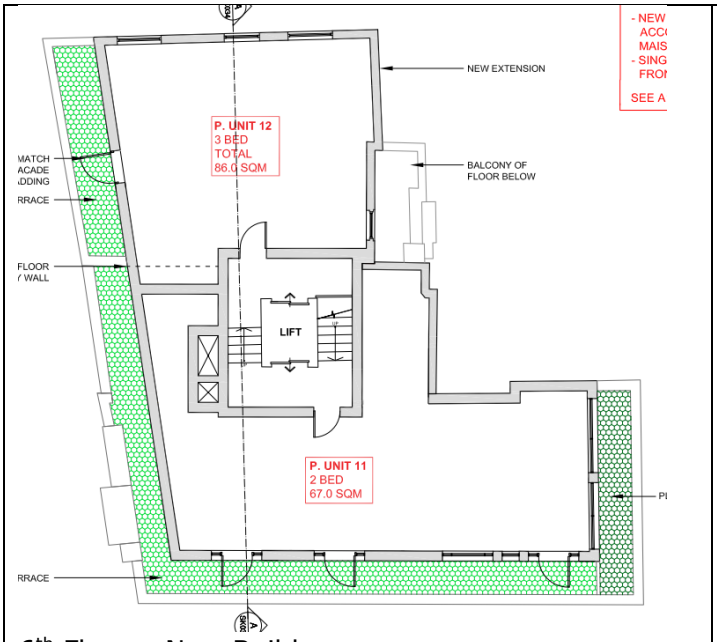
General Arrangement Drawings



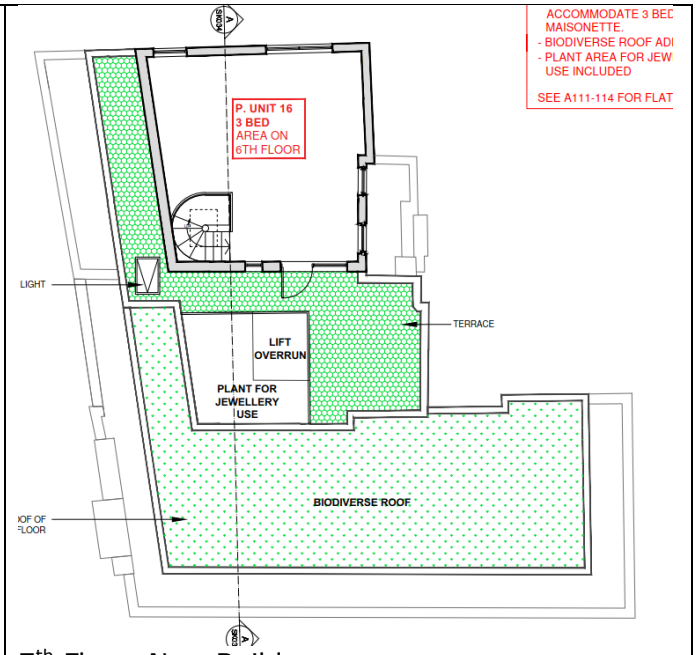
3rd Floor. Change of Use Units



5th Floor – Unit 10 new build



6th Floor – New Build



7th Floor, New Build

Planning Policy

The Pre-application advice from the London Borough of Camden, dated 7th October 2015, stated that *The Council would require development to incorporate sustainable design and construction measures. You are advised to submit a statement demonstrating how relevant measures have been incorporated into the design and proposed implementation as per Policy DP22 - Promoting sustainable design and construction*

Camden's Development Policy 22 - Promoting sustainable design and construction

The parts of DP22 relevant to this document state that:

The Council will require development to incorporate sustainable design and construction measures. Schemes must:

a) demonstrate how sustainable development principles have been incorporated into the design and proposed implementation; and

b) incorporate green or brown roofs and green walls wherever suitable.

The Council will promote and measure sustainable design and construction by:

c) expecting new build housing to meet Code for Sustainable Homes Level 3 by 2010 and Code Level 4 by 2013 and encouraging Code Level 6 (zero carbon) by 2016.;

d) expecting developments (except new build) of 500 sq. m of residential floor space or above or 5 or more dwellings to achieve "very good" in EcoHomes assessments prior to 2013 and encouraging "excellent" from 2013; The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:

f) summer shading and planting;

The London Plan

Policies within Chapter 5 of the London Plan (March 2015) set out relevant design and climate change adaptation policies relating to developments, and establish expectations for applicant's commitments in terms of CO_2 savings and measures proposed.

As required by the GLA's Guidance, after establishing the baseline energy demand and profile for the site, the strategy for the project will follow the Mayor's Energy Hierarchy in appraising appropriate measures to reduce carbon emissions and other climate impacts from the development:

- Use Less Energy - 'Be Lean'
- Supply Energy Efficiently - 'Be Clean'
- Use Renewable Energy - 'Be Green'

The Energy Hierarchy

The Mayor's energy hierarchy is central to the climate change policies. The stages of the hierarchy are:

Use Less Energy/Reduce Demand- 'Be Lean'

- Reduce use through behavior change
- Improve insulation
- Incorporate passive heating and cooling
- Install energy efficient lighting and appliances

Supply Energy Efficiently - 'Be Clean'

- Use CHP and community heating and/or cooling
- Cut transmission losses though local generation

Use Renewable Energy - 'Be Green'

- Install renewables on site
- Import renewable energy

Structure of the Energy Assessment

This statement is structured to respond to the Energy Hierarchy following the GLA's guidance. The statement includes:

- An assessment of the baseline carbon emissions based on the target emission rate for the dwellings.
- A review of the energy efficient features incorporated into the design.
- An assessment of the feasibility of incorporating a combined heat and power system.
- A review of renewable energy technologies and their application for this development.
- Recommendations and commitments

Baseline energy consumption and carbon emissions

Before energy efficiency measures are investigated it is necessary to establish the baseline energy consumption of the scheme. This baseline sets the standard against which the proposed carbon reduction measures are compared and evaluation.

New Dwellings

The baseline case against which carbon savings are assessed for the new build dwellings is the target emission rate (TER) calculated in accordance with Approve Document L1A of Part L (2013) of the Building Regulations. This baseline case represents a typical new build arrangement; where electricity for the development is imported from the grid and space and heating water are provided by natural gas fired boilers.

The onsite energy uses associated with non-Building Regulations (e.g. cooking, appliances, lighting in areas not covered by Part L) is included in the baseline carbon emission rate.

The following 'regulated' energy uses are considered in the baseline energy analysis:

- Space Heating/Cooling
- Water Heating
- Ventilation
- Fans, Pumps and Controls
- Lighting (internal)

Change of Use Dwellings

The baseline case for the units formed by a change of use is the emission rate if the building is designed to the meet minimum requirements of the Building Regulations Approved Document L1B. Accordingly, the SAP calculations undertaken for this stage of the assessment adopt the minimum standards detailed in Approved Document L1B. This includes limiting standards for the thermal properties of building fabric, as well as building services.

For building services systems, the Building Regulations refer to the Domestic Building Services Compliance Guide 2013, and the standards included therein have been followed where appropriate.

The parameters used to determine the CO_2 emissions using SAP calculations have been presented in the Table below.

Element / Service	Parameter	Limiting Values (AD L1B)
External Wall	u-value	0.3 W/m^{2}K
Windows	u-value	1.6 W/m2K
	Construction	Double glazed, argon filled.
	g-value	0.76
Floor		0.25 W/m2K
Roof		0.18 W/m2K
Air Permeability	m^3/hm^2 @ 50Pa	None, SAP default used
Ventilation		Natural Ventilation
Space Heating	Type	Communal boiler with independent controls in each flat
	Fuel	Gas

Element / Service	Parameter	Limiting Values (AD L1B)
	Efficiency Assumed	86% (Part L1B Minimum)
	Controls	Programmer and Room Thermostat
	Flue	Balanced, fan assisted
	Emitter	Underfloor (Timber)
Hot Water	Source	From Main System 110 liter tank in each flat.
Thermal Bridging	y-value	SAP default – 0.15 W/m^{2}K
Lighting	Standard Fittings	25%
	Energy Efficient Fittings	75%

BE LEAN – reduce energy demand

This section outlines how energy consumption will be reduced through the design of the building.

The energy savings will be achieved by passive measures and the introduction of more energy efficient plant and services. Any improvement achieved at this stage will reduce the extent of measures or size of plant needed to address the subsequent 'be clean' and 'be green' stages.

Dwellings

The dwellings will be constructed to be energy efficient and achieve compliance with Part L1A 2013 without the need for low or zero carbon technologies. This performance will be achieved using energy efficient design, including:

- Better U-values exceeding the requirements of Part L 2013
- Best practice system efficiencies for heating, and ventilation system
- Highly efficient light fittings
- Programmable timeclock, thermostat and thermostatic radiator valves.
- Balanced mechanical ventilation with heat recovery
- The mechanical ventilation units will incorporate the following design features:
  - Heat recovery of at least 90%.
  - Specific Fan Powers of no greater than 0.40 W/l/s.
  - Summer bypass to assist with summertime cooling
  - Variable speed controls with summertime cooling function

Fabric Standards - New Dwellings

The table below details the U-values for the domestic areas of the development in relation to the relevant Building Regulations minimum standards (Parts L1A).

New Build Dwellings (Units 10, 11, 12)	Limiting Values Building Regulations, Part L1A 2013	Proposed values
Air Tightness	5 m^3/hr per m^2	3.5 m^3/hr per m^2
Wall U-Value	0.35 W/m^2°C	0.15 W/m^2°C
Roof U-Value	0.25 W/m^2°C	0.15 W/m^2°C
Floor U-Value	0.25 W/m^2°C	N/A
Exposed Floor U-Value	0.25 W/m^2°C	N/A
Glazing U-Value	2.2 W/m^2°C	0.9 W/m^2°C
Glazing G-Value		0.40
Thermal Bridging		Accredited Construction Details. Target y-value 0.06W/m^2K

The improvements to the thermal efficiency of the building envelope, combined with a high efficiency gas fired boiler and centralised whole house ventilation will result in a considerable reduction in energy required for space heating relative to a dwelling constructed to the limiting standards permitted by the Approved Document.

Fabric Standards - Change of Use Dwellings

Having established the baseline case CO_2 emissions for the building, the next step is to determine the improvement in CO_2 emissions that is achieved using energy efficiency measures and the incorporation of systems and equipment whose performance is better than the limiting requirements of the Building Regulations.

Change of Use (Units 3, 4, 5)	Limiting Values Building Regulations, Part L1B 2013	Proposed values
Air Tightness	None	10 m^3/hr per m^2
Wall U-Value	0.30 W/m^2°C	0.25 W/m^2°C
Roof U-Value	N/A	N/A
Floor U-Value	N/A	N/A
Exposed Floor U-Value	N/A	N/A
Glazing U-Value	1.6 W/m^2°C	1.5 W/m^2°C
Glazing G-Value		0.65
Thermal Bridging		Accredited Construction Details. Target y-value 0.11W/m^2K

Heating and Hot Water

The generation of domestic hot water is responsible for approximately 45% of the regulated CO2 emissions from the dwellings. To reduce these emissions, the following measures will be implemented:

- Generation of the domestic hot water using high efficiency combi boilers with flue gas heat recovery
- Insulate domestic hot water distribution pipe-work in the dwellings.
- Provide low flow fittings, as required to meet the water use standards set by Part G of the Building Regulations and the Code for Sustainable Homes Wat 01 tool.

Lighting

Lighting accounts for 18% of the regulated CO2 emissions from the dwellings. All the fixed light fittings will be dedicated low energy lamps. The dwellings benefit from good daylight and this will help to reduce the lighting energy consumption.

Conclusion

The 'Be Lean' measures provide a carbon reduction against the baseline Part L 2013 compliant buildings of 22.8% on regulated loads.

GLA Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy		
Residences	Carbon dioxide emissions (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Building Regulations 2013 Part L Baseline	8.0	7.0
After energy demand reduction	6.1	7.0

GLA Table 2: Carbon Dioxide Emissions from each stage of the Energy Hierarchy		
Residences	Carbon dioxide savings (Tonnes CO_2 per annum)	
Savings from energy demand reduction	1.8	22.8%

BE CLEAN – supply energy efficiently

The next step in the Energy Hierarchy is the 'Be Clean' strategy of supplying the required energy as efficiently as possible.

Potential approaches include connecting the scheme to existing low carbon or CHP-led district energy networks, or if no existing schemes exist, investigating whether such networks are planned in the area and designing systems with the flexibility to connect to these in the future.

With or without a district energy system, the feasibility of CHP (combined heat and power). For larger developments, the use of a site wide communal heating system should be provided if considered viable.

District Energy Networks

The London Heat Map has been utilised to check if the development can connect into an existing distribution network. The City Gen network terminates approximately 400m on Charterhouse Street at the southern end of Farringdon Station, but extending the network to serve a small project is not viable.

CHP and Communal Heating

On site, communal heating systems serving small developments such as this are not commercially or technically viable and have not been considered.

Conclusion

The development will not be provided with a communal heating system due to the technical and management disadvantages.

The carbon emissions at the end of the 'be clean' stage is identical to those at the end of the 'be lean'.

BE GREEN – renewable energy

The third and final stage of the energy hierarchy - 'Be Green' is to review the potential of a range of renewable energy systems to serve the energy requirements of the site and thereby offset CO^2 emissions.

The following renewable energy technologies have been considered for the development:

- Solar Water Heating
- Wind Power
- Biomass Heating
- Heat Pumps
- Photovoltaics

SOLAR WATER HEATING

Solar thermal domestic hot water consumption is technically viable for this development. A solar thermal system with 2 m² of evacuated tube collector panel on the roof serving a solar domestic hot water tank would provide some carbon savings and the occupier would also benefit from renewable heat incentive payments.

WIND POWER

It is recognised that wind generators are often associated with unacceptable visual and noise implications. Wind technology as a renewable energy source is not considered appropriate for this site.

BIOMASS HEATING

Biomass heating is not considered to be a suitable technology for urban locations. With local boilers in each unit biomass boilers are not a viable solution due fuel distribution problems on the site. In addition, the boilers are often un-used due to maintenance issues, fuel supply issues, and operating costs.

HEAT PUMPS

The use of heat pump technologies has been checked one of the units and was found to give only a marginal improvement over the 'be lean' carbon emission rate, therefore, heat pumps are not considered to be a viable technology for reducing carbon emissions for this development.

PHOTOVOLTAICS

Photovoltaic collectors are compatible with the proposed building services solution. However, the orientation of much of the roof space and the availability of sunlight is not ideal. A study of the roofs has shown that it would be possible to install 7m² of PV collector on each of the 6th floor and 7th floor roofs. The PV on the 6th floor roof would be orientated towards the West, and that on the 7th floor orientated towards the south.

Both roofs are overshadowed by Langdon House, a 12-storey building to the south of the development site. A three dimensional EDSL TAS model has been constructed to test the impact of Langdon House, which has shown that:

1. the 6th Floor roof is in the shadow of Langdon House for much of the period from the start of October to the end of March
2. the 7th floor roof is in the shadow of Langdon House for around 3 hours in the middle of the day from mid-October to early March. This is predicted to reduce the availability of sunlight to the panels on this roof to around 90% of the maximum for an unobstructed roof.

Based on this study PV panels will be provided on the 7th floor roof only.

Conclusion

Photovoltaic panels will be provided on the 7th floor roof. These will provide a carbon saving of 7.3% in addition to the 22.8% provided by the energy efficiency measures.

The electricity from the PV panels will be provided directly to one or more of the units. The allocation of the energy will be decided during the detailed design phase to suit the needs of the BREEAM assessment.

GLA Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy		
Residences	Carbon dioxide emissions (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Building Regulations 2013 Part L Baseline	8.0	7.0
After energy demand reduction	6.1	7.0
After CHP	6.1	7.0
After Renewable Energy	5.7	7.0

GLA Table 2: Carbon Dioxide Emissions from each stage of the Energy Hierarchy		
Residences	Carbon dioxide savings (Tonnes CO_2 per annum)	
Savings from energy demand reduction	1.8	22.8%
Savings from CHP	0.0	0.0%
Savings from renewable energy	0.4	7.3%

COOLING HIERARCY

Planning policy states that development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy.

1. Minimise internal heat generation through energy efficient design;

2. Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;

3. Manage the heat within the building through exposed internal thermal mass and high ceilings;

4. Passive ventilation;

5. Mechanical ventilation;

6. Active cooling systems (ensuring they are the lowest carbon options).

An overheating assessment has been carried out as a part of the process to produce SAP calculations. This assessment is related to the factors that contribute to internal temperature: solar gain (taking account of orientation, shading and glazing transmission), ventilation (taking account of window opening in hot weather), thermal capacity and mean summer temperature for the location of the dwelling.

The SAP calculations show that the dwellings pass the SAP overheating test without the use of mechanical ventilation or active cooling system. The dwellings are predicted to be comfortable through reducing solar gain and providing adequate ventilation.

CONCLUSIONS

Energy efficiency measures will be implemented to provide carbon savings of 22.8 in comparison to a baseline building that is fully compliant with the standard set by Part L 2013. The energy efficiency measures include: improved fabric insulation; improved air tightness; high efficiency fans; heat recovery on ventilation systems.

The development will not be provided with a communal heating system as it is too small for communal heating to be viable.

Renewable technologies have been assessed and the development will be provided with a PV collector installation of 7m² on the 7th floor roof. This will provide an additional 7.3% carbon saving.

GLA tables 6 shows the savings in carbon dioxide achieved by the three steps. The total regulated carbon saving through the combination of energy efficient design and renewable technologies is 28.5%.

Table 6: Site wide regulated carbon dioxide emissions and savings

Site Total	Total regulated emissions (Tonnes CO_2/year)	CO_2 Savings(Tonnes CO_2/year)	Percentage Saving
	(Tonnes CO_2 per		(%)
Building Regulations 2013 Part L Baseline	8.0		
After energy demand reduction	6.1	1.8	22.8%
After CHP	6.1	0.0	0.0%
After Low or Zero Carbon Technologies	5.7	0.4	7.3%
Total cumulative savings		**2.3**	**28.5%**

Table showing breakdown of energy hierarchy results for new build and change of use dwellings

	New build residential		**Residential Change of Use**		**Overall area weighted reductions**	
	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage
Baseline	3.9	N/A	4.1	N/A	8.0	N/A
Be Lean	3.0	23.2%	3.2	22.4%	6.1	22.8%
Be Clean	3.0	0%	3.2	0%	6.1	0%
Be Green	2.7	8.6%	3.0	6%	5.7	7.3%
TOTAL REDUCTION	1.2	29.8%	1.1	27.1%	2.3	28.5%
Shortfall			N/A	N/A		

Appendix A –SAP Outputs