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Sustainability Report &
Energy Statement

Belsize Lane

London, NW3 5AS

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Appendices

1 Executive Summary

The new development at Belsize Lane has been designed to achieve the highest of environmental performance standards following the Energy Hierarchy as set down by the London Plan and City of London planning policies, and meets Code for Sustainable Homes Level 4.

A 'Lean, Clean, Green' has been adopted and the development achieves an overall improvement (DER/TER) in regulated emissions of >43% through the adoption of high standards of insulation, communal boiler plant for heating and hot water and electricity generation via roof mounted PV.

This high standard of energy performance has the benefit of offsetting some of the inherent restrictions in achieving some of the desired environmental points in the Code Assessment due to the confined nature of the site.

2 The Site & Proposal

The subject site is on Belsize Lane, approximately 100m east of the junction with Belsize Place and Belsize Park Gardens. The site is currently occupied by a collection of garages and hard standing

The proposal is for a new four storey development containing seven apartments and semi-basement parking and cycle storage.

There is a significant 4 storey dwelling to the west and 2/3 storey buildings to the east and north of the site, across Belsize Lane.

2.0 Planning Policy

The project site sits within the London Borough of Camden.

The proposal is a residential new build project and as such must adhere to LPA policies as follows:-

Camden Core Strategy CS13 - Tackling climate change through promoting higher environmental standards:-

"The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that
are financially viable during construction and occupation by:

c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:

- ensuring developments use less energy,
- making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks;
- generating renewable energy on-site;"
-

LDF Policy DP22 - Promoting sustainable design and construction in Camden Development Policies, provides further guidance on what measures can be implemented to achieve an environmentally sustainable building:-

Policy DP22 confirms that

"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 20162

Finally, in support of the above Policies, Camden provides further details of requirements within their Planning Guide No3 – Sustainability (CPG3):-

"2.5 - Developments involving 5 or more dwellings and/or 500sq m (gross internal) floorspace or more are required to submit an energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy" as well as under 9.8, encouraged to meet the Code for Sustainable Homes, Level 3 with 50% of the unweighted credits under the Energy section

Under Section 6 – "Developments are to target a 20% reduction in carbon dioxide emissions from on-site renewable energy technologies."

This report will demonstrate how the proposed development at Belsize Lane will meet the above Planning Policy requirements by following the methodology set down by the Energy Hierarchy and detailed in Policy 5 of the London Plan 2011

3 Baseline energy results

The following section details the baseline energy requirements for the overall development – the starting point when considering the energy hierarchy

The energy requirements for space heating, water heating and ventilation within the residential dwellings have been calculated using the Standard Assessment Procedure 2009 (SAP) in line with AD L1A of the Building Regulations 2010 and the Domestic Heating Compliance Guide 2nd edition.

To achieve this, for the residential element, it is necessary to determine what the Building Regulations Approved Document Part L (minimum) standard is, prior to the application of energy reduction measures to the design. The following section summarises the energy calculations undertaken in order to determine the Part L target emission rates (TER) to which the planning requirements are applied. The TER is obtained by applying the design to a reference 'notional' building the characteristics of which are set by regulations – SAP2009 – and then applying the appropriate improvement factors;

Table R1 : Reference values

Element or system	Value
Size and shape	Same as actual dwelling
Opening areas (windows and doors)	25% of total floor area (or, if total exposed façade area is less than 25% of the total floor area, the total exposed façade area) The above includes one opaque door of area 1.85 m², any other doors are fully glazed All glazing treated as windows (i.e. no roof windows)
External walls	U = 0.35 W/m²K
Party walls	U = 0
Floors	U = 0.25 W/m²K
Roofs	U = 0.16 W/m²K
Opaque door	U = 2.0 W/m²K
Windows and glazed doors	U = 2.0 W/m²K Double glazed, low-E hard coat Frame factor 0.7 Solar energy transmittance 0.72 Light transmittance 0.80
Thermal mass	Medium (TMP = 250 kJ/m²K)
Living area fraction	Same as actual dwelling
Shading and orientation	All glazing orientated E/W; average overshading
Number of sheltered sides	2
Allowance for thermal bridging	0.11 x total exposed surface area (W/K)
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	10 m³/h·m² at 50 Pa
Chimneys	None
Open flues	None
Extract fans	3 for dwellings with floor area greater than 80 m², 2 for smaller dwellings
Main heating fuel (space and water)	Mains gas
Heating system	Boiler and radiators water pump in heated space
Boiler	SEDBUK(2009) 78% room-sealed fanned flue on/off burner control
Heating system controls	Programmer + room thermostat + TRVs boiler interlock
Hot water system	Stored hot water, heated by boiler separate time control for space and water heating
Hot water cylinder	150 litre cylinder insulated with 35 mm of factory applied foam
Primary water heating losses	Primary pipework not insulated cylinder temperature controlled by thermostat
Water use limited to 125 litres per person per day	No
Secondary space heating	10% electric (panel heaters)
Low energy light fittings	30% of fixed outlets
Note: Building regulations can vary between England, Wales, Scotland and Northern Ireland. The data in the table should only be used subject to any qualifications or amendments given in the regulatory documents that apply in the Administration where the dwelling(s) will be constructed.	

SAP first creates the notional reference building, the characteristics of which are defined in SAP2009 Appendix R, Table R1 as reproduced above to achieve an emissions level compliant with Building Regulations 2006 (using emissions levels set under SAP2005). The notional building then has the improvement factors applied, firstly 20% under ADL1A2006, and a further 25% improvement factor applied to “uplift” the emissions levels to Building Regulations 2010 compliance.

This should be considered as stage 'zero' of the energy hierarchy as described earlier and sets the benchmark for the worst performing, but legally permissible, development.

A total of 7 dwellings will make up the development with a total net internal floor area of circa 1210sqm

At semi-basement level there in space provided for car parking, plant room, bin and cycle stores.

The baseline building results have been calculated and are presented in Table 1 below. They have been compiled assuming basic compliance with the building regulations as set out below:-

The baseline un-regulated energy use for cooking & appliances in the residential unit has been calculated using the SAP Section 16 methodology; the same calculation used for Code for Sustainable Homes (CfSH) Ene 7.

The Baseline SAP CfSH outputs are attached at **Appendix A** and predict regulated energy use (TER) and unregulated energy use at:-

Table 1 – Baseline energy consumption and CO2 reductions – by unit – as calculated using SAP2009 Appendix R and NCM

Unit	Target Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total baseline emissions Kg/sqm	Total baseline emissions Kg
Unit 1	16.46	12.94	29.40	5027
Unit 2	18.85	15.85	34.70	4025
Unit 3	13.16	12.07	25.23	4920
Unit 4	14.83	14.29	29.12	4135
Unit 5	13.25	12.07	25.32	4937
Unit 6	15.22	14.29	29.51	4190
Unit 7	15.37	10.62	25.99	6472
Total				**33706**

4 Design for energy efficiency

The first step in the Mayor's 'Energy Hierarchy' as laid out in Section 5 of The London Plan requests that buildings be designed to use improved energy efficiency measures – Be Lean. This will reduce demand for heating, cooling, and lighting, and therefore reduce operational costs while also minimizing associated carbon dioxide emissions.

This section sets out the measures included within the design of the dwelling, to reduce the demand for energy, both gas and electricity (not including energy from renewable sources). The table at the end of this section details the amount of energy used and CO2 produced by the building after the energy efficiency measures have been included. From these figures the overall reduction in CO2 emissions, as a result of passive design measures, can be calculated. To achieve reductions in energy demand the following measures have been included within the design and specification of the building:

4.1 Orientation

The development is located in a dense high rise urban locale entirely surrounded by other buildings of similar height or a little lower. The design team have taken advantage of the more open south east aspect with large glazed areas to improve solar gain and thereby reduce annual heating demand.

In addition, areas that are required to be kept cool – bedrooms and bathrooms – are generally arranged on the North West side of the building with smaller glazed areas to reduce heat losses

4.2 Heating system

The baseline heating system considered for the dwellings will consist of a high efficiency condensing gas combination boiler; this will in turn provide domestic hot water via highly insulated unvented cylinders. Space heating through will be via under floor heating laid under screed.

- High efficiency boiler –(90.7% SEDBUK efficiency)
- Insulated primary pipework

To increase the efficiency in the use of the heating system, the following controls will be used in a 'boiler interlock' system to eliminate needless firing of the boiler.

- Boilers fitted with weather compensation and delayed start thermostats.
- Use of multiple thermal zoning to maximise system efficiency

4.3 Fabric heat loss

Overall the design team have aspired to meet best practice standards as set out in in Camden's Planning Guide No 3

Insulation

- New wall construction will utilise good levels of insulation to achieve a target u value of 0.20
- The Flat Roof/Terrace construction is yet to be specified, but an warm roof constructions achieving a u value of 0.13 will be targeted
- Ground floor (over basement car parking) - 100mm PIR over solid floors with edge insulation achieving a u-value at 0.18 w/m^2 K
- Exposed floors over unheated spaces will achieve a minimum u-value at 0.20w/m^2 K

Glazing

- New glazing for windows and doors and have U-Values of 1.4w/m^2 K

Air Tightness

- The project will be tested for air tightness with a target value of 6m^3/hr/m^2 ,

Construction Details

- Heat loss via non-repeating thermal bridging will be minimised by the use of Accredited Construction Details throughout

4.4 Ventilation

A natural ventilation strategy will be employed for the development to further reduce the reliance on grid based electricity. An air tightness rating of 6 will be targeted as noted above, in line with AD Part F recommendations, in conjunction with trickle ventilation and intermittent extracts in wet rooms and kitchen.

4.5 Lighting and appliances

100% of internal light fittings will be dedicated low-energy/compact fluorescent fittings. In addition, occupancy sensing will be used to prevent lights being left on in areas such as toilets and storage areas

It is anticipated that under the Code for Sustainable Homes requirements, all of the electrical appliances will be provided as part of the finished dwelling: Fridge/freezers A+ rated, Dishwasher and washing machines A rated and tumble dryer with a B rating.

In addition, again in line with the Code for Sustainable Homes principles, all external lighting will be of the low energy type with consideration given to the design and location to reduce light pollution, as well as installing daylight controls to prevent unnecessary daytime use

4.6 Energy efficiency results

The above data has been used to update the SAP models, the outputs of which are attached at **Appendix B.** The following Table 2 shows the emissions levels achieved by unit, as well as the overall emissions from the building

Table 2 – Energy consumption and CO2 reductions – Energy Efficient Design

Unit	Dwelling/Building Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total Energy Efficient emissions Kg/sqm	Total Energy Efficient emissions Kg
Unit 1	15.23	12.94	28.17	4817
Unit 2	16.93	15.85	32.78	3802
Unit 3	12.45	12.07	24.52	4781
Unit 4	13.56	14.29	27.85	3955
Unit 5	12.63	12.07	24.70	4817
Unit 6	14.07	14.29	28.36	4027
Unit 6	13.93	10.62	24.55	6113
Total				**32312**

The results show that the energy efficiency measures introduced have resulted in the reduction in CO_2 emissions from the development of **4.1%** and in addition, the SAP outputs at **Appendix B,** clearly demonstrate that Building Regulations Part L 2010 compliance (25% improvement over the 2006 Regulations), has been achieved through the “fabric first” approach.

5 Supplying Energy Efficiently

The second stage in the Mayor's 'Energy Hierarchy' is to ensure efficient and low carbon energy supply – Be Clean. In particular, this concerns provision of decentralised energy where practical and appropriate.

Camden's Planning Guide No 3 has more specific requirements; Developments which fall within proposed within 1km of an existing decentralised energy network, or one that is likely to be operational within 3 years of occupation of the development, should assess the feasibility of connecting to the network.

MITIE's Asset Management division has developed and operates an off-grid, combined heat and power energy centre for the Royal Free Hampstead NHS Trust, a 900-bed hospital within the London Borough of Camden. A unique partnership has been created between the NHS Trust, MITIE and Camden Council to provide and distribute the surplus heat to Camden Council tenants. Hot water and heat will be provided to around 1,200 social housing tenants at reduced cost.

The project site at Belsize Lane is within 300m of the above facility, and accordingly, the design team have considered the feasibility of connecting to the above network

5.1 Community heating/Combined Heat and Power (CHP)

Combined heat and power systems are essentially biomass or fossil fuel fired electricity generators that use the heat by-product to provide space and water heating. The electricity generated can be used directly within the host buildings or sold to electricity suppliers on the national grid. These systems can be employed on a large scale for community schemes or at the micro scale for individual dwellings. However, at present micro scale domestic CHP systems are in their infancy.

Alternatively larger scale systems operated as a standalone entity can be used to provide heat and power to the local neighbourhood.

Buildings that are best suited as candidates for their own CHP system are those with high all year heating demand, generally for the provision of hot water such as hotels, hospitals and industrial premises together with a reasonably consistent base electrical load.

The heat production facility for a district heating scheme is generally considered to include heat only boilers (HOB) and/or the production of both electricity and heat i.e. CHP.

CHP is, as a rule of thumb, is only operated as a base load as, depending on the technology, it may be difficult and/or inefficient to operate according to daily variations in demand. In a well-designed district heating network heat from CHP will provide between 60% and 80% of the annual heat requirement with heat-only boiler plants providing the peak load and back-up. To maximise efficiency of the engine it needs to run for at least 17 hours a day; therefore, the heat load needs to be present for this period.

In a residential scheme, hot water is the only thermal load present throughout the year and during daylight hours this load is very small, with peaks in the morning and evening. Given a certain economy of scale, large scale residential developments can satisfy the requirements for community CHP by splitting the annual heat load between community boiler and community CHP, so that the CHP provides the background heating load year round, and the winter peak is met by the boilers.

The Development at Belsize Lane does not offer this scale of development and due to this, integrated CHP is not considered viable.

However, Camden's Planning guide No 3 requires that where there is more than one occupier, use or building a community heating network will be expected. A community (heat only) boiler system would offer high levels of efficiency and should be considered for this development; Not until a preliminary or detailed design would we look in detail at identifying all the equipment necessary for a specific district/community heating system, but it is clear, that given the scale of development involved, there is potential for a community scheme to be implemented

5.2 Decentralised District Heating/CHP

As noted above, Camden's Planning guide No 3 requires developments which fall within proposed within 1km of an existing decentralised energy network, or one that is likely to be operational within 3 years of occupation of the development, should assess the feasibility of connecting to the network. Further, guidance required that a connection should be made unless it can be clearly demonstrated that it would not be viable.

As can be seen from the attached extract from the London Heat Map, the development site sits within 300m of Royal Free Hampstead NHS Trust CHP system.

Extract from the London Heat Map – Location within 1km of Royal Free Hampstead NHS Trust

MITIE's Asset Management division developed and operates the off-grid, combined heat and power energy centre for the Royal Free Hampstead NHS Trust, a 900-bed hospital within the London Borough of Camden. A partnership has been created between the NHS Trust, MITIE and Camden Council to provide and distribute the surplus heat to Camden Council tenants the surplus heat from the hospital plant will be piped to a new energy centre in the Gospel Oak area of Camden to provide hot water and heat to residents.

The developer has considered the potential to connect to the Royal Free CHP network – but as part of initial investigations, it has been established that the existing network extends approximately 250m to the east of the existing CHP plant into the Gospel Oak area, whereas the Belsize Lane development site is some 250m to the west. The Gospel Oak Estate London Borough of Camden District Heating Feasibility Study prepared by CBG Consultants in July 2010 estimated the primary district heat main at £1.0m - £1.2m, so it can be assumed that a similar cost would be incurred to development the network in a westerly direction

The scale of development – at only 7 units – would clearly be unable to support the major infrastructure costs to bring the network along Belsize Lane – which would include crossing the busy Haverstock Hill (A502). Along the route of any such distribution network (along Oman Road) are a series of low rise individual dwellings and accordingly, there would be limited opportunity to source other property or new developments that could connect to the network.

Notwithstanding the above – an approach to Mitie has been made to initialise a dialogue on the opportunity to connect to the Royal Free Trust CHP system, but they confirmed that they did "not believe there is a business case to extend the DH network from the RF for a 40KW load". A copy of this communication is attached at **Appendix F**

Despite the fact that connection to the local decentralised network is not viable, the developer it to introduce a community boiler heating strategy within the development and there is sufficient space in the plant room as designed to accommodate the appropriate equipment and heat exchangers to connect to a decentralised network as and when it becomes available

Again the SAP calculations have been updated to consider the effect of the community heating approach and the summary outputs attached at **Appendix C** and tabulated below

Table 3 – Energy consumption and CO2 reductions – Source Energy Efficiently

Unit	Dwelling/Building Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total Energy Efficient emissions Kg/sqm	Total Energy Efficient emissions Kg
Unit 1	15.03	12.94	27.97	4783
Unit 2	16.45	15.85	32.30	3747
Unit 3	12.24	12.07	24.31	4740
Unit 4	13.14	14.29	27.43	3895
Unit 5	12.43	12.07	24.50	4777
Unit 6	13.67	14.29	27.96	3970
Unit 7	13.93	10.62	24.55	6113
Total				**32025**

It can be seen from Table 3, that the introduction of a high efficiency community heating scheme, that further a reduction in emissions is achieved – now totalling **5%** over the baseline model

6 Renewable Energy Options

The final element of the Mayor's 'Energy Hierarchy' requires development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible – Be Green.

This should be considered in conjunction with local planning policy requires a target of 20% reduction in emissions from renewable energy sources

Renewable energy can be defined as energy taken from naturally occurring or renewable sources, such as sunlight, wind, wave's tides, geothermal etc. Harnessing these energy sources can involve a direct use of natural energy, such as solar water heating panels, or it can be a more indirect process, such as the use of Biofuels produced from plants, which have harnessed and embodied the suns energy through photosynthesis.

The energy efficiency measures and the sourcing the energy efficiently outlined above have the most significant impact on the heating and hot water energy requirements for the development, and the associated reduction in gas consumption.

It should be noted that each Kwh of gas energy saved reduces emissions by 0.198kgCO_2/kwh, whereas, grid based electrical energy has a emissions factor of 0.517kgCO_2/kwh and accordingly, emphasis will be placed upon "off-setting" grid based electricity in order to achieve the optimum use of renewable technologies.

This section then sets out the feasibility of implementing different energy technologies in consideration of: -

- Potential for Carbon savings
- Capital costs
- Running costs
- Payback period as a result of energy saved/Government incentives
- Maturity/availability of technology
- Reliability of the technology and need for back up or alternative systems.

6.1 Government incentives

6.1.1 Feed in Tariff

Feed in Tariffs (FiTs) replaced ROCs for renewable energy generators rated at less than 5MW in April 2010. FiTs are payments made for every kilowatt-hour kWh of renewable electricity generated and the level of the payment is laid down by the government, and varies for different renewable energy sources and at different scales. Unlike the flat rates paid for ROCs, FiTs are designed to compensate for less efficient/more expensive sources of renewable energy – and for the first time – make the investment in low and zero carbon technologies viable for both domestic generators and larger companies alike.

6.1.2 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) was formally launched by the UK Government on 10th March 2011. The RHI will pay a tariff payment to renewable technologies that provide heat energy from a renewable source, with the payment relating to the KWh of heat energy provided e.g. if a property has a heat load of 20,000 KWh per annum, and it is 100% provided from a renewable source, then the tariff is paid against the 20,000KWh.

The Government have decided on a two stage delivery - the first stage being for non-domestic schemes, commencing in July 2011, with domestic schemes coming on stream in Autumn 2012, although it is understood that this may now be delayed until the Summer of 2013

Commercial schemes will be required to be metered for the heat energy delivered; the payments will be for 20 years and be linked to RPI. It should be noted that any district/community system is considered a complex metering arrangement and qualifies for the Commercial RHI

As an interim measure, the Government have introduce the RHI Premium Payments which offer a one-off payment to assist the retrofitting of sources of renewable heat, but these are generally targeted toward areas without access to the gas grid – i.e. oil based heating systems.

6.2 Wind turbines

Wind turbines come in two main types'- horizontal axis and vertical axis. The more traditional horizontal axis systems rotate around the central pivot to face into the wind, whilst vertical axis systems work with wind from all directions.

The potential application of wind energy technologies at a particular site is dependent upon a variety of factors. But mainly these are: -

- Wind speed
- Wind turbulence
- Visual impact
- Noise impact
- Impact upon ecology

The availability and consistency of wind in urban environments is largely dependent upon the proximity, scale and orientation of surrounding obstructions. The site is surrounded by other properties approximately 2 to 4 storeys in height in all directions.

To overcome these obstructions and to receive practical amounts of non-turbulent wind, the blades of a wind turbine would need to be placed significantly above the roof level of the surrounding buildings.

It is inconceivable that a wind turbine of this size would be considered acceptable in this location.

6.3 Solar Energy

The new development at Belsize Lane is orientated on a north west/south east plane, but it has a large flat roof which would enable horizontally mounted panels to harvest the sun's energy.

The 4th floor roof will have an unrestricted aspect, so there is scope therefore to site solar photovoltaic or water heating equipment at roof level.

6.3.1 Photovoltaics (PV)

A 1kWp (1 kilowatt peak) system in the UK could be expected to produce between 790-800 kWh of electricity per year based upon a south east orientation according to SAP2005 methodology used by the Microgeneration Certification Scheme (MCS). The figure given in the London Renewables Toolkit is 783 kWh per year for a development in London.

The area of panelling required to achieve 1kWp is dependent upon the efficiency of the system, but in the case, of the Belsize Lane development with a large area of roof space roof space – a high efficiency panel such as the Solarworld 250 series, which have a rating of 250w from 1.8m^2 of panel area would be more than adequate

The introduction of the Feed in Tariff has now rendered such investments viable often achieving annual returns in the region of 7-8%.

Accordingly, the use of PV panels would be recommended for the Belsize Lane project

To achieve a reduction in emissions of 20% requires a reduction in emissions of 6,405kg. Grid based electricity emits 0.517Kg/Kwh, so the PV array would need to produce 12,389kWh/annum. At 783Kwh per 1kWp equates to a PV array of **15.8Kwp** – an area of **113sqm.**

6.3.2 Solar water heating

Solar water heating panels come in two main types; flat plate collectors and evacuated tubes. Flat plate collectors feed water, or other types of fluid used specifically to carry heat, through a roof mounted collector and into a hot water storage tank. Evacuated tube collectors are slightly more advanced as they employ sealed vacuum tubes, which capture and harness the heat more effectively.

Both collector types can capture heat whether the sky is overcast or clear. Depending on location, approximately 900–1100 kWh of solar energy falls on each m^2 of unshaded UK roof surface annually. The usable energy output per m2 of solar panel as a result of this amount of insolation ranges from between 380 – 550 kWh/yr.

Solar hot water systems are of course, displacing gas (as noted above), and due to the low emissions rates of gas as a source of energy, it would require a very large system to compete with the off-setting of electricity use afforded by the PV panels.

In addition, the plumbing requirement in a large development such as this, particularly considering the ground floor plant room location would also count against such a system.

Solar thermal systems have to be optimised by ensuring that the demand for hot water is met as far as is practicable by the system to maximise the efficiency of the solar thermal output, which is very dependent upon individual behaviour patterns within the dwellings – not something within the control of the developer

Taking into account all of the above issues, this technology is not recommended for the proposed development.

6.4 Biomass heating

Biomass is a term given to fuel derived directly from biological sources for example rapeseed oil, wood chip/pellets or gas from anaerobic digestion. It can only be considered as a renewable energy source if the carbon dioxide emitted from burning the fuel is later recaptured in reproducing the fuel source (i.e. trees that are grown to become wood fuel, capture carbon as they grow).

Biomass heating systems require space to site a boiler and fuel hopper along with a supply of fuel. There also needs to be a local source of biomass fuel that can be delivered on a regular basis.

There are issues with fuel storage and delivery which mitigate against this technology in particular the emissions generated from transporting the fuel and the presence of delivery lorries would impede vehicle access for residents to the development.

A boiler of this type would replace the need for a conventional gas boiler and therefore offset all the gas energy typically used for space and water heating, however, biomass releases high levels of NO_x emissions and would therefore have to be considered carefully against the high standard of air quality requirements in dense urban development areas with reference to the air quality standards required under Camden's Planning Guide No 3

Accordingly, the use of biomass is not considered appropriate for the Belsize Lane project

6.6 Ground source heat pump

All heat pump technologies utilise electricity as the primary fuel source – in this case displacing gas, as such, the overall reduction in emissions when using this technology can be less effective when opposed to a technology that is actually displacing electricity

Ground source heating or cooling requires a source of consistent ground temperature, which could be a vertical borehole or a spread of pipework loops and a 'heat pump'. The system uses a loop of fluid to collect the more constant temperature in the ground and transport it to a heat pump. In a cooling system this principle works in reverse and the heat is distributed into the ground.

The heat pump then generates increased temperatures by 'condensing' the heat taken from the ground, producing hot water temperatures in the region of 45^{o}C. This water can then be used as pre-heated water for a conventional boiler or to provide space heating with an under floor heating system.

The use of a ground source heating/cooling system will therefore require:

- Vertical borehole or ground loop
- Use of under floor heating
- Space for heat pump unit

Following construction of the new development there will be very little outside space in which to even install a borehole, and certainly no space available to bury horizontal pipework. It is therefore unlikely that a ground source heat pump system would be possible in practical terms.

6.7 Air source heat pump

Air source heating or cooling also employs the principle of a heat pump. This time either, upgrading the ambient external air temperature to provide higher temperatures for water and space heating, or taking warmth from within the building and dissipating it to the outdoor air.

It must be remembered that heat pumps utilise grid based electricity and the associated emissions, so that actual the reduction in emissions can be limited. Assuming a seasonal system efficiency of 320% (Coefficient of Performance of 3.2) and that the air source heat pump will replace 100% of the space heating/hot water demand, then the system would reduce the overall CO_2 emissions by approximately 25%. The table below demonstrates, on the assumption of a demand of 1000Kwh/year for heating and hot water.

Type of Array	Energy Consumption (Kwh/yr)	Emission factor ($kgCO_2$/Kwh)	Total CO_2 emissions (kg/annum)
90% efficient gas boiler	1111	0.198	220
320% efficient ASHP	312.5	0.517	162

A saving of +/- 26.3%

With the above data in mind, clearly an ASHP could be an option, however, it must be born in mind that air source heat pumps can often require immersion back up for peak load times (very cold weather) and for hot water production – this can often affect overall efficiently quite dramatically.

In addition, there is the need to mount the external evaporator units – there is little external space associated with the development aside from the roof space or the rear grounds. Mounting the units on the roof space would require significant and expensive refrigerant pipe runs as well as offering a potential noise nuisance to the neighbouring properties. Mounting at ground level to the rear will also cause a noise nuisance to occupiers of the communal space.

In this case, the capital costs involved and the additional space required for the heat pump and associated equipment and the difficulties of installation as discussed above, would mean that this system would be less feasible in comparison to other technologies.

7 Sustainable Design & Construction

7.1 Code for Sustainable Homes

The Code for Sustainable Homes (the Code) is the national standard for the sustainable design and construction of new homes. The Code aims to reduce our carbon emissions and create homes that are more sustainable. It applies in England, Wales and Northern Ireland. It is entirely voluntary, and is intended to help promote higher standards of sustainable design above current Building Regulations minima.

The Code measures the sustainability of new homes against nine categories of sustainable design, rating the 'whole home' as a complete package. It covers energy/CO_2, water, materials, surface water runoff (flooding and flood prevention), waste, pollution, health and well-being, management and ecology.

The Code uses a one to six star rating system to communicate the overall sustainability performance of a new home against these nine categories. The Code sets minimum standards for energy and water use at each level and, within England, replaces the EcoHomes scheme, developed by the Building Research Establishment (BRE).

The London Plan also considers Sustainable design and Construction under Section Policy 5.3:-

"Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

- *minimising carbon dioxide emission across the site, including the building and services (such as heating and cooling systems)*
- *avoiding internal overheating and contributing to the urban heat island effect*
- *efficient use of natural resources (including water), including making the most of natural systems both within and around buildings*
- *minimising pollution (including noise, air and urban run-off)*
- *minimising the generation of waste and maximising reuse or recycling*
- *avoiding impacts from natural hazards (including flooding)*
- *ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions*
- *securing sustainable procurement of materials, using local supplies where feasible, and*
- *promoting and protecting biodiversity and green infrastructure."*

In order to demonstrate the sustainability credentials for the new build project at Belsize Lane, the developers will achieve a 4 star rating (Code for Sustainable Homes - Level 4).

In order to offer an example of how the Belsize Lane development will meet the required standard, the Code for Sustainable Homes pre-assessment attached at **Appendix E** considers a standard unit taking into account the worse performance calculated under the SAP methodology for Ene 1 and Ene2.

Overall, the developer commits to the achievement of Code Level 4 for all units for all units within the Belsize Lane development.

8 Conclusions

This report has detailed the baseline energy requirements for the proposed development, the reduction in energy demand as a result of energy efficiency measures and the potential to achieve further CO_2 reductions using renewable energy technologies.

The baseline results have shown that if the dwellings were built to meet only the minimum requirements of current building regulations, the total amount of CO2 emissions would be **33706Kg/year**.

Following the introduction of passive energy efficiency measures into the development, as detailed in section 3, the total amount of CO2 emissions would be reduced to **32312Kg/year**, a reduction of **4.1%.**

It is further proposed to introduce a community heating scheme to the development, this clean source of energy supply further reduces emission to **32025Kg/year** – a cumulative reduction over the baseline model of **5.0%**

There is also a requirement to reduce CO_2 emissions across the development using renewable or low-carbon energy sources. Therefore the report has considered the feasibility of the following technologies:

- Wind turbines
- Solar hot water
- Photovoltaic systems
- Biomass heating
- CHP (Combined heat and power)
- Ground source heating
- Air source heating

The results of the assessment of suitable technologies relative to the nature, locations and type of development suggest that the most suitable solution to meeting reduction in CO_2 emissions would be via the use of photovoltaic (PV) panels.

The developer has indicated the installation of a 16Kwp system consisting of 64 x 250w panels horizontally mounted.

This large array has been selected to ensure that the residential development achieves Code Level 4 via good credit scores under Ene 1 – Energy Efficiency and Ene 7 – Use of Low and Zero Carbon Technologies as well as avoiding the use of electrically fuelled heating systems and the higher associated NOx emissions – such as heat pumps

The design team have also indicated that an element of comfort cooling will be considered within the design, and this has been taken into account as part of the final SAP calculations.

This has be used in the SAP models (reproduced at **Appendix D**) for the residential units which have also been detailed below in Table 4, which show a final gross emission level of **25720Kg/year**, representing a total reduction in emission over the baseline model, taking into account unregulated energy, of **23.7%**

In addition, the Code for Sustainable Homes outputs at **Appendix D** demonstrate that the dwellings achieve an overall improvement of DER/TER for Building Regulations of minimum **43%** (CfSH Level 4 standard and compliant with The London Plan 2011),

Table 4 – Energy consumption and CO2 reductions – Produce energy on-site

Unit	Dwelling/Building Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total Energy Efficient emissions Kg/sqm	Total Energy Efficient emissions Kg
Unit 1	9.76	9.29	22.70	3882
Unit 2	11.32	10.72	27.17	3152
Unit 3	7.00	6.49	19.07	3719
Unit 4	7.94	7.39	22.23	3157
Unit 5	7.19	6.68	19.26	3756
Unit 6	8.49	7.92	22.78	3235
Unit 7	8.74	8.18	19.36	4821
Total				**25720**

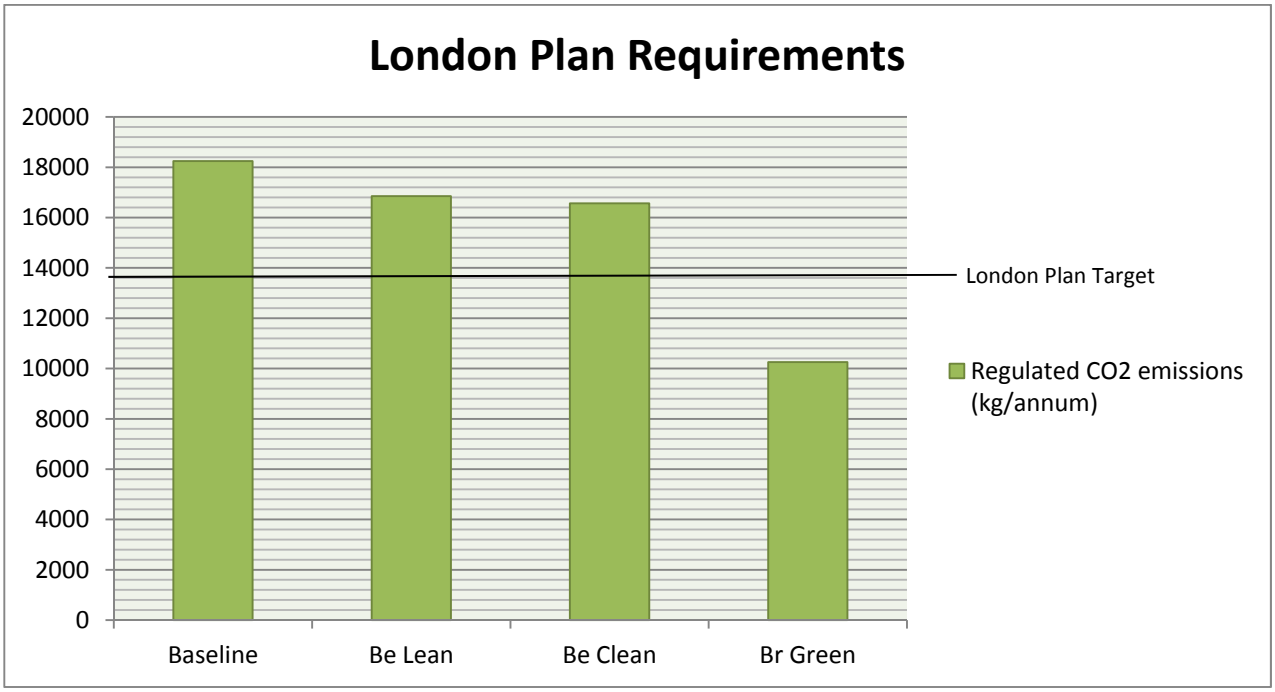
Tables 5 & 6 Demonstrate how the Belsize Lane project complies with the London Plan requirements;

Table 5 – Carbon Emission Reductions

	Carbon Dioxide Emissions ($Kg\ CO_2$ per annum)	
	Regulated	Unregulated
Building Regulations 2010 Part L Compliant Development	18245	15461
After energy Demand Reduction	16851	15461
After CHP	16565	15461
After renewable energy	10258	15461

Table 6 – Regulated Emissions Savings

	Regulated Carbon Dioxide Savings	
	$Kg\ CO_2$/annum	%
Savings from energy demand reduction	1394	7.6
Savings from Community	286	1.7
Savings from renewable energy	6307	38.0
Total Cumulative Savings	**7987**	**43.8**


London Plan Requirements
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Baseline
Be Lean
Be Clean
Br Green
London Plan Target
Regulated CO2 emissions (kg/annum)

Appendix A

Baseline/Un-regulated Energy Use:-

SAP 2009 – Code for Sustainable Homes outputs

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 1
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	16.46
DER	19.88

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		19.88	*(ZC1)*
TER		16.46	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		19.88	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	19.88	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.83	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.11	*(ZC3)*
Net CO2 emissions	32.8	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 72.9
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		34.2
Standard DER		21.26
Actual Case CO2 emissions		34.2
Actual DER		21.26
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 2
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	18.85
DER	22.1

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		22.1	*(ZC1)*
TER		18.85	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		22.1	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	22.1	*(ZC1)*
CO2 emissions from appliances, equation (L14)	14.24	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.61	*(ZC3)*
Net CO2 emissions	38	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 76.95
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year	
Standard Case CO2 emissions		39.48	
Standard DER		23.62	
Actual Case CO2 emissions		39.48	
Actual DER		23.62	
Reduction in CO2 emissions	0		

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 3
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.16
DER	15.86

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		15.86	*(ZC1)*
TER		13.16	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		15.86	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	15.86	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	27.9	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 56.68
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.05
Standard DER		16.98
Actual Case CO2 emissions		29.05
Actual DER		16.98
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 4
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	14.83
DER	17.31

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		17.31	*(ZC1)*
TER		14.83	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		17.31	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	17.31	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	31.6	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 57.83
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		32.8
Standard DER		18.51
Actual Case CO2 emissions		32.8
Actual DER		18.51
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 5
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.25
DER	15.98

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		15.98	*(ZC1)*
TER		13.25	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		15.98	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	15.98	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	28.1	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 57.53
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.22
Standard DER		17.15
Actual Case CO2 emissions		29.22
Actual DER		17.15
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 6
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.22
DER	17.71

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		17.71	*(ZC1)*
TER		15.22	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		17.71	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	17.71	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	32	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 60.47
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year	
Standard Case CO2 emissions		33.37	
Standard DER		19.08	
Actual Case CO2 emissions		33.37	
Actual DER		19.08	
Reduction in CO2 emissions	0		

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 7
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.37
DER	17.66

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		17.66	*(ZC1)*
TER		15.37	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		17.66	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	17.66	*(ZC1)*
CO2 emissions from appliances, equation (L14)	9.85	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.77	*(ZC3)*
Net CO2 emissions	28.3	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 75.05
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		30.48
Standard DER		19.86
Actual Case CO2 emissions		30.48
Actual DER		19.86
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Appendix B

Energy Efficient Design:-

SAP 2009 – Code for Sustainable Homes outputs

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 1
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	16.46
DER	15.23

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		15.23	*(ZC1)*
TER		16.46	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		15.23	
% improvement DER/TER	7.47		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	15.23	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.83	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.11	*(ZC3)*
Net CO2 emissions	28.2	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0.9

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 54.9
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.73
Standard DER		16.79
Actual Case CO2 emissions		29.73
Actual DER		16.79
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 2
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	18.85
DER	16.93

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		16.93	*(ZC1)*
TER		18.85	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		16.93	
% improvement DER/TER	10.19		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	16.93	*(ZC1)*
CO2 emissions from appliances, equation (L14)	14.24	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.61	*(ZC3)*
Net CO2 emissions	32.8	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.3

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 56.87
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		34.5
Standard DER		18.64
Actual Case CO2 emissions		34.5
Actual DER		18.64
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 3
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.16
DER	12.45

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		12.45	*(ZC1)*
TER		13.16	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		12.45	
% improvement DER/TER	5.36		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	12.45	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	24.5	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0.7

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 44.07
Credits awarded for Ene 2 = 4.5

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		25.81
Standard DER		13.74
Actual Case CO2 emissions		25.81
Actual DER		13.74
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 4
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	14.83
DER	13.56

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		13.56	*(ZC1)*
TER		14.83	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		13.56	
% improvement DER/TER	8.58		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	13.56	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	27.8	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.1

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 43.92
Credits awarded for Ene 2 = 4.5

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.2
Standard DER		14.91
Actual Case CO2 emissions		29.2
Actual DER		14.91
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 5
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.25
DER	12.63

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		12.63	*(ZC1)*
TER		13.25	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		12.63	
% improvement DER/TER	4.67		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	12.63	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	24.7	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0.6

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 45.18
Credits awarded for Ene 2 = 3.9

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		26.04
Standard DER		13.97
Actual Case CO2 emissions		26.04
Actual DER		13.97
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 6
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.22
DER	14.07

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		14.07	*(ZC1)*
TER		15.22	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		14.07	
% improvement DER/TER	7.56		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	14.07	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	28.4	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0.9

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 47
Credits awarded for Ene 2 = 3.3

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.88
Standard DER		15.59
Actual Case CO2 emissions		29.88
Actual DER		15.59
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 7
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.37
DER	13.93

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		13.93	*(ZC1)*
TER		15.37	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		13.93	
% improvement DER/TER	9.36		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	13.93	*(ZC1)*
CO2 emissions from appliances, equation (L14)	9.85	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.77	*(ZC3)*
Net CO2 emissions	24.6	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.2

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 60.36
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		26.78
Standard DER		16.16
Actual Case CO2 emissions		26.78
Actual DER		16.16
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

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Appendix C

Sourcing Energy Efficiently:-

SAP 2009 – Code for Sustainable Homes outputs

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 1
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	16.46
DER	15.03

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		15.03	*(ZC1)*
TER		16.46	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		15.03	
% improvement DER/TER	8.67		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	15.03	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.83	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.11	*(ZC3)*
Net CO2 emissions	28	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.1

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 54.9
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.73
Standard DER		16.79
Actual Case CO2 emissions		27.97
Actual DER		15.03
Reduction in CO2 emissions	5.92	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 2
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	18.85
DER	16.45

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		16.45	*(ZC1)*
TER		18.85	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		16.45	
% improvement DER/TER	12.73		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	16.45	*(ZC1)*
CO2 emissions from appliances, equation (L14)	14.24	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.61	*(ZC3)*
Net CO2 emissions	32.3	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.6

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 56.87
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		34.5
Standard DER		18.64
Actual Case CO2 emissions		32.31
Actual DER		16.45
Reduction in CO2 emissions	6.35	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

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Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 3
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.16
DER	12.24

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		12.24	*(ZC1)*
TER		13.16	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		12.24	
% improvement DER/TER	6.97		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	12.24	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	24.3	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0.9

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 44.07
Credits awarded for Ene 2 = 4.5

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		25.81
Standard DER		13.74
Actual Case CO2 emissions		24.31
Actual DER		12.24
Reduction in CO2 emissions	5.81	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 4
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	14.83
DER	13.14

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		13.14	*(ZC1)*
TER		14.83	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		13.14	
% improvement DER/TER	11.39		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	13.14	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	27.4	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.4

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 43.92
Credits awarded for Ene 2 = 4.5

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.2
Standard DER		14.91
Actual Case CO2 emissions		27.43
Actual DER		13.14
Reduction in CO2 emissions	6.06	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 5
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.25
DER	12.43

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		12.43	*(ZC1)*
TER		13.25	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		12.43	
% improvement DER/TER	6.22		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	12.43	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	24.5	*(ZC8)*

Result:

Credits awarded for Ene 1 = 0.8

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 45.18
Credits awarded for Ene 2 = 3.9

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		26.04
Standard DER		13.97
Actual Case CO2 emissions		24.5
Actual DER		12.43
Reduction in CO2 emissions	5.91	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 6
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.22
DER	13.67

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		13.67	*(ZC1)*
TER		15.22	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		13.67	
% improvement DER/TER	10.16		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	13.67	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	28	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.3

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 47

Credits awarded for Ene 2 = 3.3

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.88
Standard DER		15.59
Actual Case CO2 emissions		27.96
Actual DER		13.67
Reduction in CO2 emissions	6.43	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 7
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.37
DER	13.93

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		13.93	*(ZC1)*
TER		15.37	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		13.93	
% improvement DER/TER	9.39		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	13.93	*(ZC1)*
CO2 emissions from appliances, equation (L14)	9.85	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.77	*(ZC3)*
Net CO2 emissions	24.6	*(ZC8)*

Result:

Credits awarded for Ene 1 = 1.2

Code Level = 3

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 60.36
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		26.78
Standard DER		16.16
Actual Case CO2 emissions		24.55
Actual DER		13.93
Reduction in CO2 emissions	8.33	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Appendix D

Generating energy on-site:-

SAP 2009 – Code for Sustainable Homes outputs

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 1
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	16.46
DER	9.76

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		9.76	*(ZC1)*
TER		16.46	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		9.76	
% improvement DER/TER	40.72		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	9.76	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.83	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.11	*(ZC3)*
Net CO2 emissions	22.7	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.4

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 54.9
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.83
Standard DER		16.89
Actual Case CO2 emissions		22.7
Actual DER		9.76
Reduction in CO2 emissions	23.9	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 2
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	18.85
DER	11.32

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		11.32	*(ZC1)*
TER		18.85	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		11.32	
% improvement DER/TER	39.94		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	11.32	*(ZC1)*
CO2 emissions from appliances, equation (L14)	14.24	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.61	*(ZC3)*
Net CO2 emissions	27.2	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.4

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 56.87
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		34.73
Standard DER		18.87
Actual Case CO2 emissions		27.18
Actual DER		11.32
Reduction in CO2 emissions	21.74	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 3
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.16
DER	7

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		7	*(ZC1)*
TER		13.16	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		7	
% improvement DER/TER	46.8		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	7	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	19.1	*(ZC8)*

Result:

Credits awarded for Ene 1 = 5

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 44.07
Credits awarded for Ene 2 = 4.5

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		25.95
Standard DER		13.88
Actual Case CO2 emissions		19.07
Actual DER		7
Reduction in CO2 emissions	26.51	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 4
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	14.83
DER	7.94

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		7.94	*(ZC1)*
TER		14.83	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		7.94	
% improvement DER/TER	46.44		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	7.94	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	22.2	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.9

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 43.92
Credits awarded for Ene 2 = 4.5

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		29.39
Standard DER		15.1
Actual Case CO2 emissions		22.23
Actual DER		7.94
Reduction in CO2 emissions	24.36	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 5
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	13.25
DER	7.19

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		7.19	*(ZC1)*
TER		13.25	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		7.19	
% improvement DER/TER	45.73		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	7.19	*(ZC1)*
CO2 emissions from appliances, equation (L14)	11.09	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.98	*(ZC3)*
Net CO2 emissions	19.3	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.9

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 45.18
Credits awarded for Ene 2 = 3.9

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		26.19
Standard DER		14.12
Actual Case CO2 emissions		19.26
Actual DER		7.19
Reduction in CO2 emissions	26.46	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 6
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.22
DER	8.49

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		8.49	*(ZC1)*
TER		15.22	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		8.49	
% improvement DER/TER	44.21		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	8.49	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.96	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.33	*(ZC3)*
Net CO2 emissions	22.8	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.7

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 47
Credits awarded for Ene 2 = 3.3

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		30.08
Standard DER		15.79
Actual Case CO2 emissions		22.78
Actual DER		8.49
Reduction in CO2 emissions	24.27	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Unit 7
Belsize Lane
LONDON
NW3 5AS

Buiding regulation assessment

	kg/m²/year
TER	15.37
DER	8.74

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		8.74	*(ZC1)*
TER		15.37	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		8.74	
% improvement DER/TER	43.16		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	8.74	*(ZC1)*
CO2 emissions from appliances, equation (L14)	9.85	*(ZC2)*
CO2 emissions from cooking, equation (L16)	0.77	*(ZC3)*
Net CO2 emissions	19.4	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.7

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 60.36
Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		26.97
Standard DER		16.35
Actual Case CO2 emissions		19.36
Actual DER		8.74
Reduction in CO2 emissions	28.22	

Credits awarded for Ene 7 = 2

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

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Appendix E

Code for Sustainable Homes – Pre-assessment Estimator

Typical Unit

Code for Sustainable Homes

Technical Guide November 2010 - Technical Guidance Note 2

Pre-Assessment Report

Report Reference:	**13156**
Site Registration:	**002943-121205-27-1116**
Site Name:	**Belsize Garages**
Assessor Number:	**STRO002943**
Company:	**EB7**
Assessor:	**Neil Ingham**

Site Details	
Site Name:	Belsize Garages
Site Registration:	002943-121205-27-1116
Site Address:	Belsize Lane
	Camden
City/Town:	London
County:	Greater London
Postcode:	NW3 5AS
No. of Dwellings:	1
No. of Dwelling Types:	1
Planning Authority:	Camden Council
Funding Body:	

Assessor Details	
Company:	EB7
Assessor Name:	Neil Ingham
Cert Number:	STRO002943
Address:	Studio F7
	Battersea Studios
	80 Silverthorne Road
City/Town:	London
County:	
Postcode:	SW8 3HE
Tel:	07736 771584
Email:	neili@eb7.co.uk

Client Details	
Company:	TBA
Contact Name:	
Job Title:	
Email:	
Tel:	
Address:	
City/Town:	
County:	
Postcode:	

Architect Details	
Company:	PKS Architects LLP
Contact Name:	Andrew Griffiths
Job Title:	
Email:	
Tel:	
Address:	10 Deane House Studios
	Greenwood Place
City/Town:	London
County:	
Postcode:	NW5 1LB

Developer Details	
Company:	TBA
Contact Name:	
Job Title:	
Email:	
Tel:	
Address:	
City/Town:	
County:	
Postcode:	

Dwelling ID	Plot No.	Address	Social Unit
1	1	Typical Flat Belsize Lane London	Yes

Development Summary & Ratings

Dwelling ID	Dwelling Type	Description	Level	Score
1	Belsize Garages		4	68.29

Deviations from Standard

No deviations from standard

Score Sheet for Belsize Garages

	ENE									WAT		MAT			SUR		WAS			POL		HEA				MAN				ECO					Summary	
Dwelling ID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**	**Score**	**Level**
1	4.6	0	2	1	2	2	2	2	1	3	1	13	5	2	0	2	4	3	1	1	3	3	1	1	4	3	1	2	0	1	1	1	3	1	68.29	4

Summary Score Sheet

Dwelling Type: Belsize Garages

Dwelling ID: 1

	Credit Score	Credits Available	Score Assessment Sub Total	Credits Available	%	Weighting Factor	Points Score
Energy & CO2 Emissions							
ENE 1 Dwelling Emission Rate	4.6	10	16.6	31	53.55	36.4	19.49
ENE 2 Fabric Energy Efficiency	0	9					
ENE 3 Energy Display Device	2	2					
ENE 4 Drying Space	1	1					
ENE 5 Energy Labelled White Goods	2	2					
ENE 6 External Lighting	2	2					
ENE 7 Low or Zero Carbon Energy Technologies	2	2					
ENE 8 Cycle Storage	2	2					
ENE 9 Home Office	1	1					
Water							
WAT 1 Internal Water Use	3	5	4	6	66.67	9	6
WAT 2 External Water Use	1	1					
Materials							
MAT 1 Environmental Impact of Materials	13	15	20	24	83.33	7.2	6
MAT 2 Responsible Sourcing (Basic Building Elements)	5	6					
MAT 3 Responsible Sourcing (Finishing Elements)	2	3					
Surface Water Run-off							
SUR 1 Management of Surface Water Run-Off from Site	0	2	2	4	50	2.2	1.1
SUR 2 Flood Risk	2	2					
Waste							
WAS 1 Household Waste Storage and Recycling Facilities	4	4	8	8	100	6.4	6.4
WAS 2 Construction Site Waste Management	3	3					
WAS 3 Composting	1	1					
Pollution							
POL 1 Global Warming Potential of Insulants	1	1	4	4	100	2.8	2.8
POL 2 NOx Emissions	3	3					
Health & Wellbeing							
HEA 1 Daylighting	3	3	9	12	75	14	10.5
HEA 2 Sound Insulation	1	4					
HEA 3 Private Space	1	1					
HEA 4 Lifetime Homes	4	4					
Management							
MAN 1 Home User Guide	3	3	6	9	66.67	10	6.67
MAN 2 Considerate Constructors Scheme	1	2					
MAN 3 Construction Site Impacts	2	2					
MAN 4 Security	0	2					
Ecology							
ECO 1 Ecological Value of Site	1	1	7	9	77.78	12	9.33
ECO 2 Ecological Enhancement	1	1					
ECO 3 Protection of Ecological Features	1	1					
ECO 4 Change of Ecological Value of Site	3	4					
ECO 5 Building Footprint	1	2					
	Level Achieved: 4		Total Points Scored: 68.29				

Evidence for ENE 1 (Dwelling Emission Rate) - Belsize Garages
Improvement above Part L Building Regulations 2010. 4.6 credits allocated
As part of the energy statement development, SAP calculations have been undertaken. The lowest SAP rating of the 7 units has resulted in a minimum of43.14% improvement over the Part L 2010 Building Regulations At this stage, 4.6 credits are awarded
Assumptions for ENE 1

Evidence for ENE 2 (Fabric Energy Efficiency) - Belsize Garages
Not Sought 0 credits allocated
As part of the energy statement development, SAP calculations have been undertaken. Some units have achieved a minimum FEE ratingbut others have not - at the pre-assessment stage - no credits are awarded
Assumptions for ENE 2

Evidence for ENE 3 (Energy Display Device) - Belsize Garages
Correctly specified display device showing current primary heating fuel consumption data. Correctly specified display device showing current consumption data.
The developer will install display energy devices to monitor electrical consumption within the new development. Information on the display energy device will be supplied and the consumption data that it will display.
Assumptions for ENE 3

Evidence for ENE 4 (Drying Space) - Belsize Garages
Compliant internal drying space
The developer has confirmed external drying lines will be installed in the communal gardens. The communal gardens can only be accessed through the development and as such are private and secure
Assumptions for ENE 4
All units to be supplied with appropriate drying space

Evidence for ENE 5 (Energy Labelled White Goods) - Belsize Garages
A+ rated fridge & freezers or fridge/freezer A rated washing machine and dishwasher AND B rated washer-dryers & tumbles dryers, or EU energy efficiency labelling scheme leaflet where washing machines and/or dishwashers not provided
The developer has commited to supplying energy efficient white goods to all properties in the development Developer to provide details of all white goods provided and the energy ratings to include A+ rated fridge freezers, A rated washing machines and dishwashers and a copy of the EU energy labelling scheme as part of the Home User Guide
Assumptions for ENE 5
It is assumed that all units will be supplied with white goods and that each unit will receive details of the EU labelling scheme in the Home User Guide

Evidence for ENE 6 (External Lighting) - Belsize Garages
Compliant space lighting Compliant security lighting
The development is to have a low energy lighting strategy including all space and security lighting. Developer to supply details of all lighting including make, type and efficacy in lumens/circuit watt. Burglar security lights will be fitted with a max wattage of 150w, with PIR and dawn/dusk controls

Assumptions for ENE 6
All security and space lighting to be of the low energy type. All buglar security lights to be max 150w and fitted with PIR and dusk/dawn controls.

Evidence for ENE 7 (Low or Zero Carbon Energy Technologies) - Belsize Garages
Contribution of low or zero carbon technologies greater than or equal to 15%
The developer has confirmed a energy startegy for the development that will utilise photovoltaic panels to a/ achieve ADL1A complaince and b/ provide 20% + of the developments energy needs via low or zero carbon technologies. At the formal design stage, the developer will provide SAP outputs to confirm this, but initial SAP calculations suggest a minimum of 22% reduction has been achieved
Assumptions for ENE 7

Evidence for ENE 8 (Cycle Storage) - Belsize Garages
2 or 3 bedroom dwelling - Storage for 2 cycles per dwelling
The supplied scheme drawings show 5 x double sided Sheffield style bicycle racks. This will provide a total cycle parking provision of 10 spaces. The development consists of 2 & 3 bed units - therefore 14 spaces are required to achieve 2 credits under this section - accordingly, only 1 credist can be awarded The facilties will be secure and compliant with code requirements
Assumptions for ENE 8
Space for cycle storage shown on drawings

Evidence for ENE 9 (Home Office) - Belsize Garages
Compliant home office
Home office space will be provided for each unit in a well lit, well ventilated space
Assumptions for ENE 9

Evidence for WAT 1 (Internal Water Use) - Belsize Garages
Internal water use less than or equal to 105 litres per person per day
The development requires to meet the stringent water consumption rates to achieve the Code 3 level status, this will require low flow/flush fittings, for example:- Dual flush toilets at 5l/2.5/ flush rates Low capacity baths cica 180l Low flow taps in kitchens ad bathrooms, cicra 5l/min Low flow showers at circa 8l/min Developer to supply full details of all sanitaryware including make/model, flush/flow rates, locations and a completed water efficiency calculation for each dwelling.
Assumptions for WAT 1
It is assummed that the development will meet the minimum standard of 105l/p/day as required for Code level 3&4

Evidence for WAT 2 (External Water Use) - Belsize Garages
Compliant communal rainwater collection system
A rainwater collection system will be installed to enable the maintenance of the soft landscaped areas
Assumptions for WAT 2
It is assummed that a rainwater collection system will be used to provide water for soft landscaping purposes.

Evidence for MAT 1 (Environmental Impact of Materials) - Belsize Garages
Mandatory requirements met: At least 3 elements rated A+ to D, 13 credits scored
The developer will provide detailed specification for all the main build elements, it is expected that elements with a high Green Guide rating will be utilised which will indicate that the build elements specified have a low environmental impact The Mat 1 calculator will be completed to demonstrate compliance

Assumptions for MAT 1

Evidence for MAT 2 (Responsible Sourcing (Basic Building Elements)) - Belsize Garages
5 credits scored
The developer intends to use responsibly sourced materials for the main build elements. Full details of the materials used and their EMS certification to be provided which will identify the level of certification, be it key process or key process & supply chain Mat 2 calculator to be completed to demonstrate compliance
Assumptions for MAT 2

Evidence for MAT 3 (Responsible Sourcing (Finishing Elements)) - Belsize Garages
2 credits scored
The developer will use responsibly sourced materials for finishing elements, and will provide the EMS certification as appropriate to confirm compliance under key process and supply chain The completed Mat 3 calculator tool will demonstrate compliance
Assumptions for MAT 3

Evidence for SUR 1 (Management of Surface Water Run-Off from Site) - Belsize Garages
Special Case: No change/decrease in impermeable area. Credits not available Credits not sought, water quality criteria not met/sought.
The developer will supply a site specific flood risk assessment to demonstrate that surface water run-off is no greater than pre-development. The development is on an area of garaging and existing hardstanding, as such there is no decrease in impermeable area and as such, the special case exemption will be demonstrated
Assumptions for SUR 1

Evidence for SUR 2 (Flood Risk) - Belsize Garages
Low flood risk - zone 1
The EA flood maps indicate that the site lies within Flood Zone 1 A formal site specific flood risk assessment will be produced to confirm that the development as at a low flood risk from ALL sources
Assumptions for SUR 2

Evidence for WAS 1 (Household Waste Storage and Recycling Facilities) - Belsize Garages
Mandatory requirements met: Adequate storage of household waste with accessibility in line with checklist WAS 1. Local authority collection: Before collection sorting with appropriate internal storage of recyclable materials
The developer will be required to install 3 x recycling bins with minimum capacity of 30 litres in to each residential unit, as well as providing adequate external storage areas for general waste - which will be marked on the plans Checklists Cat 5.1 and IDP will need to be completed as well as evidence of internal storage - number, type and locations. In addition, documented details of the Local Authority collection scheme for general waste and recyclables will be supplied
Assumptions for WAS 1

Evidence for WAS 2 (Construction Site Waste Management) - Belsize Garages
Compliant site waste management plant containing benchmarks, procedures and commitments for the minimizing and diverting 80% waste from landfill in line with the criteria and with Checklist WAS 2a, 2b & 2c
The developer will put in place a site waste management plan, along with checklists Was 2a, 2b & 2c to demonstrate commitments to minimise waste generated on site and to minimise hazardous waste with appropriate monitoring and recording proceedures. In addition, the developer will target the diversion of 85% of non-harzardous waste away from landfill, which will include re-use of excavated soils for landscaping works elsewhere on the site
Assumptions for WAS 2
Given the scale of the development, it is assumed that a SWMP will be put in place

Evidence for WAS 3 (Composting) - Belsize Garages
Communal/community composting service, with a management plan in place Local authority kitchen waste collection scheme - No Garden
The credits can be awarded as the the local authority - Camden Council - operate a food waste colection scheme
Assumptions for WAS 3
It is assumed that the management company for the apartments will operate a communal composting scheme

Evidence for POL 1 (Global Warming Potential of Insulants) - Belsize Garages
All insulants have a GWP of less than 5
The developer will supply a copy of Checklist Pol1, with supporting evidence, to demonstrate that all insulants used within the development will have a GWP < 5
Assumptions for POL 1

Evidence for POL 2 (NOx Emissions) - Belsize Garages
NOx emissions less than or equal to 40mg/kWh
The heating strategy for the development will be gas fired community heating The developer will select high efficiency A rated boilers that will meet the low emission standards required under this issue. Full details of the boilers to be installed will be provided.
Assumptions for POL 2

Evidence for HEA 1 (Daylighting) - Belsize Garages
Kitchen: Average daylight factor of at least 2% Living room: Average daylight factor of at least 1.5% Dining room: Average daylight factor of at least 1.5% Home office: Average daylight factor of at least 1.5% All rooms (kitchen, living, dining and where applicable the home office) have 80% of the working plane with direct light from the sky
It is assumed that, given the design drawings and the large areas of glazing to the south east aspect, that good levels of daylight will be achieved throughout the development. The developer will supply formal daylighting calculations as set out in Littlefair 1998, to demonstrate compliance.
Assumptions for HEA 1

Evidence for HEA 2 (Sound Insulation) - Belsize Garages
Robust details have been incorporated Airborne 3dB higher, impact 3dB lower
The developer will commit to a regime of sound testing in order to demonstrate a 5dB improvment over Part E Building Regulations compliance. The developer will confirm the qualifications of the sound testing body and the outcomes of the testing
Assumptions for HEA 2

Evidence for HEA 3 (Private Space) - Belsize Garages
Individual private space provided
The supplied drawings demonstrate that some units have private balconies, and all units have access to private communal gardens The developers will confirm the number of bedrooms for each unit, plans and calculations of the outdoor space and Checklist IDP.
Assumptions for HEA 3

Evidence for HEA 4 (Lifetime Homes) - Belsize Garages
All criteria of Lifetime Homes in line with all 16 principals of Lifetime Homes
The architects have confirmed that the Lifetime Homes criteria will be met for all units
Assumptions for HEA 4

Evidence for MAN 1 (Home User Guide) - Belsize Garages
All criteria inline with checklist MAN 1 Part 1 - Operational Issues will be met All criteria inline with checklist MAN 1 Part 2 - Site and Surroundings will be met
The developer will supply a Home User Guide to all units within the development. The guide will include details required under Checklists Man1, parts 1 & 2. The developer will confirm in writing that such Home User Guides will be supplied, and a copy of the Guide when prepared.
Assumptions for MAN 1

Evidence for MAN 2 (Considerate Constructors Scheme) - Belsize Garages
Considerate constructors scheme: Best practise only, a score of between 24 and 31.5 and at least a score of 3 in every section
The developer will confirm the the lead contractor will have membership of the Considerate Constructors Scheme, and will provide written commitment to perform to best practice with at least a score of 3 in every section. A final scoring sheet will be submitted upon completion
Assumptions for MAN 2

Evidence for MAN 3 (Construction Site Impacts) - Belsize Garages
Monitor, report and set targets for CO2 production or energy use from site activities Monitor, report and set targets for water consumption from site activities Adopt best practise policies in respects to air (dust) pollution from site activities Adopt best practise policies in respects to water (ground and surface) pollution
The main contractor will be required to adopt best pratices in respect of the control of air and ground water pollution as well as monitoring and report upon energy use and water use from site activities
Assumptions for MAN 3

Evidence for MAN 4 (Security) - Belsize Garages
Credit not sought or no secure by design undertaken
The developer has indicated that these credist will not be sought
Assumptions for MAN 4

Evidence for ECO 1 (Ecological Value of Site) - Belsize Garages
Land of low ecological value, achieved through checklist ECO 1. Development site has been identified as low ecological value by a suitably qualified ecologist
The development is site is currently 100% hardstanding and garages. Accordingly, the site can be signed off as having low ecological value
Assumptions for ECO 1

Evidence for ECO 2 (Ecological Enhancement) - Belsize Garages
Key recommendations and 30% additional recommendations by a suitably qualified ecologist
The developer is to employ an ecologist to advise on appropriate measure to improve on site ecology, utilising green roof and the planting of indigenous species
Assumptions for ECO 2

Evidence for ECO 3 (Protection of Ecological Features) - Belsize Garages
Land of low ecological value as identified under ECO 1
Credit by default as land is of low ecological value under Ene 1
Assumptions for ECO 3

Evidence for ECO 4 (Change of Ecological Value of Site) - Belsize Garages
Minor enhancement: Greater than 3 and less than or equal to 9
The appointed ecologist will undertake species assessment both before and after development. As the development site was 100% developed prior to redevelopment, it is expected that at least a "minor enhancement" outcome will be achieved
Assumptions for ECO 4

Evidence for ECO 5 (Building Footprint) - Belsize Garages
Flats ratio of 3:1
The SAP calculations have indicated a footprint to NIA ratio of circa 3.14 : 1 - one credit is achieved
Assumptions for ECO 5

Assessor Declaration

I Neil Ingham, can confirm that I have compiled this report to the best of my ability, I have based all findings on the information that is referenced within this report, and that this report is appropriate for the registered site.

To the best of my knowledge all the information contained within this report is correct and accurate. I have within my possession all the reference material that relates to this report, which is available for inspection by the client, the clients representative or Stroma Certification for Quality Assurance monitoring.

Signed:

Neil Ingham
EB7
10 January 2013

Information about Code for Sustainable Homes

The Code for Sustainable Homes (the Code) is an environmental assessment method for rating and certifying the performance of new homes. It is a national standard for use in the design and construction of new homes with a view to encouraging continuous improvement in sustainable home building. The Code is based on EcoHomes©.

It was launched in December 2006 with the publication of 'Code for Sustainable Homes: A stepchange in sustainable home building practice' (Communities and Local Government, 2006), and became operational in England from April 2007.

The Code for Sustainable Homes covers nine categories of sustainable design. Each category includes a number of environmental issues. Each issue is a source of impact on the environment which can be assessed against a performance target and awarded one or more credits. Performance targets are more demanding than the minimum standards needed to satisfy Building Regulations or other legislation. They represent good or best practice, are technically feasible, and can be delivered by the building industry. The issues and categories are as follows:

- Energy & CO2 Emissions
  - Dwelling Emission Rate
  - Building Fabric
  - Internal Lighting
  - Drying Space
  - Energy Labelled White Goods
  - External Lighting
  - Low or Zero Carbon Technologies
  - Cycle Storage
  - Home Office
- Water
  - Internal Water Use
  - External Water Use
- Materials
  - Environmental Impact of Materials
  - Responsible Sourcing of Materials - Basic Building Elements
  - Responsible Sourcing of Materials - Finishing Elements
- Surface Water Run-off
  - Management of Surface Water Run-off from the Development
  - Flood Risk
- Waste
  - Storage of Non-Recyclable Waste and Recyclable Household Waste
  - Construction Site Waste Management
  - Composting
- Pollution
  - Global Warming Potential of Insulants
  - NOx Emissions

- Health & Wellbeing
  - Daylighting
  - Sound Insulation
  - Private Space
  - Lifetime Homes
- Management
  - Home User Guide
  - Considerate Constructors Scheme
  - Construction Site Impacts
  - Security
- Ecology
  - Ecological Value of Site
  - Ecological Enhancement
  - Protection of Ecological Features
  - Change in Ecological Value of Site
  - Building Footprint

The Code assigns one or more performance requirements (assessment criteria) to all of the above environmental issues. When each performance requirement is achieved a credit is awarded (with the exception of the four mandatory requirements which have no associated credits). The total number of credits available to a category is the sum of credits available for all the issues within it.

Mandatory minimum performance standards are set for some issues. For four of these, a single mandatory requirement is set which must be met, whatever Code level rating is sought. Credits are not awarded for these issues. Confirmation that the performance requirements are met for all four is a minimum entry requirement for achieving a level 1 rating. The four un-credited issues are:

- Environmental Impacts of Materials
- Management of Surface Water Run-off from Developments
- Storage of Non-Recyclable Waste and Recyclable Household Waste
- Construction Site Waste Management

If the mandatory minimum performance standard is met for the four un-credited issues, four further mandatory issues need to be considered. These are agreed to be such important issues that separate Government policies are being pursued to mitigate their effects. For two of these, credits are awarded for every level of achievement recognised within the Code, and minimum mandatory standards increase with increasing rating levels.

The two issues with increasing mandatory minimum standards are:

- Dwelling Emission Rate
- Indoor Water Use

For one issue a mandatory requirement at Level 5 or 6:

- Fabric Energy Efficiency

The final issue with a mandatory requirement for Level 6 of the Code is:

- Lifetime Homes

Further credits are available on a free-choice or tradable basis from other issues so that the developer may choose how to add performance credits (converted through weighting to percentage points) achieve the rating which they are aiming for.

The environmental impact categories within the Code are not of equal importance. Their relative value is conveyed by applying a consensus-based environmental weighting factor (see details below) to the sum of all the raw credit scores in a category, resulting in a score expressed as percentage points. The points for each category add up to 100.

The weighting factors used in the Code have been derived from extensive studies involving a wide range of stakeholders who were asked to rank (in order of importance) a range of environmental impacts. Stakeholders included international experts and industry representatives.

It is also important to note that achieving a high performance in one category of environmental impact can sometimes result in a lower level of performance for another. For instance, if biomass is used to meet heating demands, credits will be available for performance in respect of energy supplied from a renewable source, but credits cannot be awarded for low NOX emission. It is therefore impossible to achieve a total percentage points score of 100.

The Code uses a rating system of one to six stars. A star is awarded for each level achieved. Where an assessment has taken place by where no rating is achieved, the certificate states that zero stars have been awarded:

Code Levels	Total Points Score (Equal to or Greater Than)
Level 1 ★☆☆☆☆☆	**36 Points**
Level 2 ★★☆☆☆☆	**48 Points**
Level 3 ★★★☆☆☆	**57 Points**
Level 4 ★★★★☆☆	**68 Points**
Level 5 ★★★★★☆	**84 Points**
Level 6 ★★★★★★	**90 Points**

Formal assessment of dwellings using the Code for Sustainable Homes may only be carried out using Certified assessors, who are qualified ‘competent persons’ for the purpose of carrying out Code assessments.

Energy & CO2 Emissions
ENE 1: Dwelling Emission Rate **Available Credits:**10 **Aim:**To limit CO2 emissions arising from the operation of a dwelling and its services in line with current policy on the future direction of regulations.
ENE 2: Fabric Energy Efficiency **Available Credits:**9 **Aim:**To improve fabric energy efficiency performance thus future-proofing reductions in CO2 for the life of the dwelling.
ENE 3: Energy Display Device **Available Credits:**2 **Aim:**To promote the specification of equipment to display energy consumption data, thus empowering dwelling occupants to reduce energy use.
ENE 4: Drying Space **Available Credits:**1 **Aim:**To promote a reduced energy means of drying clothes.
ENE 5: Energy Labelled White Goods **Available Credits:**2 **Aim:**To promote the provision or purchase of energy efficient white goods, thus reducing the CO2 emissions from appliance use in the dwelling.
ENE 6: External Lighting **Available Credits:**2 **Aim:**To promote the provision of energy efficient external lighting, thus reducing CO2 emissions associated with the dwelling.
ENE 7: Low or Zero Carbon Technologies **Available Credits:**2 **Aim:**To limit CO2 emissions and running costs arising from the operation of a dwelling and its services by encouraging the specification of low and zero carbon energy sources to supply a significant proportion of energy demand.
ENE 8: Cycle Storage **Available Credits:**2 **Aim:**To promote the wider use of bicycles as transport by providing adequate and secure cycle storage facilities, thus reducing the need for short car journeys and the associated CO2 emissions.
ENE 9: Home Office **Available Credits:**1 **Aim:**To promote working from home by providing occupants with the necessary space and services thus reducing the need to commute.

Water
WAT 1: Indoor Water Use **Available Credits:**5 **Aim:**To reduce the consumption of potable water in the home from all sources, including borehole well water, through the use of water efficient fittings, appliances and water recycling systems.
WAT 2: External Water Use **Available Credits:**1 **Aim:**To promote the recycling of rainwater and reduce the amount of mains potable water used for external water uses.

Materials
MAT 1: Environmental Impact of Materials **Available Credits:**15 **Aim:**To specify materials with lower environmental impacts over their life-cycle.
MAT 2: Responsible Sourcing of Materials - Basic Building Elements **Available Credits:**6 **Aim:**To promote the specification of responsibly sourced materials for the basic building elements.
MAT 3: Responsible Sourcing of Materials - Finishing Elements **Available Credits:**3 **Aim:**To promote the specification of responsibly sourced materials for the finishing elements.

Surface Water Run-off
SUR 1: Management of Surface Water Run-off from developments **Available Credits:**2 **Aim:**To design surface water drainage for housing developments which avoid, reduce and delay the discharge of rainfall run-off to watercourses and public sewers using SuDS techniques. This will protect receiving waters from pollution and minimise the risk of flooding and other environmental damage in watercourses.
SUR 2: Flood Risk **Available Credits:**2 **Aim:**To promote housing development in low flood risk areas, or to take measures to reduce the impact of flooding on houses built in areas with a medium or high risk of flooding.

Waste
WAS 1: Storage of non-recyclable waste and recyclable household waste **Available Credits:**4 **Aim:**To promote resource efficiency via the effective and appropriate management of construction site waste.
WAS 2: Construction Site Waste Management **Available Credits:**3 **Aim:**To promote resource efficiency via the effective and appropriate management of construction site waste.
WAS 3: Composting **Available Credits:**1 **Aim:**To promote the provision of compost facilities to reduce the amount of household waste send to landfill.

Pollution
POL 1: Global Warming Potential of Insulants **Available Credits:**1 **Aim:**To promote the reduction of emissions of gases with high GWP associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials.
POL 2:NOx Emissions **Available Credits:**3 **Aim:**To promote the reduction of nitrogen oxide (NOX) emissions into the atmosphere.

Health & Wellbeing
HEA 1: Daylighting **Available Credits:**3 **Aim:**To promote good daylighting and thereby improve quality of life and reduce the need for energy to light the home.
HEA 2: Sound Insulation **Available Credits:**4 **Aim:**To promote the provision of improved sound insulation to reduce the likelihood of noise complaints from neighbours.
HEA 3: Private Space **Available Credits:**1 **Aim:**To improve quality of life by promoting the provision of an inclusive outdoor space which is at least partially private.
HEA 4: Lifetime Homes **Available Credits:**4 **Aim:**To encourage the construction of homes that are accessible and easily adaptable to meet the changing needs of current and future occupants.

Management
MAN 1: Home User Guide **Available Credits:**3 **Aim:**To promote the provision of guidance enabling occupants to understand and operate their home efficiently and make the best use of local facilities.
MAN 2: Considerate Constructors Scheme **Available Credits:**3 **Aim:**To promote the environmentally and socially considerate, and accountable management of construction sites.
MAN 3: Construction Site Impacts **Available Credits:**2 **Aim:**To promote construction sites managed in a manner that mitigates environmental impacts.
MAN 4: Security **Available Credits:**2 **Aim:**To promote the design of developments where people feel safe and secure- where crime and disorder, or the fear of crime, does not undermine quality of life or community cohesion.

Ecology
ECO 1: Ecological value of site **Available Credits:**1 **Aim:**To promote development on land that already has a limited value to wildlife, and discourage the development of ecologically valuable sites.
ECO 2: Ecological enhancement **Available Credits:**1 **Aim:**To enhance the ecological value of a site.
ECO 3: Protection of ecological features **Available Credits:**1 **Aim:**To promote the protection of existing ecological features from substantial damage during the clearing of the site and the completion of construction works.
ECO 4: Change in ecological value of site **Available Credits:**4 **Aim:**To minimise reductions and promote an improvement in ecological value.
ECO 5: Building footprint **Available Credits:**2 **Aim:**To promote the most efficient use of a building’s footprint by ensuring that land and material use is optimised across the development.

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Appendix F

Email Communication with Mitie

Neil Ingham

From: Paul Hayes <Paul.Hayes@mitie.com>
Sent: 02 January 2013 11:18
To: Neili@eb7.co.uk
Cc: 'Andrew Griffiths'
Subject: RE: Royal Free CHP

Neil

I hope you had a good break and as per our previous conversation we do not believe there is a business case to extend the DH network from the RF for a 40KW load -

Good luck with the project –

Kind regards,

Paul

Paul Hayes
MITIE Asset Management
Ground Floor East, Cottons Centre, Cottons Lane, 47/49 Tooley St, London, SE1 2QN
T: 0203 123 8784 F: 0203 123 8782 M: 0788 146 5756 ✉ paul.hayes@mitie.com

www.mitie.com

From: Neil Ingham [mailto:neili@eb7.co.uk]
Sent: 20 December 2012 15:32
To: Paul Hayes
Cc: 'Andrew Griffiths'
Subject: Royal Free CHP

Good afternoon Paul

Very kind of you to call today – very much appreciated

As per discussion, we at the very early stages of a potential residential scheme along Belsize Lane – approx. 200m distant from the Royal Free.

It is not the largest of schemes and still to be finalised, but at the moment is a 7 unit scheme. No heat loss calcs done yet, but rule of thumb would suggest at heat and hot water load at 40kw

Your most basic thoughts on budget costs/connection viability would be greatly appreciated

Kind Regards
Neil Ingham
eb7 - environmental consultants
STUDIO F7, BATTERSEA STUDIOS
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daylight | sunlight | rights of light | wind | sustainability | eia | code for sustainable homes | breeam | part L | renewable energy

Disclaimer

Appendix G

Belsize Lane

Pack back Model – PV Array

16 KWp Belsize Lane

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Costs																										
Feasibility and Planning	£0.00																									
Purchase and installation	-£27,500.00																									
Total	-£27,500.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	
Revenues																										
Grid costs saving	£584.99	£596.69	£608.63	£620.80	£633.21	£645.88	£658.80	£671.97	£685.41	£699.12	£713.10	£727.36	£741.91	£756.75	£771.88	£787.32	£803.07	£819.13	£835.51	£852.22	£869.27	£727.36	£741.91	£756.75	£771.88	
Feed in Tariff + Export	£1,946.14	£1,980.83	£2,016.14	£2,052.08	£2,088.66	£2,125.89	£2,163.78	£2,202.35	£2,241.61	£2,281.57	£2,322.23	£2,363.63	£2,405.76	£2,448.64	£2,492.29	£2,536.72	£2,581.93	£2,627.95	£2,674.80	£2,722.48	£2,771.00	£2,820.40	£2,870.67	£2,921.84	£2,973.92	£60,633.33
Total	£2,531.14	£2,577.53	£2,624.77	£2,672.88	£2,721.87	£2,771.77	£2,822.58	£2,874.32	£2,927.02	£2,980.69	£3,035.34	£3,090.99	£3,147.67	£3,205.39	£3,264.17	£3,324.04	£3,385.00	£3,447.08	£3,510.31	£3,574.70	£3,640.27	£3,547.76	£3,612.58	£3,678.59	£3,745.81	
						40 Year life expectancy																				£0.00
Costs + Revenue	-£24,968.86	£2,577.53	£2,624.77	£2,672.88	£2,721.87	£2,771.77	£2,822.58	£2,874.32	£2,927.02	£2,980.69	£3,035.34	£3,090.99	£3,147.67	£3,205.39	£3,264.17	£3,324.04	£3,385.00	£3,447.08	£3,510.31	£3,574.70	£3,640.27	£3,547.76	£3,612.58	£3,678.59	£3,745.81	£51,214.26
Discount Factor	1.0000	0.9662	0.9335	0.9019	0.8714	0.8420	0.8135	0.7860	0.7594	0.7337	0.7089	0.6849	0.6618	0.6394	0.6177	0.5969	0.5767	0.5572	0.5384	0.5202	0.5026	0.4856	0.4692	0.4533	0.4380	
Net Present Value	-£24,968.86	£2,490.41	£2,450.22	£2,410.67	£2,371.84	£2,333.83	£2,296.17	£2,259.22	£2,222.78	£2,186.93	£2,151.75	£2,117.02	£2,083.13	£2,049.53	£2,016.28	£1,984.12	£1,952.13	£1,920.72	£1,889.95	£1,859.56	£1,829.60	£1,722.79	£1,695.02	£1,667.50	£1,640.66	£24,632.96
Cumulative	-£24,968.86	-£22,391.34	-£19,766.57	-£17,093.69	-£14,371.82	-£11,600.05	-£8,777.48	-£5,903.15	-£2,976.13	£4.55	£3,039.89	£6,130.88	£9,278.55	£12,483.95	£15,748.12	£19,072.16	£22,457.16	£25,904.24	£29,414.55	£32,989.25	£36,629.52	£40,177.28	£43,789.87	£47,468.46	£51,214.26	
Life Time (cost) benefit	£24,632.96																									
IRR	89.57%