ENERGY STATEMENT

Incorporating the Baseline assessment, and renewable energy statement for the proposed residential development at:

Park House
Teddington
London TW11 9AD

for

Longford Securities and Equities Limited

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Report prepared by:
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Estimation of Energy Demand for the proposed development

New Home Assessments have been commissioned by Longford Securities & Equities Limited to prepare this 'energy statement' the purpose of which is to show compliance with the requirements of item 4 (energy saving) of the London Borough of Richmond upon Thames 'sustainable construction checklist' utilising the following steps:

1. Analysis of the site.
2. Baseline energy assessment.
3. Baseline carbon emissions.
4. Supplying energy efficiently (CHP).
5. Assessment of the different renewable energy technologies available for the site.
6. Calculation of the amount of site renewable energy.
7. Conclusion.

As the development consists of a block of nine new residential apartments the calculations will be carried out using NHER SAP software.

1.0 Analysis of the Site

The site, located at Park House, Teddington is situated at the north end of Station road, adjacent to it's junction with High Street, close to the centre of Teddington.

The site consists of an existing building being converted into a Travelodge, together with redundant studio space at the north west corner of the building, which this report concerns. This redundant studio space is to be demolished and replaced with the new residential dwellings.

The scheme consists of nine new 1 & 2 bed apartments constructed over three floors, which themselves will be constructed above a new restaurant area (not part of this assessment).

2.0 Baseline Energy

The calculations (summarised below) have been carried out using SAP 2009 and are based upon the proposed plans and elevations drawing nos 7524/101, 102, 103, 104, 105, 106, 109 & 110 provided by LAP Architects.

Assessing the annual energy demand (known as the 'Baseline Energy Calculation') is all the energy that would be used by the new dwellings for heating, cooling and power if no energy efficiency measure or renewable energy generation was applied.

The baseline energy figure is dependent on the method of heating and cooling that would be installed as a minimum provision; it is the energy delivered to the site via utilities – usually gas and electricity.

How this energy has been calculated:

- Dwellings – using SAP 2009 and NHER

Table A – Calculation Methodology of Baseline Annual Energy Use

Area	Energy Use	Fuel	Calculation Method	Reference
Residential	Space heating	Gas	SAP 2009	BRE/ADL1A
	Hot Water	Gas	SAP 2009	BRE/ADL1A
	Lights and Appliances	Electric	SAP 2009	BRE/ADL1A
	Cooling	n/a	-	

Initial SAP calculations have been carried out for the dwellings and the annual energy values from the SAP calculations for the dwellings have been calculated for the nine residential units.

Table B – Basis of calculation – annual energy consumption using baseline specification

	Predicted annual delivered energy requirements for		Baseline carbon emissions arising from		Total Carbon Emissions
	Electric	Gas	Electric	Gas	
Carbon emissions factor used for this fuel			0.517	0.198	
Units	KWh/year	KWh/year	KgCO_2/year	kgCo_2/year	KgCO_2/year
Flat 1	585	5019	302	994	1296
Flat 2	550	5758	284	1140	1424
Flat 3	548	4340	283	859	1142
Flat 4	584	5705	302	1129	1431
Flat 5	550	6005	284	1189	1473
Flat 6	548	4728	283	936	1219
Flat 7	585	7327	302	1451	1753
Flat 8	550	7478	284	1481	1765

Flat 9	548	6160	283	1220	1503
Site Total	5048	52520	2607	10399	13006
Flat Average	561	5836	290	1155	1445

Specification used for baseline calculation

- Floor 1 (new) 75mm mesh reinforced screed on 75mm Kingspan (or equal) rigid insulation board (λ=0.023W/mK) on concrete floor construction U-value = 0.27W/m^{2}K
- Wall 1 (new timber) – cladding on timber battens on plywood fixed to 140mm timber frame fully filled with mineral wool cavity insulation (λ=0.038W/mK), drylined/lightweight plaster finish U-value = 0.29W/m^{2}K
- Wall 2 (party walls) – new wall drylined as necessary to meet the requirements of AD part E; SAP 2009 default taken for wall with unfilled cavity sealed at edges U-value = 0.20W/m^{2}K.
- Roof 1 (flat) – single layer roof covering (or equal) on plywood on min 50x150mm roof joists filled with mineral wool insulation (λ=0.038W/mK) with 12.5mm plasterboard and skim coat to ceiling U–value = 0.29/m^{2}K
- Windows – Aluminium framed windows throughout U–value = 1.70W/m^{2}K
- Doors – front entrance doors to be PVCu/steel faced with insulated core to achieve u-value of 2.00/m^{2}K
- Ventilation – Individual extract fans to wet rooms (kitchen + bathrooms) to be provided.
- Air permeability – designed to be 5.00m^3/hm^2 @50pa
- Heating – Ideal Isar HE24 combi boiler (90.1% sedbuk 2005 efficiency) and radiator system controlled by programmer, room thermostat and TRV's.
- Hot water from main boiler
- Solar water heating – none provided
- Photovoltaic cells – none provided
- Internal lighting – min 75% low energy fittings located in accordance with AD part L1A.
- Thermal bridging – design to and register for use of accredited details for construction.
- Thermal mass parameter = Medium

4.0 – Supplying energy efficiently

The use of microgeneration CHP will be investigated to determine whether there is sufficient space to provide/locate a gas fired CHP boiler in the dwellings. The boiler to be considered for the development is the Baxi Ecogen it will provide up to 24kW of thermal output for the space heating and hot water with exhaust gases being used to generate electricity.

Heatloss calculations will be carried out on the unit (to allow determination of the boiler size required) prior to any decision on the use of the method being taken.

Notwithstanding this the dwellings will be highly insulated and will be fitted with gas fired boiler heating and hot water systems plus efficient controls for the heating and hot water and be fitted with a minimum of 75% low energy light fittings to ensure that the energy supplied is done so efficiently.

Table C – Basis of calculation – annual energy consumption using upgrade specification

	Predicted annual delivered energy requirements for		Baseline carbon emissions arising from		Total Carbon Emissions
	Electric	Gas	Electric	Gas	
Carbon emissions factor used for this fuel			0.517	0.198	
Units	KWh/year	KWh/year	$KgCO_2$/year	$KgCO_2$/year	$KgCO_2$/year
Flat 1	503	4068	260	805	1065
Flat 2	475	4628	246	916	1162
Flat 3	474	3223	245	638	883
Flat 4	503	4561	260	903	1163
Flat 5	475	4880	246	966	1212
Flat 6	474	3484	245	690	935
Flat 7	503	5589	260	1107	1367
Flat 8	475	5836	246	1156	1402
Flat 9	476	4386	246	868	1114
Site Total	4358	40655	2254	8049	10303
Flat Average	484	4517	250	894	1144

Specification used for upgrade calculation (upgrades highlighted in bold italic)

- ***Floor 1 (new) 75mm mesh reinforced screed on 150mm Kingspan (or equal) rigid insulation board (λ=0.023W/mK) on concrete floor construction U –value = 0.14W/m^{2}K***
- ***Wall 1 (new timber) – cladding on timber battens on plywood fixed to 140mm timber frame fully filled with mineral wool cavity insulation (λ=0.038W/mK), underlined with 20mm insulation board (λ=0.023W/mK), drylined/lightweight plaster finish U-value = 0.23W/m^{2}K***

- ***Wall 2 (party walls) – new wall with cavity filled with insulation and drylined as necessary to meet the requirements of AD part E; SAP 2009 default taken for wall with filled cavity and sealed at edges U-value = 0.0W/m^{2}K***

- ***Roof 1 (flat) – single layer roof covering (or equal) on 126mm Kingspan Thermoroof TR31 plywood composite insulation board on min 50x150mm roof joists with 12.5mm plasterboard and skim coat to ceiling U–value = 0.17/m^{2}K***

- Windows – Aluminium framed windows throughout U–value = 1.70W/m^{2}K

- Doors – front entrance doors to be PVCu/steel faced with insulated core to achieve a u-value of 1.00/m^{2}K

- Ventilation – Individual extract fans to wet rooms (kitchen + bathrooms) to be provided.

- Air permeability – designed to be 5.00m^3/hm^2 @50pa

- ***Heating – Ideal Isar HE24 combi boiler (90.1% sedbuk 2005 efficiency) and radiator system controlled by time and temperature zone control, with delayed start thermostats***

- Hot water from main boiler

- Solar water heating – none provided

- Photovoltaic cells – none provided

- ***Internal lighting – 100% low energy fittings***

- Thermal bridging – design to and register for use of accredited details for construction

- Thermal mass parameter = Medium

5.0 - Assessment of the different renewable energy technologies available for the site

Available renewable technologies:

1. Solar thermal energy (water heating)
2. Biomass
3. Solar photovoltaics
4a. Ground source heat pumps – geothermal
4b. Air source heat pumps
5. Wind turbines
6. Hydropower
7. CHP (combined heat and power)

All of the above technologies have been considered for the development with the following conclusions.

No.1 Solar thermal (water heating) – This is normally the preferred choice for residential units on the basis of size, practicality of use, cost and the ability to locate the collectors on the roof with the optimum orientation; however it is not always possible to source a system that will provide 20% of the overall energy requirements for a building, especially where there are multiple dwellings over multiple floors in a block, and therefore the method has been discounted.

No.2 – Biomass – This has been discounted as it is considered that the cons far outweigh the pros for this type of installation being in a densely populated area i.e. potential particulate emissions from wood pellets and insufficient space to store the wood pellet fuel.

No.3 – PV (Solar electric) – this is the preferred method to be used for this development; the flat roof allows the panels to be oriented south and the height of the structure helps reduce shading from adjacent properties. A specialist supplier/manufacturer will be employed to design the most efficient and cost effective system with a view to keeping the number/size of panels to a minimum.

No.4a – Geothermal (ground source heat pumps) – due to the size and nature of the site there is insufficient space to provide either and underground pipe/loop system or borehole system which would be suitable and commercially viable therefore this method of providing energy has been discounted.

No.4b – Air source heat pumps – as gas is available for heating and is more efficient that electricity this method has been discounted for the present.

No.5 – Wind turbines – The DTI wind speed database gives a predicted wind speed for the area for the site of between 6 - 7 metres per second (at a height of 25m above ground level - 7.00m above the top of roof). Where an average wind speed is below 5.0 metres per second the installation of a domestic scale wind turbine is not recommended. With the top of the roof somewhat below the DTI database level, and the fact that the DTI database makes no allowance for the urban nature of this site, thus reducing wind speed, this method has been discounted.

No.6 – Hydropower – as there is no (flowing) water source either on or adjacent to the site to allow a method of hydropower to be utilised this item has been discounted on grounds of impracticality.

No.7 0 Micro CHP (or cogeneration) – as noted in section 4 (above) the provision of a 'Baxi Ecogen' gas fired micro CHP boiler system will be looked at and investigated in depth to establish whether it would provide a cost effective alternative to the PV (should it be required). Accordingly, this method will not be used but considered as an alternative should the preferred system prove to be not practical.

6.0 – Calculation of the amount of site renewable energy

Add Renewables to achieve 20% based upon the site assessment parameters noted in the previous section, the method to be selected for the purpose of the calculations will be PV (photovoltaics with the area of roof panels being required/assessed as follows.

From the SAP calculations (details below) it can be seen that the provision of 4.0m^2 of PV (photovoltaic) panels (0.5kWp) for each dwelling will provide the required amount of energy from a renewable source therefore the system size selected will achieve the required result.

Table D – Assessment of renewable energy required

	Baseline carbon emissions	Carbon emissions with upgrade	Target carbon emissions (20% renewable added)
Units	KgCO_2/year	KgCO_2/year	KgCO_2/year
Site Total	13006	10303	8242

Table E – Basis of calculation – annual energy consumption renewable energy options

	Predicted annual delivered energy requirements for		Baseline carbon emissions arising from		PV Savings	Total Carbon Emissions
	Electric	Gas	Electric	Gas		
Carbon emissions factor used for this fuel			0.517	0.198	0.529	
Units	KWh/year	KWh/year	KgCO_2/year	KgCO_2/year	KgCO_2/year	KgCO_2/year
Flat 1	503	4068	260	805	-229	836
Flat 2	475	4628	246	916	-229	933
Flat 3	474	3223	245	638	-229	654
Flat 4	503	4561	260	903	-229	934
Flat 5	475	4880	246	966	-229	983
Flat 6	474	3484	245	690	-229	706
Flat 7	503	5589	260	1107	-229	1138
Flat 8	475	5836	246	1156	-229	1173

Flat 9	476	4386	246	868	-229	885
Site Total	4358	40655	2254	8049	-2061	8242
Flat Average	484	4517	250	894	-229	916

Table F – SAP2009 calculation results

Plot No.	**Area Weighted Ave TER**	**Area Weighted Ave DER**	**Building Regs Compliance**			**CO2 Emissions**
			Fabric	CO2	**Overall**	
As designed						
Flat Ave	17.96	23.58	Fail	Fail	**Fail**	---
As designed with upgrades						
Flat Ave	17.96	18.83	Fail	Fail	**Fail**	---
With PV panels						
Flat Ave	17.96	15.44	Pass	Pass	**Pass**	---

7.0 - Conclusion

The results from section 6 (tables D + E) show that the dwellings achieve 20% of energy from renewable sources utilising PV panels and therefore meets the requirements of the London Borough of Richmond upon Thames.

There are a number of proprietary PV panel systems on the market from specialist suppliers/manufacturers and a system that meets the required parameters set out in section 5 will be specified to run in tandem with the highly efficient gas condensing boiler heating/hot water system, at the time of construction.