Myatts Field North
Regeneration

Regenter Consortium | March 2010

Energy Assessment & Strategy

BUILDING SERVICES ENGINEERING

REPORT ON ENERGY ASSESSMENT & STRATEGY

FOR

HIGGINS CONSTRUCTION ON BEHALF OF THE REGENTER CONSORTIUM

AT

MYATTS FIELD NORTH REGENERATION

RPS PROJECT No: JKK 3734

REVISION H

March 2010

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PLANNING INTRODUCTION

The London Borough of Lambeth's Housing Department have been pursuing options to regenerate the Myatts Field North Estate, for a number of years. In order to generate additional funds, they have successfully pursued a Private Finance Initiative (PFI) project to raise the necessary funds for the improvement of the Estate. The PFI consortium selected to regenerate the Estate is led by Regenter, Higgins, Pinnacle and Equipe.

The following vision for Myatts Field North, established in the Myatts Field North Development Planning Guidance 2006:

A new high quality neighbourhood that is fully integrated into the surrounding area based on traditional street patterns and a hierarchy of public open spaces that are well overlooked, attractive and safe, and includes a range of housing within a sustainable environment.

Following extensive community consultation, proposals for regeneration have been prepared which are the subject of this planning application as given below:

Outline planning application, with the matters to be determined being; Layout, Scale and Access as shown on the Masterplan for the erection of a total 808 new residential units, a Community Centre, 435sqm of retail floorspace, park and landscaping resulting in a total of 980 dwellings on the estate. Appearance and Landscaping are reserved for later determination, except in relation to the following, where full planning permission is sought as part of this application for the demolition of 305 dwellings, the erection of 485 dwellings, highways and parking, associated landscaping, the installation of Combined Heat and Power plant.

This statement forms part of the above planning application

EXECUTIVE SUMMARY

This **energy statement** has been prepared by RPS in support of the detailed application for the mixed use development proposed to be built at Myatts Field North, London.

The energy statement follows the Be Lean, Be Clean, Be Green framework described by the London Renewables Toolkit.

Myatts Field North

The project comprises of 808 new dwellings & 1No. new Community Centre of 1000m2. Apartment blocks will consist of 808 one to three bedroom flats or maisonette / duplex units. .

In addition to the new build works there are 172No. existing dwellings and 8No. Commercial units to be connected and linked to the new heating network.

Myatts Field South

Not to be considered under the renewables (Be Green) aspect of this report, there will also be provision made for Myatts Field South (400 dwellings) to connect to the district heating.

In line with GLA recommendations and the London Plan, future networks connections have also been considered throughout the scheme and two local schools to the development have been approach. One has expressed a keen interest in linking to the heating network.

As part of the overall planning submission there has also been an expressed wish to utilise the existing subterranean plant room, termed ‘the submarine’, which originally served both Myatts Field North and South. The discussed plant within this strategy will utilise the existing chimneys located at this construction, however the possible increase in height of these chimneys are planned.

The preferred method for providing heat and power to the proposed development comprises a gas-fired Combined Heat and Power (CHP) plant and gas-fired boilers. Consistent with relevant technical guidance, the assessment focuses on the short-term air quality effects. The assessment also focuses on key pollutants of concern in the Borough, NO_2 and PM_{10}.

A scenario of emission characteristics has been identified which represents the worst-case air quality effects in any hour over a typical year. Contributions to ground level pollutant concentrations associated with stack emissions at a height of 12m above the submarine structure have been modelled using an atmospheric dispersion model. The contributions have been combined with background concentrations using prescribed methods. For NO_2 and PM_{10}, the relevant short-term objectives are expected to be met.

High-level consideration has also been given to long-term effects using these worst-case emissions assumptions. For both pollutants, the long-term objectives are expected to be met.

Energy Strategy

It is the developer's intention for Myatts Field North that;

- All Residential units will be designed and constructed to meet the Code for Sustainable Homes Level 3 ENE 1 target. A combination of energy conservation measures and renewable technology will ensure an improvement of 25% over Part L1A of the current Building Regulations.
- A large Gas Fired CHP installed in the submarine serving all Flats and the Commercial spaces will ensure a greater then 25% improvement of dwelling carbon emissions compared with Part L1 of the Building Regulations targets.
- The Commercial spaces will conform to Part L2A of the 2006 Building Regulations.
- Improvements to the fabric and heating systems in apartments, maisonettes will result average 8% reduction in CO2 associated with regulated and non regulated energy.
- Photovoltaic Panels to be located on the roofs across the site to general electricity to communal area lighting and Commercial spaces.
- As a result of the sustainable & LZC technology measures, CO2 emissions associated with **MFN & MFS** annual total energy demand will be reduced by **77%**. **This represents a saving of 4347 tonnes of CO2 per annum.**
- As a result of the above Photovoltaic renewable measures, CO2 emissions associated with **MFN** annual total energy demand will be reduced by **2.6%. This represents a saving of 18.29 tonnes of CO2 per annum.**

SECTION 1: INTRODUCTION

1.1 Regenter in conjunction with Higgins Construction are proposing the redevelopment of a housing scheme in Myatts Field North. RPS have been instructed to provide an energy statement for the proposed development that complies with local and regional planning obligations and Code for Sustainable Home requirements.

1.2 The proposed development is situated to the south of Kennington Park and is bounded by Camberwell New Road, Brixton Road and Akerman Road. The current outline planning application consists of 808 new dwellings and refurbishment of 172 units.

1.3 The calculations in this document are based on the schedule of areas issued on 18th April 2008 and relate to the existing and new build element of the development, as shown in Table 1.1.

a) Requirement for an Energy Strategy

1.4 The Myatts Field North development is referable to the London Mayor, and the requirements of the London Plan, the SPG on Sustainable Design and the London Energy Strategy apply. Currently requirements include a 20% emissions reduction through renewable technologies, Policy 4A.7

1.5 The Lambeth replacement Unitary Development Plan has now been adopted, this also requires the incorporation for renewable power generation, providing at least 10% of the predicted Energy requirements, Policy 34.

1.6 The developer is working to achieve a 20% emissions reduction through the use of renewable technologies, but following subsequent meetings with the GLA on these matters the option to increase capacity of Low Carbon Technologies, which are discussed later in this report have been developed.

1.7 Housing will be built to Code for Sustainable Homes level 3 to comply with the Housing Corporation’s funding requirements. CSH level 3 requires a 25% emissions reduction over Building Regulations ADL(2006) standards.

1.8 Lambeth request the use of CHP to serve a community heating system for all new residential and refurbishment accommodation, and also to include Myatts Field South.

1.9 Before the construction starts in any particular phase of the development, the applicants shall submit to the Council for its approval a draft Energy Scheme for the whole development, demonstrating how the new residential accommodations remaining energy needs after implementing energy efficiency and CHP can be derived from renewable sources.

1.10 The importance of reducing the energy demand of the scheme as the first step towards reducing emissions has been recognised and best practice will be applied throughout the design process as far as possible.

1.11 The calculations provided in this document are an indication of system size and CO2 emissions based on NHER and BRE software packages and practical experience, not published benchmarks & guidance documents. They are based upon typical ground, mid floor and top floor apartments across the site to establish the viability of the renewable and low carbon technologies for inclusion within Myatts Field North development. Any costings provided are budget costs based on typical unit costs achieved at similar projects and reflect premium costs only.

b) Development Phasing

1.12 The attached phasing drawing illustrates how the entire Myatts Field North redevelopment will be broken into two main phases.

- Phase 1 (Yellow shading) – detail planning, including some refurbishment blocks and adjoining landscape works.
- Phase 2 (Grey shading) – Outline planning.

1.13 The designated plant within the existing submarine will be modulated to suit the above phasing breakdown, to reflect the gradual increase of load.

Diagram 1.1 – PRP Phasing drawing for Myatts Field North.

SECTION 2: ENERGY POLICY

2.1 The UK and European Parliaments are concerned about the long-term security of energy supplies and the emissions associated with fossil fuel use. Their strategy for dealing with this is to:

- Reduce energy demand through better building regulations, tighter controls on vehicle emissions, more efficient use of energy, emerging technologies and economic instruments or fiscal levies.

- Gradually move away from a carbon based economy through legal requirements for greater generation of energy from renewable sources and the development of alternative fuels.

a) Europe

2.2 As the signatory of the Kyoto Protocol, EU policy on energy is now driving much of UK policy on energy.

i) Common Energy Policy for Europe

2.3 In March 2006, the European Council of Ministers called for an EU policy on energy and a prioritised action plan. The principles include encouraging energy efficiency, use of renewable energies, greater use of bio-fuels and the application of more efficient technologies. Over 40% of total carbon emissions are associated with property, and so it is likely that the sector will be a focus of attention as the Commission seeks to deliver policy.

ii) Renewable Generation

2.4 The renewable energy and climate change package announced by the European commission 23rd January 2008 proposes a directive to establish national renewable energy targets resulting in an overall binding target of a 20% share of renewable energy sources in energy consumption by 2020.

2.5 It is proposed that the UK's binding target is set at 15% by 2020.

iii) Energy Certification of Buildings

2.6 The objective of the Energy Performance in Building Directive (EPBD) is to promote improved energy use in all buildings and set minimum performance standards for new buildings.

2.7 The relevant articles for the Myatts Field North development are:

Article 5 – requiring new minimum standards for energy performance and the consideration of low/no carbon technologies in new buildings. This requirement is met through the 2006 revisions to the Building Regulations part L.

Article 7 – requires that when buildings are constructed, sold, or rented out the owner makes an energy certificate available to the prospective buyer or tenant. In dwellings this requirement will be introduced through Home Information Packs (HIPs).

b) The United Kingdom

i) Energy White Paper 2007

2.8 In May 2007, the UK published its second Energy White Paper in five years introducing new measures for reducing CO2 emissions. It is estimated that the combined effect will reduce annual UK carbon emissions by 23-33 Million Tonnes of carbon by 2020.

2.9 To achieve their targets and in relation to dwellings the government intends to:

- improve information to the consumer on energy through the installation of smart energy metering in all homes and businesses;

- drive further energy efficiency improvements in the home through continued obligation on energy suppliers until at least 2020;

- introduce an ambitious new Planning and Policy Statement on climate change to help support development of community heating schemes;

- lower the barriers to the installation of micro-generation in homes and change market structure to reward homeowners selling electricity into the grid;

- raise building standards to make new homes zero carbon;

- provide targeted support in key areas such as expansion of energy crops and biomass heat installations, through direct grants and other measures and source an additional 1 million tonnes of wood from unmanaged woodlands.

2.10 It is estimated that 30-35% of the emission savings will come from using energy more efficiently through a combination of fiscal measures, improved technology and better public awareness. Further savings are expected from wider adoption of microgeneration and renewable energy technologies in all buildings.

ii) Renewables Targets

2.11 The UK has a target that 10% of the UK's electricity supply will come from renewable resources by 2010 and 15.4% by 2016. To achieve this target, the government has introduced a mix of regulation, policy and fiscal measures.

2.12 The Renewable Obligation (RO) places a financial value on electricity produced from renewable sources, and allows electricity suppliers to achieve their target through the purchase of Renewable Obligation Certificates. The obligation is increased incrementally each year, producing a potential income for developments generating electricity from renewable sources.

iii) DCLG Planning and Policy Statement 22

2.13 PPS22 requires the development of renewable energy schemes in England and Wales through a seamless approach in Regional Spatial Strategies and Local Development Frameworks. Its scope includes schemes in urban as well as rural locations, ranging in size from domestic to commercial scale.

iv) Building Regulations Part L – Conservation of Fuel and Power

2.14 Building Regulations Approved Documents L (ADL 2006) introduced new standards for the total energy performance of a building, setting carbon emission targets and encouraging renewable energy sources to be fitted to all new buildings. For new dwellings the target is to produce a CO2 Emission Rate (TER) that is 20% lower than an equivalent building constructed under the 2002 Building Regulations. For buildings other than dwellings the requirement is for a 23.5% reduction when naturally ventilated and for a 28% reduction when mechanically ventilated or air conditioned. The government has declared its intention to revise the regulations in 2010 with a reduction over the current TER of 25%.

v) Code for Sustainable Homes

2.15 The aim of the Code for Sustainable Homes (CSH) is to provide a single national standard to guide industry in sustainable design and construction. It sets out principles to be considered within the design of dwellings, and minimum levels of compliance that must be achieved to qualify for the various CSH ratings. Energy is just one of the factors addressed in the Code.

2.16 A cost review of the Code for Sustainable Homes was published in February 2007. It evaluates the additional costs involved in improving the emission rate from EcoHomes "very good" to Code level 3 and indicates that the increased cost is typically between 3-6% for a detached or terraced house and 1-4% for an apartment. The TER and minimum points score required for CSH compliance are set out in Table 2.1.

CO2 emissions criteria for the Code for Sustainable Homes						
Code Level	1	2	3	4	5	6
Minimum CSH points score	36	48	57	68	84	90
Improvement over target emission rate (TER)	10%	18%	25%	44%	100%	100%+
Proposed Building Regulations implementation (year)			2010	2013		2016

Table 2.1 CSH emission targets and proposed Building Regulation Implementation.

vi) Building a Greener Future

2.17 This states the government's aim that all new build dwellings should be zero carbon by 2016 and sets out a delivery timetable with step changes to the Building Regulations in 2010, 2013 and 2016 (Table 2.1).

2.18 The CLG document, The future of the Code for Sustainable Homes, considers the costs associated with making an assessment under the code mandatory, or merely making a rating mandatory.

vii) Planning Policy Statement: Planning and Climate Change Supplement to Planning Policy Statement 1

2.19 The policy requires that all planning bodies and authorities should apply the following principles in making decisions about energy use in their spatial strategies:

- the proposed provision of new development, its spatial distribution, location and design should be planned to limit CO_2 emissions;

- new development should be planned to make good use of opportunities for decentralised and renewable or low carbon energy.

2.20 At regional level it requires planning bodies to:

- provide a framework to focus substantial new development on locations where energy can be gained from decentralised energy supply systems, or where there is a clear potential for this to be realised;

- ensure opportunities for renewable and low-carbon sources of energy supply and supporting infrastructure, including decentralised energy supply systems, are maximised;

- set regional targets for renewable energy generation in line with PPS22.

2.21 At local development level, core strategies and supporting local development documents should provide a framework that promotes and encourages renewable and low carbon energy generation and expect a proportion of the energy supply of new development to be secured from decentralised and renewable or low carbon energy sources.

c) London

i) GLA Energy Strategy

2.22 In February 2004 the Mayor published the GLA Energy Strategy[1]. Most of its requirements have now been superseded by later policy.

ii) The London Plan (consolidated with alterations since 2004)

2.23 The Spatial Development Strategy for Greater London: the London Plan requires that

- Planning applications for major development should be supported by an energy statement
- Developments to make the fullest contribution to the mitigation of and adaptation to climate change and to minimise emissions of CO_2;
- Utilise the energy hierarchy to assess applications (use less energy, supply energy efficiently, use renewable energy);
- Incremental emission reduction targets for London starting at 15% by 2010 with incremental increases to 30% by 2025. These targets are for the whole of Greater London and are not development specific;
- Future developments to meet the highest standards of sustainable design and construction;
- Developments to achieve a reduction in CO_2 emissions of 20% from on site renewable energy generation, which can include sources of decentralised renewable energy;
- Developments to demonstrate that their heating and cooling systems have been selected to minimise CO_2 emissions;
- The need for active cooling systems should be reduced as far as possible through passive design. Any heating and cooling infrastructure to be designed to allow the use of decentralised energy (including renewable generation) and for it to be maximised in the future;
- Developments should evaluate Combined Heat and Power (CHP) systems and explore connection to existing neighbourhood CHP or examine opportunities to extend the scheme to adjacent area;
- Developers to demonstrate how development could be made heat resilient in design, construction and operation.

[1] The Mayor's Energy Strategy - February 2004

iii) GLA SPG – Sustainable Design and Construction

2.24 The SPG does not set policy but has weight as a formal supplement to the London Plan. The SPG sets essential standards as listed below:

- Carry out an energy demand assessment as part of the planning application;
- Design measures to maximise energy efficiency;
- Outdoor lighting or other electrically powered street furniture should be energy efficient and minimise light pollution;
- Carbon emissions from the total energy needs of the development should be reduced by at least 20% by the on-site generation of renewable energy;
- Major commercial and residential developments to demonstrate that consideration has been given to the following ranking method for heating and where necessary, cooling systems:
    - Passive design *then*
    - Solar water heating *then*
    - Combined Heat and Power for heating and cooling (i.e. trigeneration), preferably fuelled by renewables *then*
    - Community heating. New developments should always be connected to existing community heating networks preferably fuelled by renewables where feasible *then*
    - Heat pumps *and then*
    - Gas condensing boilers.

d) Lambeth

2.25 Lambeth adopted its replacement Unitary Development Plan in August 2007. The document contains new policy that places a requirement for renewable generation on major developments (those above a threshold of 1,000m2 or 10 dwellings). Policy 34 requires that at least 10% of developments' predicted energy demand is to be met by onsite renewable energy generation.

2.26 Further policy within the UDP sets out requirements for sustainable design and construction, including the use of passive solar gain, renewable energy production, natural ventilation and cooling. The policy also states that larger schemes should, wherever feasible, include Combined Heat and Power and Community Heating.

e) GLA meeting

2.27 The development team for Myatts Field North have met with the GLA to discuss the initial findings and solutions in light of the renewable targets set.

2.28 The development design team have demonstrated by increasing the capacity and output of gas fired CHP, significant CO2 savings, exceeding the previous savings identified in earlier revisions of this report, can be achieved. The potential increased CHP capacity running at fully optimised output has been determined.

2.29 The developer and the ‘ESCO’ provider have requested the ‘Biomass boiler’ previously included to achieve the 20% renewable target is replaced by an increased capacity CHP plant.

2.30 The design team have investigated the use if Photovoltaics (PV) and propose an installation which will offer 2.5% reduction in emissions by this technology.

2.31 Following the London Plan guide lines; this statement will adhere to Policy 4A.4 for the energy assessment, exploring the feasibility of CCHP / CHP and community heating system before Renewable technology selection.

SECTION 3: METHODOLOGY

3.1 Energy conservation in dwellings is typically measured as a saving of energy or carbon dioxide in comparison with a similar dwelling which just passes the fabric construction and air leakage requirements of the 2006 Building Regulations Part L1A. The Standard Assessment Procedure (SAP) 2005 for Energy use in dwellings is used to establish annual energy demands for a dwelling based on the proposed construction, air leakage rates, heating systems and other relevant parameters.

3.2 SAP methodology has been used to estimate the *regulated* energy for the development. This is the energy associated with the space heating, hot water and fixed electrical elements such as lights and pumps. It is regulated energy that is the subject of Code for Sustainable Homes targets. Added to this is a calculation of the energy that will be used by electrical appliances once dwellings are occupied. Energy used by appliances in the completed homes have been included from NHER SAP calculations. This gives a total annual energy demand and is incorporated into the Energy summary shown in Appendix A.

3.3 Please note that the embodied energy associated with the construction of the proposed development is not included within the remit of this report.

3.4 The predicted energy demand for the retail and commercial areas has been established using CLG approved methodology and software (iSBEM).

3.5 Summation of each areas predicted energy demand provides the annual energy demand for the development that is the basis of the analysis in this statement.

3.6 The CO_2 emission factors used within this report to determine carbon emissions and savings are those adopted in the current Building Regulations Part L.

3.7 Emissions are calculated from their association with a particular fuel source. CO2 conversion factors have been taken from Table 2, Building Regulations Part L2A (2006), as below.

Fuel Source	CO2 Conversion factor (kg/kWh)
Electricity (grid)	0.422
Gas	0.194
Biomass	0.025

SECTION 4: ENERGY DEMAND

4.1 In calculating the energy demand we have made the following assumptions on controlled fittings and elements:

- Light fittings will be specified for T5 fluorescent tubes with high frequency ballasts or compact fluorescent lights where appropriate,
- Low temperature hot water boilers have been specified with a seasonal efficiency of 89%,
- Cooling will be supplied to the office areas and retail units by air source heat pumps with an SEER of 3.0 (Standard value),
- An air permeability of $5m^3/h.m^2$ has been specified for apartments and $7m^3/h.m^2$ for the commercial spaces.
- Mechanical ventilation / cooling has been assumed to treat offices and retail areas where potential overheating can not be engineered out.
- The following u-values were selected for materials, these will be applied to all of the MFN development only:

Element	U-value (W/m^2 K)
External Walls	0.25
Ground Floors	0.2
Roofs	0.15
Windows	1.5
External Doors	1.61

Table 4.1 – Material u-values

4.2 Each area of different use throughout the development and its inherent different levels of energy use have been assessed, in accordance with the London Plan Policies 4A.4 & 4A.5, as table 4.2:

BASELINE ENERGY DEMAND & CARBON DIOXIDE EMISSIONS

Area Use	No.	Area	Annual Emissions
		m.sq	Tonnes (CO2)
Accommodation	808	55,451	2203
Community Centre	1	1000	47.1
Existing dwellings (MFN)	172	14,312	980.1
Retail units	8	280	31.6
Existing dwelling (MFS)	400	50,000	3025
			Total – **6287**
Table 4.2			

The projected load of the Myatts Field North and South sites have been developed. The figures here have been provided by the NHER Plan Assessor (SAP) and BRE iSBEM (SBEM) software. The overall summary of these can be seen in Appendix A.

REDUCTION OF ENERGY DEMAND FROM HEATING, COOLING AND ELECTRICAL POWER

Area Use	No.	Area	Annual Emissions
		m.sq	Tonnes (CO_2)
Accommodation	808	55,451	1837.1
Community Centre	1	1000	25.9
Existing dwellings (MFN)	172	14,312	891.6
Retail units	8	280	16.8
Existing dwellings (MFS)	400	50,000	3025
			Total – **5796**
Table 4.3			

4.3 Applying the required CO_2 reductions that are achieved by complying with the 2006 Building Regulations [Part L1 and L2] to the two highlighted sections in table 4.3, produces projected annual emissions of 5796 Tonnes of CO_2 per annum. This represents a reduction of **8%** through fabric improvements. This is in line with the requirement to be *lean*:

4.4 The predicted demand in table 4.3 is used as the basis for evaluating suitable sustainable design methods and then renewable and low carbon technologies for the development as addressed and discussed within section 5, 6 & 7 of this report.

RESIDUAL ENERGY DEMANDS THROUGH SUSTAINABLE MEASURES

4.5 Initial investigation was not able to identify a local distribution network of CHP/CCHP of sufficient capacity to connect into, thus the scheme will incorporate a gas fired CHP and together with Gas fired boilers provide a communal heating scheme for the development. This is compliance with the London Plan Policy 4A.6. The scheme will be designed such that future connection into an extended district heating system will be viable.

Area Use	No.	Area	Annual Emissions
		m.sq	Tonnes (CO_2)
Accommodation	808	55,451	459.5
Community Centre	1	1000	6.475
Existing dwellings (MFN)	172	14,312	222.9
Retail units	8	280	4.2
Existing dwellings (MFS)	400	50,000	756
			Total – **1449**
Table 4.4			

4.6 In accordance with the GLA requirements this project will need to consider and incorporate District/Communal heating, this will supplemented with Gas fired CHP and condensing boilers.

4.7 Generating power (electricity) on site reduces the inefficiencies of distribution associated with the national grid, thus the application of the CHP plant will help further to reduce the overall energy demands and CO_2 emissions.
The application of a community heating scheme and a CHP plant reduces emissions to 1449 Tonnes of CO_2 per annum, a total reduction from the base figures of **77%**. This is in line with the requirement to be *clean*:

4.8 Application of renewable technologies, in accordance with the London Plan Policy 4A.7 – Renewable Energy, as discussed in section 6 of this report, identifies how this development will fulfill the third GLA criteria, to be *Green*.

SECTION 5: ENERGY EFFICIENT DESIGN

5.1 Reducing energy use is the priority in the Mayor's energy hierarchy. It is often the least cost implementation measure and any reduction will reduce the requirement for on-site generation from renewable energy sources.

5.2 Achieving optimum use of energy throughout a building's life requires passive design to reduce the need for energy associated with controlling the environment and efficient controls to assist in occupants' use of energy.

a) Materials

5.3 Building Regulations set the minimum thermal performance standards for a building. Improvements over and above minimum standards will reduce a building's space heating requirement, but introduces the potential for summertime overheating and occupant discomfort.

5.4 Materials with high thermal densities are able to store thermal energy, and this ability to act as a "heat sink" can help to reduce peak heating demand in winter and high occupancy temperatures in summer.

5.5 Lightweight, low thermal density materials do not have the same thermal response characteristics but their use can assist off-site fabrication and improve both build quality and construction time. It is likely that the new build will adopt some off-site fabrication and the materials' ability to absorb rapid changes in temperature will be considered to ensure that the risk of overheating is minimised and the need for mechanical ventilation is limited to the requirements of Building Regulations ADF.

5.6 The detail of the thermal bridges that connect the internal and external walling also needs to be considered in the design to minimise heat losses.

b) Glazing

5.7 The combination of frame material, number and thickness of glazing panels, the air gap, and the method of separating the panes produces the area weighted U-value of a window unit.

5.8 The current UK Building Regulations area weighted average requirement for is 2.2W/m^{2}K. Examples of the average weighted U-Value are set out in table 5.1 below.

Area weighted average	**2.2 W/m²K window**	**2.0 W/m²K window**	**1.5W/m²K window**
No of panes	Double glazed	Double glazed	Double glazed
Gap space	12mm	12mm	16mm
Gap fill	Air	Air	Argon
Frame Material	Wood	Wood	Wood
Coating	Low e coating 0.15	Low e coating 0.05	Low e coating 0.05

Table 5.1 – Typical U-values for windows

5.9 The windows for this development should be selected to reduce heat loss in winter, without increasing the risk of overheating in summer. It is possible that different average weighted U values will be used for the North and South elevations.

c) <u>Air Permeability</u>

5.10 A significant proportion of heating energy is lost through air leakage from buildings (infiltration or air permeability). Typically this occurs where there is poor sealing at joins or at penetrations in the building. The building regulations recognise this in setting acceptable standards for air permeability. The regulation standard is $10m^3/m^2$ at 50Pa and the new development will aim to achieve $5m^3/m^2$ at 50Pa for apartments and $7m^3/m^2$ at 50Pa for the commercial spaces.

d) <u>Shading & Thermal Mass</u>

5.11 As buildings become more thermally efficient and air tight, the possibility of seasonal overheating increases. Integrating shading into the development can lower the risks of summer overheating and reduce the need for mechanical cooling. The use of natural and structural shading is an efficient method in reducing the possibility of overheating in summer, without restricting natural daylight.

5.12 Shading for a building can be in the form of external features such as external louvres, balconies and overhangs, or stepped elevations. Internal blinds can also assist to a lesser effect. Solar shading from these measures are limited only to the number and size of balconies provided.

5.13 The type of buildings do not include any provision for large balconies and overhangs, therefore additional solar shading can not be provided. However it is recommend that blinds and solar reflective glazing is incorporated.

5.14 The construction method proposed for the building is most likely to be a modular steel framed cassette system or timber frame construction. A system of this nature can not provide adequate thermal massing properties

e) <u>Lighting</u>

5.15 The internal and external lighting schemes will optimise daylight wherever possible and achieve the recommended lighting levels in all areas. Lighting controls will be carefully selected to ensure security is not affected and minimise nuisance to occupants, whilst ensuring that lights are not left on for long periods in areas with transient occupancy. Motion sensor and photoelectric controls will be specified for different areas as appropriate.

5.16 Compact fluorescent lights can provide efficiencies in the range 50-85 lm/W and will be installed where appropriate. The development will seek the installation of the light fittings within the apartments are dedicated low energy fittings, ensuring that the most efficient luminaries, control gear and lamps are used.

f) <u>Ventilation and Cooling</u>

5.17 Mechanical ventilation and cooling will only be used in any areas predicted to overheat in summer. Heat recovery and inverter motor control will be installed within all apartments.

5.18 A general natural cross flow ventilation strategy has been applied to the apartments. Mechanical ventilation and cooling will only be used in any areas (Community Centre and retail only) predicted to overheat in summer. Heat recovery and inverter motor control will be installed wherever there is proven benefit.

5.19 The Community Centre and retail units have been identified through the provisional iSBEM models that there is still a potential for summertime over heat and the need for mechanical ventilation and cooling. These unit types will need closer control and to necessitate a controlled and quiet environment, the solution of opening windows will not be acceptable. It has been deemed suitable to include Air Source Heat Pumps to provide this level of cooling and heating. This application of plant will minimise the additional plant space required in lieu of additional Boilers and Chillers.

5.20 Plant expected are identified below in the picture below, these units will typically have Coefficients of Performance (COPs) of 3-3.5, therefore for ever 1kW of electrical input the potential output will be 3-3.5 times greater.

Typical ASHP example from ICS Heat Pumps.

g) Heating & Domestic Hot Water

5.21 The design will ensure that appropriate temperatures are achieved throughout the development. Lower temperatures will be set for corridors, bathrooms, toilets, kitchens and storage areas as specified in the CIBSE design guide[2].

5.22 Any gas fired boilers installed at the development will be of a high efficiency type with efficiencies above 90%.

i) White Goods

5.23 The amount of energy used by fridges, freezers, washing machines and dishwashers can vary significantly. An "A" rated fridge will typically use 60% less energy and produce approximately 125 kg less CO_2 per year than a "D" rated unit.

5.24 White goods that are installed by the developer for use in the dwellings will be sized for their intended use and have an energy rating of at least "A". The energy efficiency of appliances will also be considered for the retail areas of the development.

[2] CIBSE Guide B – Heating, ventilating, air conditioning and refrigeration, 2005

j) Energy Management

5.25 Intelligent controls that are appropriate for this development include motion sensors, photoelectric controls and timers.

5.26 When building occupants can identify the cost of energy waste, it assists in changing their behaviour. Smart metering provides this information in simple form to ensure that occupants are aware of the cost associated with leaving equipment and lighting on at night and during periods when they are out of the apartment. The provision of such information will be specified at the development.

SECTION 6: RENEWABLE TECHNOLOGIES

6.1 This section considers the appropriateness of each technology for the Myatts Field North development. In accordance with the London Plan Policy 4A.7 Renewable Energy –
'*This will support the Mayor's Climate change mitigation and Energy Strategy and its objectives of increasing the proportion of energy used generated from renewable sources'.*

6.2 The ability of each technology to comply with the planning conditions is set out in section 8.

6.3 The Government's Renewable Obligation (2002) defines renewable energy in the UK. The accepted renewable technologies are:

- Landfill and sewage gas;
- Small hydro-electric (under 20 MW) or larger if commissioned after 1982;
- Tidal and wave power;
- Onshore and offshore wind;
- Biomass;
- Geothermal power;
- Solar.

6.4 The use of landfill or sewage gas, offshore wind, or any form of hydroelectric power is not suitable for the site due to its location. The remaining technologies are considered below.

a) Wind

6.5 The UK has a large natural wind resource that can be used to generate renewable electricity.

6.6 Wind turbines are available in various sizes, from very large rotors able to supply whole communities down to small units for individual houses. The Department for Business Enterprise Regulatory Reform (BERR) windspeed database predicts wind speeds at this location of 4.7m/s at 10m above ground level (agl), 5.4m/s at 25m agl and 5.9m/s at 45m agl.

6.7 Horizontal axis turbines require sufficient area to allow them to turn into the direction of the wind to make best use of the available resource, resulting in large land requirements. In addition, the potential for noise, signal interference and flicker effects so close to residential areas may face planning opposition.

6.8 Vertical axis wind turbines, as shown in figure 6.1, may be considered for the site. These turbines rotate around the mast, and because of this design are always facing into to wind. They have a smaller footprint than equivalent horizontal axis turbines with reduced interference to radio signals and being less of a hazard to birds and bats.

6.9 Small building mounted wind turbines can be installed to generate small but valuable amounts of renewable electricity. Turbines are available that are specifically designed to make best use of the wind flow over a building, and these generate well at the low wind speeds often found in an urban environment.

6.10 The demand that building mounted wind turbines place on structures and the effect of potential noise, vibration and visual intrusion will need to be considered. Other potential issues include interference with radar, television and communication signals and blade flicker caused by the sun shining through rotating blades.

Fig 6.1 - Vertical Axis Wind Turbine *Fig 6.2 – Building Mounted Wind Turbine*

b) Biomass

6.11 There are three main sources of biomass:

- Dependent resources: co-products and waste generated from agricultural, industrial and commercial processes, such as sawdust or wood off-cuts.

- Dedicated crops: short-rotation crops that are grown specifically to generate biomass fuels, such as willow or miscanthus.

- Multifunctional crops: crops that have dual purpose e.g. the ears of wheat can be used to create bio-fuel while the straw can be burned to generate electricity.

6.12 Although associated emissions of CO2 are generated in the transport and combustion of biomass, the majority of the CO2 released is offset by the CO2 absorbed from the atmosphere during the growth stage. Despite not being truly zero emission, it is a renewable energy source and net emissions resulting from transport and processing of the fuel are included in the emissions calculations.

6.13 Biomass boilers are a standard solution in continental Europe and are a mature technology, proven in service. Fully automated biomass boilers are manufactured in a range of sizes and only require occasional attendance. Adjacent storage hoppers supply the fuel to the boiler and the ash is periodically removed. The whole process can be automated including ignition of the boiler and modulation of heat output.

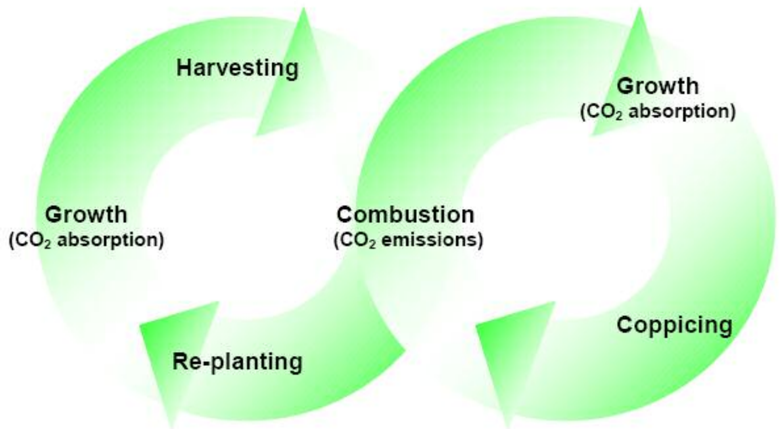


Fig 6.3 - Biomass wood chip and wood pellet

6.14 The fuel can be delivered to the site by a 20 tonne articulated HGV, and then either dropped or blown into the fuel store. Wood pellet fuel typically produces 2% of its weight as ash and this needs to be removed and disposed of. Good vehicle access is required for delivery of the fuel with turning circles or reversing arrangements to ensure minimum disruption.

6.15 The combustion of biomass on site may have an effect on local air quality, particularly Nitrous Oxides and particulates. Lambeth have declared an Air Quality Management Area (AQMA) with regards to Nitrogen Dioxide (NO2). Myatts Field North falls within the AQMA. Further consultation with the borough is recommended if biomass is chosen as a renewable energy solution. An air quality assessment may be required to determine the impact of biomass emissions on the neighbouring area.

6.16 Biomass can also be used as a fuel for Combined Heat and Power plant. The emissions savings that can be achieved from CHP are greater than for biomass boilers as it is supplying both heat and electricity at high efficiency. The potential for CHP at the development is considered further in section 7.

Fig 6.4 - Delivery of biomass fuel by tipping

c) Geothermal

6.17 Sub soil temperatures are reasonably constant and predictable in the UK, providing a store of the sun's energy throughout the year. Geothermal systems extract the lowgrade heat from this reservoir and utilise heat pumps to convert it into usable heat for the conditioned areas of the development.

6.18 Heat pumps operate on the same principle as fridges as they transfer energy from a cool place to a warmer place. They operate most efficiently when providing space heating at a low temperature, typically underfloor heating or warm air systems. The pumps require electricity for their operation resulting in some CO2 emissions associated with the technology, and this has been taken into account in our CO2 calculations.

6.19 There are three types of geothermal installation that may be considered for the site.

i) Borehole (open loop)

6.20 Borehole systems can be open or closed loop. Open loop boreholes extract energy from ground water located deep below the surface and discharge the water through separate pipework. The system requires boreholes to be positioned sufficiently far apart from each other in order to provide an intake and extract borehole. Open loop systems typically provide more energy but the possibilities of Environment Agency concerns mean that we do not generally recommend an open loop systems.

ii) Borehole (closed loop)

6.21 Closed loop borehole systems comprise a series of vertical boreholes containing pipework loops extract heat from the substrata. There are minimum space requirements between loops of the exchanger, typically 6m. The energy that can be extracted varies with the depth of the borehole and the geology of the site.

6.22 Where foundation piling is used in building construction, closed loop boreholes can be integrated into the piles to reduce the costs associated with drilling.

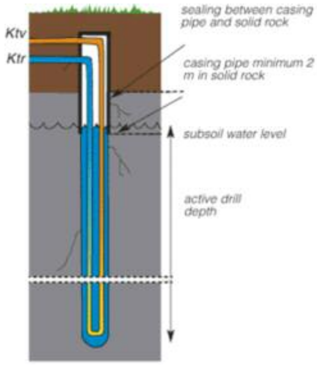


Fig. 6.5 - Typical Closed loop Bore hole arrangement.

iii) Subsoil

6.23 Horizontal subsoil systems make use of the relatively constant subsoil ground temperature. A polyethylene pipe network is installed to act as a ground exchanger, transferring energy between the subsoil and fluid within the pipes. This requires a relatively large land area to extract a useful amount of energy. The pipes are typically buried 1.6m below ground to avoid winter frost.

6.24 The heat demand will determine the area needed for the heat exchanger, so subsoil systems are not feasible for high-density schemes where the load per square meter of development land is high.

Fig. 6.6 - Typical geothermal horizontal sub-soil pipes

d) Solar

6.25 Solar energy involves capturing and harnessing the energy of the sun. There are three main ways of achieving this: passive solar design, solar thermal water heating and solar photovoltaics. Passive solar design has already been considered in section 5.

i) Solar Thermal

6.26 Solar Hot Water panels use solar energy to directly heat water circulating through panels or pipes. The technology is simple but efficient. Panels are traditionally roof mounted and for highest efficiencies should be positioned to face south/southwest at an incline of approximately 30^{o}.

6.27 Typically panel manufacturers predict output of approximately 400-700kWh/m2/annum, but it is not unusual for this to be exceeded. An output of 1100kWh/m2/annum is being achieved at a “green” house in Norwich.

6.28 The preferred use is to supply domestic hot water with top up from the main heating system as required. Within this site we are not having an independent Cylinder but indirect plate heat exchangers, so the thermal panels in this arrangement would not work.

6.29 Panels are available that can be directly integrated into the roof, replacing traditional roof tiles. Although the output of the panel is typically lower than more conventional solar panels, there is no change to the roofline, making them ideal for locations where the visual appearance of the development is sensitive.

Fig 6.6 – Roof integrated solar tiles Fig 6.7 – Roof mounted solar panels

ii) Solar Photovoltaics

6.30 Solar Photovoltaic (PV) panels generate clean and silent electricity. Various types of panels are available, varying from those which have a low cost but a low output, such as amorphous silicon panels, to higher cost panels, with a higher output, such as polycrystalline of hybrid panels. PV can be installed vertically or horizontally and can be mounted on building roofs or integrated into building panelling, shading or glazing. Monocrystalline tiles are available that can be used to replace traditional roof tiles, and can be installed along side solar thermal tiles.

6.31 The highest efficiencies are achieved when they are exposed to direct sunlight and are orientated to face south/southwest with an inclination of approximately 30^{o}, but they will generate electricity in most daylight conditions.

Fig 6.8 - PV roof panels

6.32 PV panels typically have an electrical warranty of 20-25 years and an expected system lifetime of 25-40 years. They are still expensive and will not generate savings equal to their capital cost within their lifetime. New materials are being tested with that have much higher generation efficiencies and the expectation is this combined with volume production will soon make PV a competitive and realistic technology.

e) Street Furniture

6.33 Photovoltaic panels on street furniture provides emission free lighting. The street furniture will continue to operate even if there has been an interruption to the mains supply and it can be relocated very easily if necessary.

6.34 Self-contained lighting columns include a PV panel supplying batteries in the base of the column. The batteries store the electricity generated during the day and the batteries power the lamp at night. The PV panels generate electricity even in overcast conditions and allow the lamp to operate autonomously for two to three days without daylight, ensuring even long winter nights are catered for.

Fig 6.9 – Solar street lighting

6.35 Sensors within the installation can ensure that lighting only operates during defined times or when external lighting conditions are suitable to reduce light pollution and extend the operation of the light.

6.36 Due to the expensive nature of these items, these will be applied only in areas of particular community interest, for example around the Community Centre, Communal gardens and the main open spaces, not within the main streets.

SECTION 7: LOW CARBON TECHNOLOGIES

7.1 In accordance with the London Plan Policy 4A.6 –

'Developments should evaluate combined cooling, heat & power (CCHP) and combined heat & power (CHP) systems and where new CCHP/CHP systems are installed as part of a new development examine opportunities to extend the scheme beyond the site boundary to adjacent areas'.

7.2 Technologies that generate heat or electricity at high efficiency are now essential for Building Regulation compliance. Used in association with renewable energy, they are called Low and Zero Carbon Technologies (LZC).

7.3 New technologies are emerging and maturing in this rapidly developing field and Planning Policy is now encouraging their application. Low Carbon technologies will make a major contribution to the UK long-term objectives for ensuring security of supply and reducing environmental impact. This is recognised in the Further Alterations to the London Plan where the energy hierarchy has been changed to reflect the contribution of efficient generation. See figure 7.1.

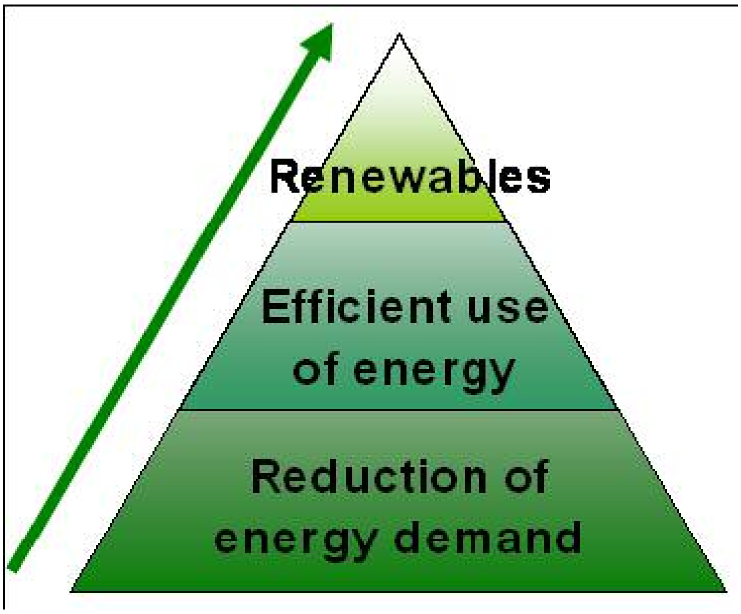


Fig 7.1 – Revised energy hierarchy

7.4 As with renewables, LZC technologies will be applied once all other energy saving measures have been applied.

7.5 Low carbon technologies that could contribute to emission reduction at Myatts Filed North re-development include Combined Heat and Power (CHP) and community heating.

a) CHP

7.6 Combined Heat and Power (CHP) plant comprises an on-site engine that is used to generate electricity. In a power station, up to 60% of the primary fuel's energy is dissipated through cooling systems and exhaust, but CHP recovers this energy to provide heat for the building services. Well-designed CHP can have efficiencies approaching 75%, as opposed to the 40-45% of the UK's most efficient central power stations. The result is that more work is carried out for the same CO2 emissions, providing electricity and heat to occupiers at competitive costs and with enhanced security of supply.

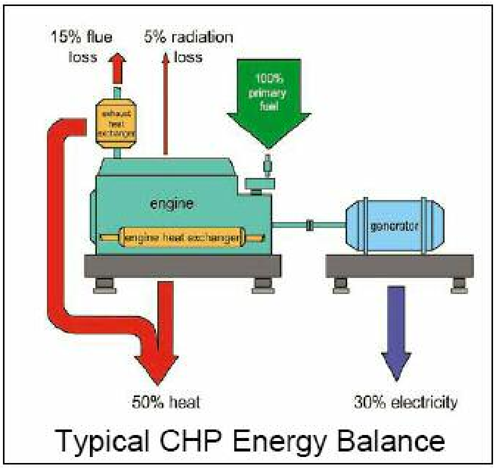


Fig 7.1 – Typical CHP Energy Balance

Fig 7.2 Internal working of CHP unit

7.7 To be economically viable CHP needs to run for as many hours as possible with high demands for electricity and heat and so the best schemes are installed in mixed-use developments where there is a balanced and constant heat demand throughout the day for most days of the year.

7.8 A risk in CHP is to be too ambitious and oversize the plant with the intention to export surplus electricity back to the electricity grid. The current UK electricity trading arrangements make this a high-risk strategy and so RPS always recommends that the plant be sized for the development's base heat load only.

7.9 A second risk is one of long-term operational issues. The design team includes SSE and Vital Energy Services Company (ESCO) to procure and manage the energy network at the site, being responsible for installation, maintenance and replacement of the energy assets, and management of revenue. The ESCO involvement removes the risk element.

7.10 The potential involvement of an ESCO has been reviewed for Myatts Field North development. Vital Energy and Scottish and Southern Energy have been selected to fulfill this role with Lambeth.

7.11 As part of the CHP analysis a forecast of heat, hot water and electricity consumption profiles for every hour throughout the year was calculated for the development. The profiles used are the eight national consumption profiles produced by the electricity association for daily balancing of the UK national electricity distribution system.

7.12 Our conclusion is that the development is suitable for prolonged gas fired CHP operation.

7.13 The operating hours of the CHP units, and hence environmental benefit, can be increased if there is a requirement for heat outside of the heating season, such as comfort cooling or air conditioning. However there is no requirement for cooling at Myatts Field North and so no opportunity to extend the CHP operating season.

7.14 SE and Vital Energy have sized the CHP element of plant for this scheme to match the maximum peak demand. The current proposals are for 1No. 1.8MWe gas fired CHP, which will produce an equal amount of heat and electricity due to the large engine capacity.

7.15 The application of this unit will potentially reduce emission by 3600 Tonnes of CO_2 as previously illustrated in section 4 of this report.

b) Community and District Heating

7.16 Community heating involves the distribution of heat from a centralised source to the serviced properties. The heat is distributed as hot water through insulated pipes. In order to ensure high efficiencies, the heating system will be in a central location to keep distribution losses low.

Fig 7.4 – District pipe work distribution within Trench

7.17 The improved efficiencies of central boilers running at high loads, more than offsets the losses experienced in distribution, thereby reducing the associated CO_2 emissions.

7.18 Community heating creates new service charge issues and these need to be considered in the design to ensure recovery of costs is both simple for management and transparent to occupiers.

7.19 Vital Energy and SSE propose within all the new build units a ‘Hydraulic Interface Unit’ (HIU) will be installed. This is basically a mini plate heat exchanger, as shown below, providing the apartments central heating and hot water demands.

Vital Energy – Hydraulic Interface Unit (indirect Mini-plate heat exchanger)

This system will serve wall mounted radiators, controlled via a wall thermostat and integral programmer and local thermostatic radiator valves, as indicated below.

7.20 In addition to the main unit there will also be the facility to meter the amount of energy being utilized by the individual tenant for the apartment heating and hot water. This is via an internally fitted smart meter, as shown below. The energy meter will enable the tenant to access directly the amount of thermal units being consumed for heating and hot water use.

These meters have the facility to send a radio signal output to a hand held PDA unit to collect the data for management billing. This will enable the facilities management company to collect an entire buildings energy data from one single point – (externally to the building) without unnecessary access to each unit.

7.21 An alternative data collection process would be to have these units hard wired back to a Data Logger station within the ground floor plant room which can be access via a plug in data point, PC terminal or internet link.

7.22 An Energy Centre / Plant room would be sited within the local existing subterranean plant room, termed 'the submarine', which originally served both Myatts Field North and South. The plant within this energy centre will utilize the existing chimneys with some extension works to ensure compliance with local air quality levels.

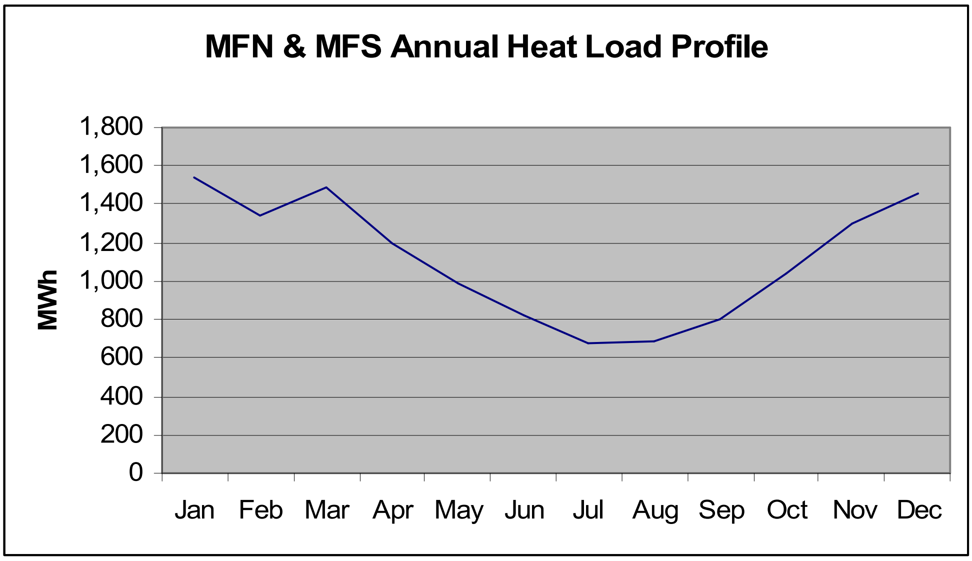
7.23 In line with GLA recommendations and the London Plan, future network connections have also been considered throughout the scheme and two local schools to the development have been approached. The development team can confirm there has been a keen interest expressed by one of the schools for linking into the network.

7.24 This decentralized energy scheme has been sized and considered to minimize the carbon dioxide emissions in line with the London Plan Policy 4A.6.

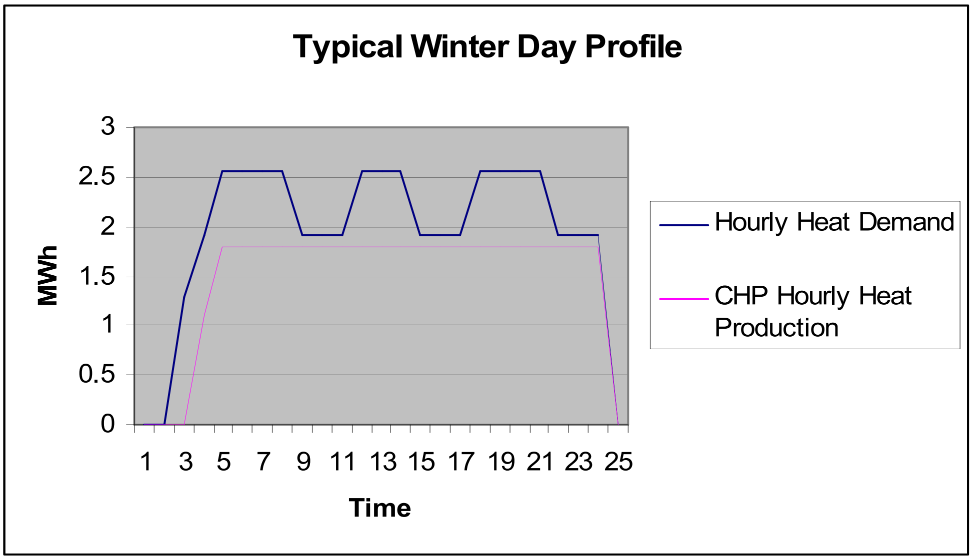
7.25 The site wide heating network will be supplied to all the 808 new and 172 refurbishment dwellings within Myatts Field North.

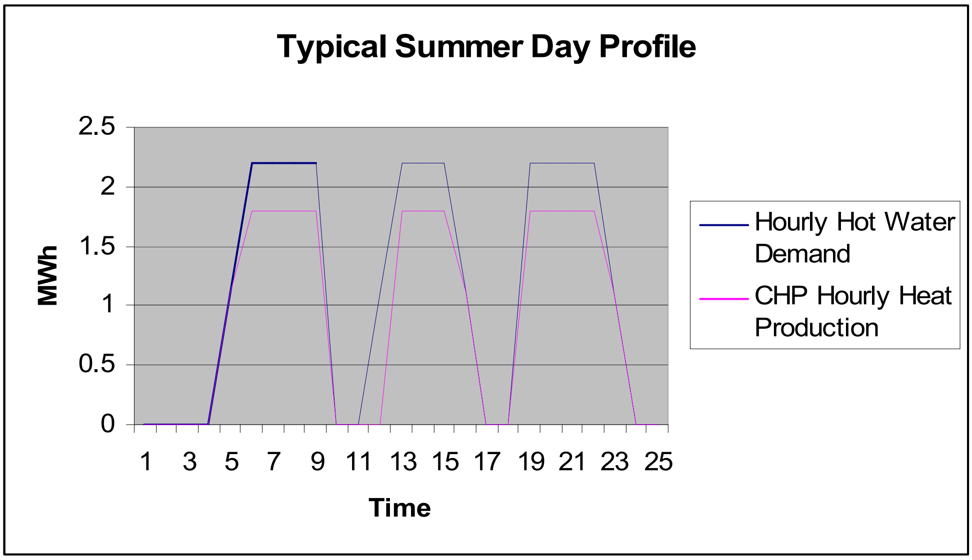
7.26 Further investigation and development has been considered for Myatts Field South. An additional number of 400 existing dwellings have been considered and the redeveloped energy centre which originally served both Myatts North and South will have the facility to connect to the South Site again via a large plate heat exchanger.

7.27 The preliminary study undertaken is based on 1.8MWe CHP engine with modulating output at varying efficiencies between 50% and 100% to account for peaks and troughs in hot water / heating use. The diagram below identifies the predicted annual heating load profile for MFN & MFS.

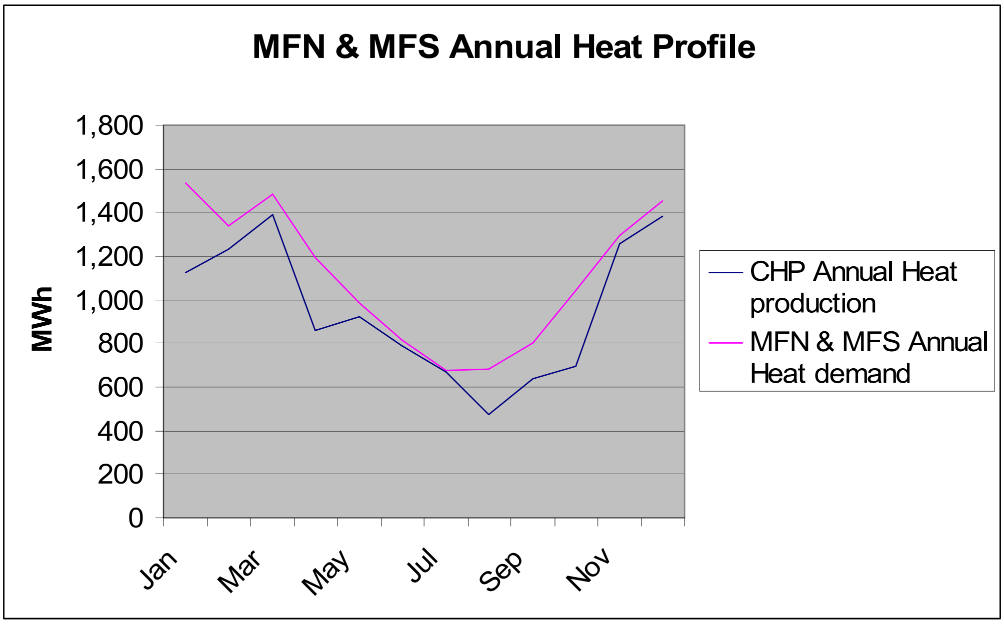


7.28 It has been estimated that the CHP engine runs for 20-24 hours per day during the winter periods and approximately 8-15 hours during the summer periods, as illustrated in the diagrams below, this equates to 6,350 hours per year. A series of thermal stores will be installed to store excess heat produced during times of low hot water demand (e.g. between 11pm and 6am) for later use.



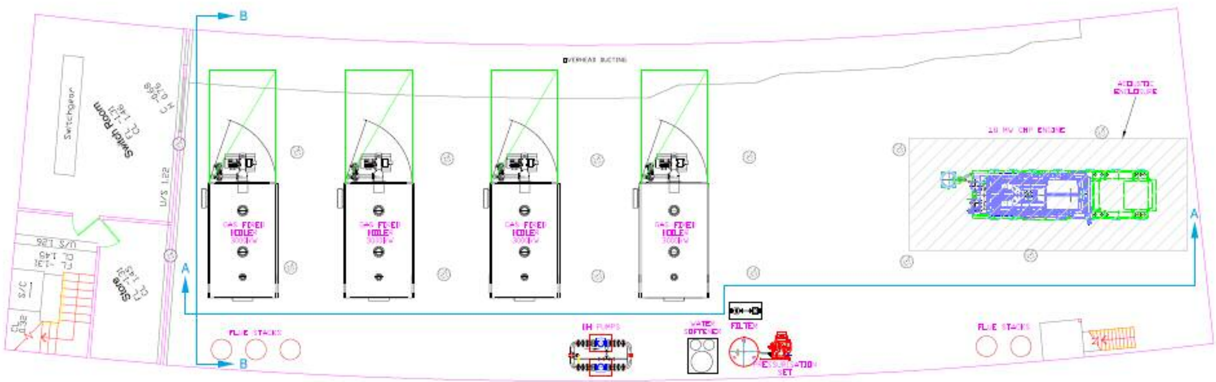


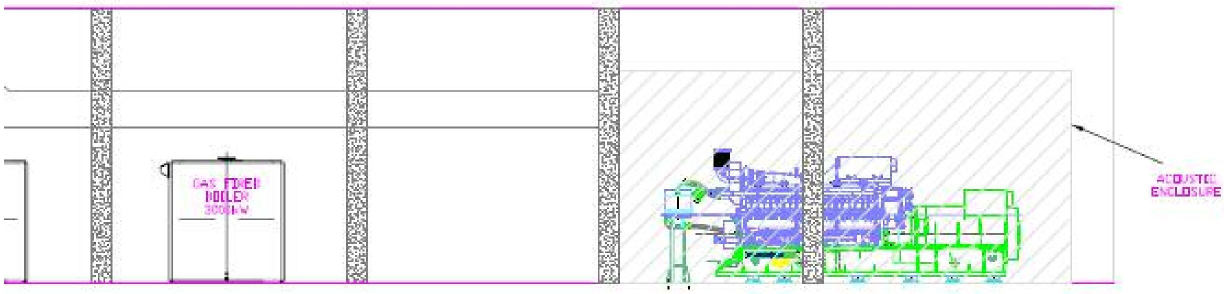
7.29 The CHP will be the lead boiler for heating and DHW to meet the baseload demand. However, the CHP boiler will only be capable of providing part of the peak instantaneous load. Additional demands for heating will be met by the new gas-fired boilers, sequenced to come on only when the demand is greater than the CHP can provide. There will be no direct electric heating. The diagram below indicates the CHP annual heat production profile against the established annual heat demand profile, highlighting where the short fall will be made up by the gas boilers.



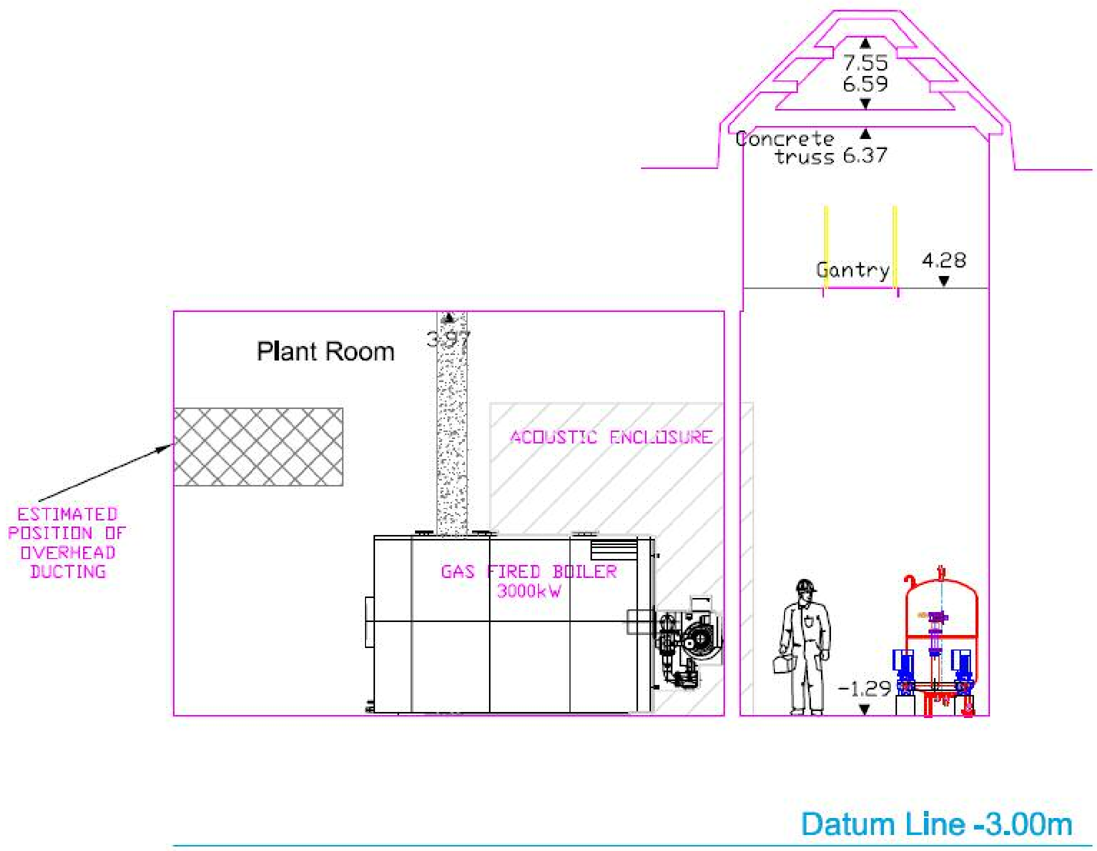
7.30 The plant room will be laid out within the existing ‘submarine plantroom’. The new CHP and gas boiler plant will be situated in an accessible location so that they can be worked on safely. Plant operation will be automatic and will run under the dictates of a control system. Occupants will be able to control certain simple comfort parameters. Building managers will be able to control all aspects of the systems.

Floor Plan & sections showing proposed CHP Plant Room.





SECTION A-A



SECTION B-B

SECTION 8: ANALYSIS OF COSTS AND BENEFITS

8.1 This section evaluates the financial and environmental benefits of the renewable and low carbon technologies discussed in section 6 and section 7, and assesses their ability to meet the planning requirements.

a) Wind Turbines

8.2 The outputs for both vertical and horizontal and vertical axis wind turbines were calculated for the location using manufactures published power curves and wind speed data from the government database.

8.3 Due to the low predicted wind speeds at the development, the output for two 3kW ground installed vertical axis wind turbines is only predicted to produce a 0.05% contribution to the overall developments predicted energy demand and a 0.01% reduction in associated CO2 emissions.

b) Ground Source Heat Pumps (GSHP)

8.4 Due to the high-density layout of the proposed development it would prove difficult to locate the required space for a viable GSHP, secondly the optimum working temperature for GSHPs (50-30) would not lend itself to the district heating system and mean enlarged radiator panels across the site.

8.5 We do not propose the use of GSHP at Myatts Field North Park due to space constraints.

c) Solar Hot Water

8.6 Solar hot water panels could be used to provide domestic hot water for some of the apartments. However the practicality of this installation, proves complicated with routes from the roof to each individual apartment. It would be best applied to a central plant room where the solar water can help to preheat the main district heating and the routing would only need run along side the main central core of each building.

8.7 As an example 100 panels with a budgeted total cost of £250,000 would provide 1% of the developments total energy demand and reduce CO2 emissions by 1%.

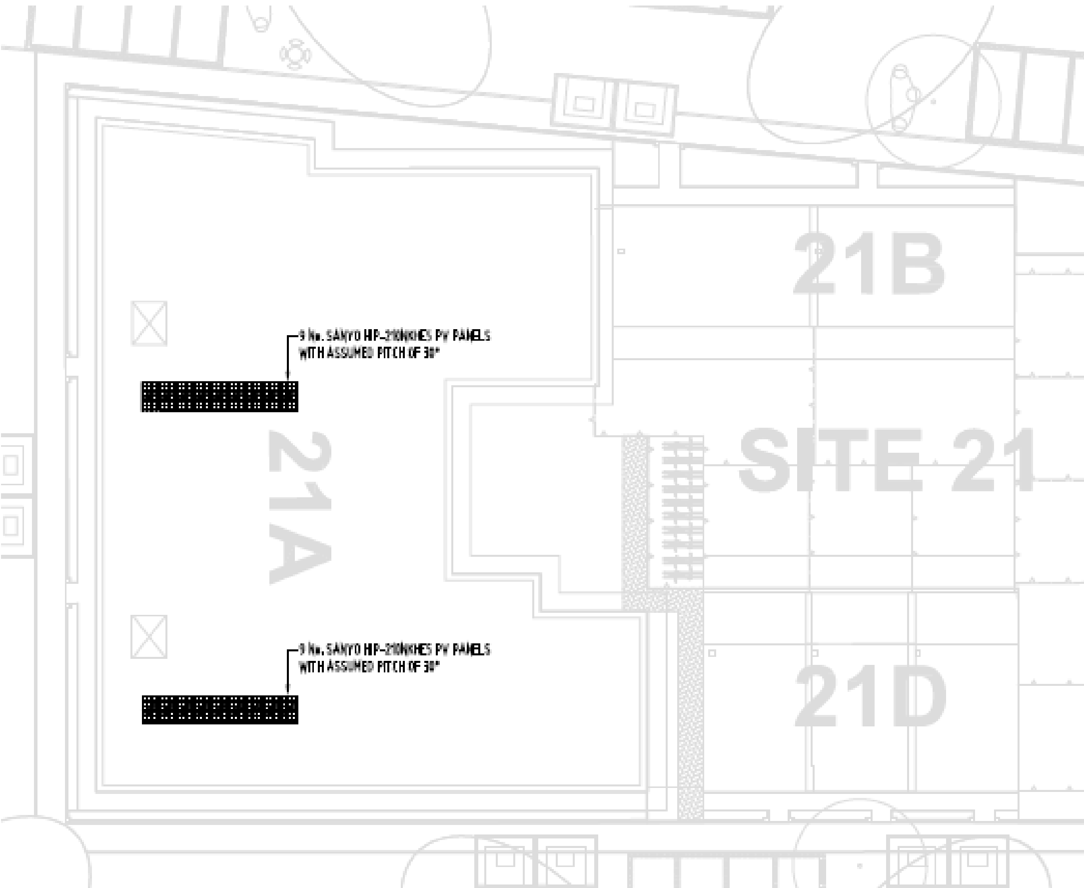
8.8 On the basis of limited numbers of apartments benefitting from this directly for hot water savings and the small renewable impact saving this technology has been discounted.

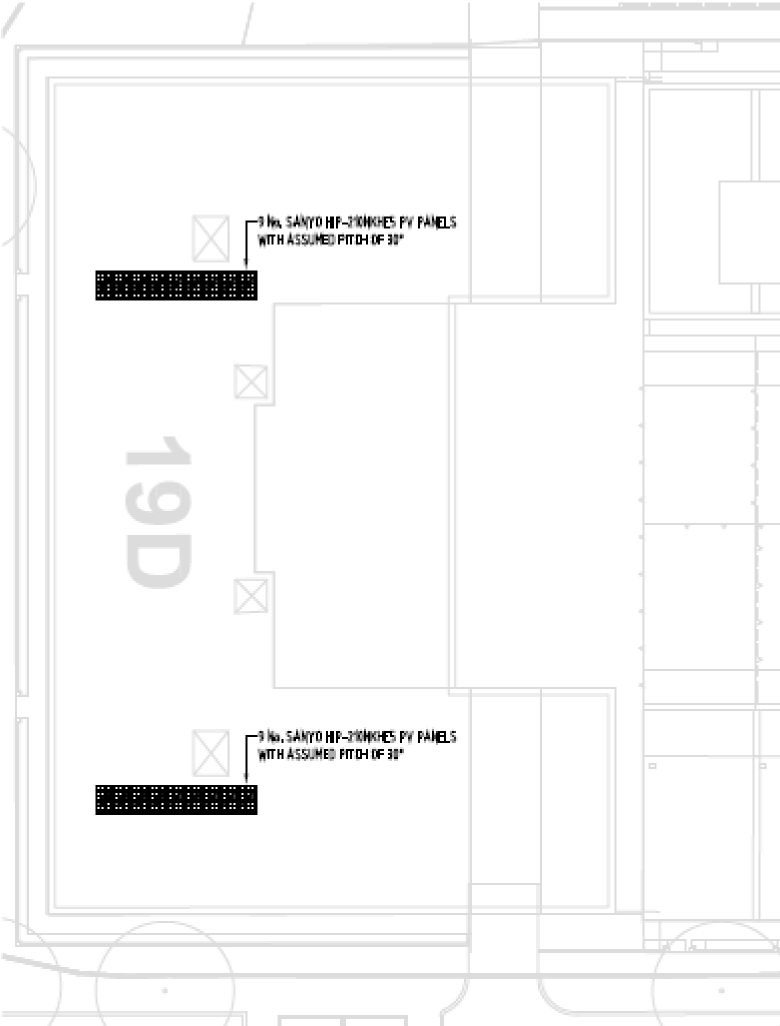
d) Solar Photovoltaic (PV)

8.9 Although previously discounted on the basis of limited roof space, with the application of a sizable gas fired CHP the potential for heat producing renewables is limited. A PV installation for this development has now been considered. .

8.10 Across the site there are 29 potential roof spaces and commercial unit roof space where we could locate 186No. PV panels at a budget cost of £175,000.00. These panels will generate 210Wp and potentially reduce emissions by 18.29 Tonnes of CO_2. This would be a reduction of emissions of 2.6% through renewable technology. A typical panel at 210Wp based upon 825hrs/yr will produce 173kWh/yr, this equates to 0.098 Tonnes of CO_2/yr. The sketches below illustrate the typical even distribution of the Panels across the site on two example blocks.

Typcial roof layouts complete with PV panels for Blocks 21A and 19D.





8.11 Consideration has been given to ensure that a correctly oriented roof area, without shading, is available for the PV panels, while proposing a practical number of panels to suit the available space. Local to each core, the Electricity generated will be fed back to the Landlords switch board to maximize it is use for communal lighting, communal power (tank room pumps, bin store extraction etc) before it is fed back to the grid. Where the power is fed back to the grid, this utility saving will then in turn be reflected back to the tenants via the ESCOs management billing arrangement and maximize the FITs benefits.

e) Biomass & Gas Combined Heat & Power

8.12 With the application of a sizable gas fired CHP the potential for heat producing renewables is limited. RPS and SSE have considered the application of a CHP of 1.4MWe and a 400kW Biomass boiler but projected smaller carbon savings.

8.13 The application of the smaller CHP and 400kW biomass boiler provided a saving of 3833 Tonnes of CO2 per annum, in comparison to the larger CHP where, 4347 Tonnes of CO2 are saved, without any biomass plant.

8.14 The combined capital cost of a smaller CHP and Biomass was greater in comparison to the single larger CHP unit. With the bigger carbon saving presented by CHP alone and the target for renewables lowered as a result of this, the application of Biomass is now not considered for Myatts Field North.

8.15 As detailed in section 7, one 1.8MWe gas fired CHP unit would reduce the developments emissions by 75%. Whilst not a renewable technology it complies with the GLA hierarchy and S106 obligations.

8.16 Gas CHP is not a renewable technology, so although it will generate emissions savings that will contribute to the Code for Sustainable Homes requirements, any savings will be in addition to those required by the GLA renewable targets.

8.17 RPS recommend that the Myatts Field North scheme include the above CHP unit within its energy strategy.

8.18 The Myatts Field North Scheme will not have its own private electrical network, the generated electricity by CHP will eventually be fed back into the main grid network. Where the power is fed back to the grid this utility saving will then in turn be reflected back to the tenants via the ESCOs management billing arrangement.

SECTION 9: ENERGY CONCLUSION

9.1 As the proposed development is referable to the Mayor, it is necessary for it to consider the requirements of the GLA energy hierarchy which is to reduce energy consumption, use energy efficiently, and generate on-site renewable energy. Policy also requires the development to reduce it's emissions by 20% from onsite renewable sources, which can include sources of decentralised generation.

9.2 Further consultation with the GLA has highlighted the preference to maximise the use of CHP to meet the heating and hot water demand, then address via renewable technology requirement in-line with set targets.

9.3 Priority at the development will initially be given to reducing the total energy demand of the proposed development by considering the most appropriate efficiency measures discussed in section 5. This will include specifying materials with appropriate u-values for the building envelope, ensuring low air leakage, and installing energy efficient fittings, controls and appliances. Efficiency improvements are predicted to result in the development exceeding Building Regulations requirements by at least 8%.

9.4 The use of community heating is a prerequisite for buildings of this type, and its use will assist with achieving higher rates of efficiency in generating energy, thereby reducing development CO_2 emissions. It should therefore be selected for this development.

9.5 The use of CHP has been considered for the development, in compliance with the GLA energy hierarchy. A 1.81MWe CHP unit is predicted to reduce emissions by 75% alone. However, its use does limit the contribution that can be provided by other heat generating renewables, such as biomass boilers, so much so that alternative renewable technologies are to be used.

9.6 Electricity generating renewable technologies are also restricted in their ability to contribute to the development's energy requirements, because of location, size and area constraints. The power generated by this installation would be utilised to serve the communal areas (mainly lighting) and commercial spaces. To comply with Local Authorities aims, this energy saving would then be reflected in the landlords / ESCOs charge rate to tenants.

9.7 As discussed in section 9.1, where the development has maximised the use of CHP, the options for renewable technology are reduced to PV and wind. With the introduction of wind turbines being already discounted the investigation of viable roof space for PV was conducted.

9.8 To achieve the target figure of 20% carbon saving (138.5 Tonnes of CO2) there would need to be approximately 1430No. PV panels across the site and 2860m^2 of available roof space.

9.10 The project is limited to 29 available roofs (350m^2 available roof space) which will accommodate 186No. PV panels and provide an 18.29 Tonnes of CO2 saving, therefore a reduction of emissions from renewables by 2.6%.

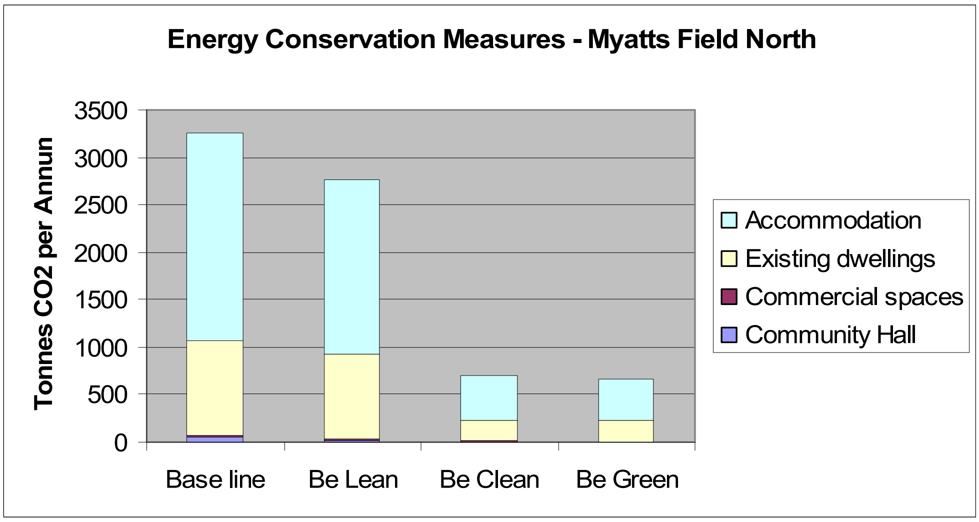
9.11 RPS are confident that the development is capable of complying with the discussed matters of local and regional renewable energy policy, as set out below;

SUSTAINABLE ENERGY	
Baseline Carbon Emissions	Notional Building emissions of 6287 Tonnes of CO2.
Reduction of energy demand through fabric improvements (Be Lean)	Fabric improvements in-line with Building regulations reduces emissions by 8% to 5796 Tonnes of CO2.
Reduction of energy demand through sustainable measures (Be Clean)	Application of a 1.81MWe Gas fire CHP unit reduces emissions by 75% to **1449** Tonnes of CO2. (MFN – 692.4 Tonnes of CO2) (MFS – 756.6 Tonnes of CO2)
Renewable Energy systems (Be Green)	Target for 20% emissions reduction by renewable technology is **138.5** Tonnes of CO_2 for Myatts Field North only. Inclusion of 186No. PV panels @ 210Wp reduces emissions by 2.6% (**18.29** Tonnes of CO2).
Overall Carbon Dioxide Reduction (MFN & MFS)	**77%**

Myatts Field North

9.12 As the sustainable energy table above discusses, the renewable appraisal is only derived against the MFN energy demand load after the application of CHP, as the Energy Conservation Measures chart below demonstrates. Therefore this will breakdown as;

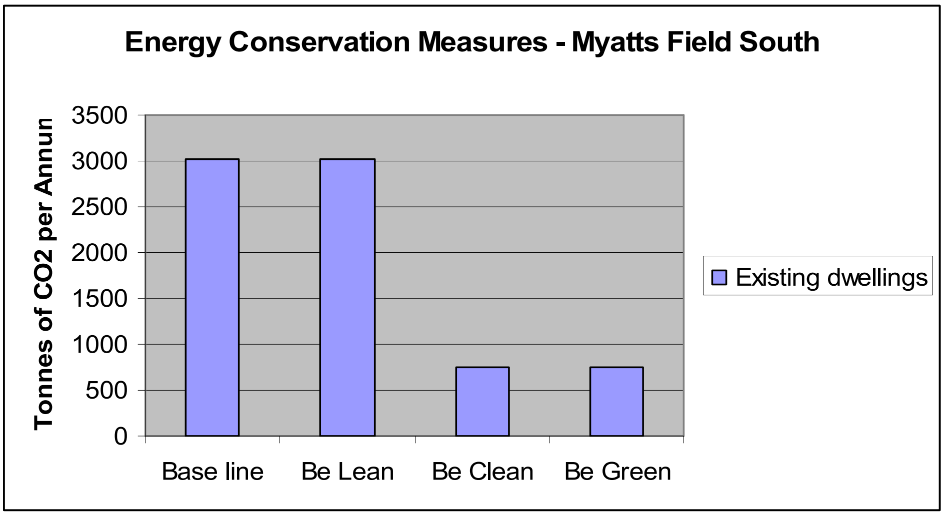
Base Line – 3261.8 Tonnes of CO2
Be Lean – 2771.4 Tonnes of CO2 – (Fabric improvements)
Be Clean – 692.4 Tonnes of CO2 – (Application of CHP)
Be Green – 674.56 Tonnes of CO2 – (Application of PV)
Overall Carbon Dioxide Reduction – 80%



Myatts Field South

9.13 Secondly the same san be identified for MFS, see chart below.

Base Line – 3025 Tonnes of CO2
Be Lean – 3025 Tonnes of CO2 – (no improvement works)
Be Clean – 756 Tonnes of CO2 – (Application of CHP plant)
Be Green – 756 Tonnes of CO2 – (no renewable application).
Overall Carbon Dioxide Reduction – 75%



APPENDIX A: MYATTS FIELD NORTH & SOUTH ENERGY ASSESSMENT SUMMARY

REDUCTION OF ENERGY DEMAND FROM HEATING, COOLING AND ELECTRICAL POWER

PROPERTY TYPE	AVERAGE AREA (m2)	No. UNITS	TOTAL AREA (m2)	GAS (kgCO2/m2)	Non REGULATED Energy (kgCO2/m2)	ELECTRICITY (kgCO2/m2)	PER UNIT TOTAL (kgCO2/m2)	TOTAL SITE CO2 (tonnes CO2)	PART L IMPROVEMENT (kgCO2/m2)	Non REGULATED Energy (kgCO2/m2)	BE LEAN TOTAL SITE CO2 (tonnes CO2)
1 BED FLAT	46.16	198	9139.68	20	15.08	3.85	38.93	357.6	18.18	15.08	305.5
2/3 BED FLAT	68	395	26860	22.5	15.08	3.43	41.01	1101.5	18.7	15.08	907.3
3 BED HOUSE	102	43	4386	15.89	10.26	3.14	29.29	128.5	14.96	10.26	110.6
3 BED MAISONETTE	84	151	12684	24.55	15.32	3.26	43.13	547.1	20.48	15.32	454.1
4 BED HOUSE	113	19	2147	15.36	10.26	3.09	28.71	61.6	14.74	10.26	53.7
5 BED HOUSE	117.3	2	234.6	15.09	10.26	3.06	28.41	6.7	14.52	10.26	5.8
COMMUNITY CENTRE	1000	1	1000		25		82.69	47.1	34.26	25	25.9
NEW BUILD TOTAL		**808**	55451.28				**Total Baseline**	**2250.1**		**Total (Be Lean)**	**1862.9**
1 BED FLAT	50	88	4400	46.3	18.8	3.38	68.48	301.3	46.3	18.8	274.1
3 BED HOUSE	108	19	2052	46.3	18.8	3.38	68.48	140.5	46.3	18.8	127.8
3 BED MAISONETTE	108	25	2700	46.3	18.8	3.38	68.48	184.9	46.3	18.8	168.2
4 BED HOUSE	125	34	4250	46.3	18.8	3.38	68.48	291.0	46.3	18.8	264.8
5 BED HOUSE	130	7	910	46.3	18.8	3.38	68.48	62.3	46.3	18.8	56.7
COMMERCIAL UNITS	35	8	280	35	28	50	113	31.6	35	28	16.8
REFURBISHMENT TOTAL		**172**	14312				**Total Baseline**	**1011.7**		**Total (Be Lean)**	**908.4**
MYATTS FIELD NORTH TOTAL		**980**					**Total Baseline**	**3261.8**		**Total (Be Lean)**	**2771.3**
MYATTS FIELD NORTH BE LEAN APPROACH - IMPROVED U-VALUES, HEAT RECOVERY AND ENERGY EFFICIENT MEASURE FOR LIGHTING, FANS AND PUMPS PROVIDES AN AVERAGE IMPROVEMENT % O											**15.0**
MYATTS FIELD SOUTH EXISTING PROPERTIES	125	400	50000	52.7		7.8	60.5	3025.0	60.5		3025.0

* assumed values for Myatts Field South
* note no fabric improvement anticipated (not part of works)

	BASELINE (TONNES CO2)	IMPROVEMENT ON PART L (TONNES CO2)
TOTAL MYATTS FIELD NORTH & SOUTH	6287	5796

BE LEAN - 5796 Tonnes of CO2 per annum (8% improvement on baseline)

RESIDUAL ENERGY DEMANDS THROUGH SUSTAINABLE MEASURES

LOW CARBON TECHNOLOGY ARRANGEMENTS

	CHP UNIT SIZE	CHP SAVING (% BY SSE SIMULATION)	Total CHP SAVING (tonnes of CO2)	MFN saving (tonnes of CO2)	Remain Total (tonnes of CO2)
LARGE AMOUNT OF GAS FIRED CHP ONLY	1816kWe	75%	4347.00	2078	1449

BE CLEAN - 1449 Tonnes of CO2 per annum (77% improvement on Baseline)

APPLICATION OF RENEWABLE TECHNOLOGIES - only considered against MFN

	DESCRIPTION	SAVING (tonnes of CO2)	Remaining (tonnes of CO2)	RENEWABLES PERCENTAGE (%)
RESIDENTIAL DEVELOPMENT ONLY	160 PV PANELS ACROSS THE SITE	15.74	1433	
COMMUNITY CENTRE	10No. PV PANELS	0.98	1432	
COMMERCIAL UNITS	16No. PV PANELS	1.57	1431	
				2.6

BE GREEN - 1431 Tonnes of CO2 per annum (78% improvement on base line)