Management
and
Engineering
Services Ltd

COMET HOTEL
HATFIELD

ENERGY STATEMENT
VERSION 3.0

Project No:	B2623
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Client	Fusion Hatfield Hotels

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PROJECT REVISION SHEET

Version	Details	Comments	Prepared by	Checked by	Issued
1.0	First Issue	First Issue	TH	ALH	Sept 2015
2.0	Bed numbers	Revised Figures	TH	ALH	Sept 2015
3.0	Revised Scheme	Updated in line with revised proposal	TH	ALH	Aug 2016

Executive Summary

This Energy Statement outlines the proposed development's energy efficiency and renewable energy strategies. The proposed redevelopment involves the demolition/adaption/addition of the buildings on site, together with the construction of purpose built student accommodation blocks, with a variety of room types.

Passive design measures will be implemented to reduce the energy demand of the building. These include improving the thermal performance of the building fabric and achieving an air permeability in excess of the requirements of Building Regulations 2010 Approved Document L2A 2010 Edition. Cooling and ventilation loads will be reduced by providing performance glazing to reducing the solar gain.

Energy efficient plant will then be used to ensure that the energy consumed in the operation of the building is consumed on the most efficient manner possible. This includes the use of boilers and ventilation equipment with efficiencies in equal to or in excess of that required by the Non-Domestic Building Services Compliance Guide 2010 Edition. Internal lighting will incorporate high efficiency LED luminaires wherever possible with automatic lighting controls provided to transient areas such as circulation spaces. External lighting will incorporate low level high frequency fluorescent lighting with programmable time clock and photocell controls.

An energy demand assessment for the proposed development was carried out, using the benchmark figures contained within the Chartered Institute of Building Services Engineers (CIBSE) Guide F Energy Efficiency in Buildings (2012).

	Annual Energy Consumption	**Annual CO_2 Emissions**
Grid Supplied Electricity	449,550 kWh/yr.	232,417 kgCO_2/yr.
Natural Gas	1,998,000 kWh/yr.	395,604 kgCO_2/yr.
Site Total	2,447,550 kWh/yr.	628,021 kgCO_2/yr.

Based on this energy assessment, the feasibility of various renewable and low/zero carbon technologies was assessed. This has shown that photovoltaic panels, gas-fired CHP and air source heat pump can be used to provided low/zero carbon electrical and heat energy for the development.

Technologies such as wind turbines, biomass heating, ground source heat pump and solar hot water have been deemed inappropriate for this development due to local site constraints and conflicts with other, more appropriate technologies.

Introduction

This Energy Statement has been prepared for Fusion Hatfield Hotels to support their planning application for the redevelopment of the Comet Hotel site in Hatfield.

It has been developed by Amber Management and Engineering Services Ltd, Chartered Institute of Building Services Engineers (CIBSE) Low Carbon Energy Assessors as a response to the Planning requirements. The statement is intended to provide the information required within an Energy Statement.

This Energy Statement deals with the new build student accommodation building only. The existing hotel will be refurbished and extended in accordance with the requirements of Building Regulations Approved Document Part L2B.

Welwyn Hatfield Borough Council in their pre-application response letter dated 30 June 2015 confirmed the following planning policy applies to the proposed development of the Comet Hotel, Hatfield:

> *"You have enquired about the Council's requirements with regard to energy efficiency. The relevant saved policies of the Welwyn Hayfield District Plan 2005 are R3 (Energy Efficiency) and R4 (Renewable Energy Sources). The Council will seek to encourage good practice with regard to energy efficiency and will expect developments to include measures to maximise energy conservation in the design of buildings, site layout and provision of landscaping. The Council will also expect developments to incorporate the best practical option for energy supply and to make use of passive solar gain in the design and layout of the site. The incorporation of renewable energy sources will also be encouraged subject to considerations of visual impact, atmospheric pollution and noise. The suggested method of using Combined Heat and Power on site would be acceptable subject to the above provisions."*

The relevant policies are listed as follows:

Policy R3 - Energy Efficiency

The Council will expect all development to:

(i) Include measures to maximise energy conservation through the design of buildings, site layout and provision of landscaping; and

(ii) Incorporate the best practical environmental option (BPEO) for energy supply.

Policy R4 - Renewable Energy Sources

Planning permission will be granted for proposals for the development of renewable energy sources subject to all of the following criteria:

(i) It would not have a significant visual impact;

(ii) It would not generate an unacceptable level of traffic;

(iii) It would not result in an unacceptably high level of atmospheric emissions;

(iv) It would not have a significant adverse impact upon features or areas of ecological, architectural, landscape or conservation importance;

(v) It would not have a detrimental impact upon adjoining properties and land holdings; and

(vi) It would not generate an unacceptable level of noise.

Statement Intent

This Energy statement has been produced to address issues associated with the need to reduce the CO_2 emissions for the development and includes a number of concerns related to energy statements and the reduction of carbon dioxide emissions.

Key Information

The key information identified is:

- How much CO_2 will the development emit annually in operation?
- Reference to how these emissions have been calculated?
- Which technology has (or technologies have) been chosen to deliver a reduction in annual carbon emissions?
- How have annual saving from the chosen technology (or technologies) been calculated for this site?

All development proposals will be expected to deliver high levels of sustainability in order to mitigate against and adapt to climate change, and to contribute to national and local targets on reducing carbon emissions and energy use.

Developments must demonstrate how carbon dioxide emissions have been minimised in accordance with the following energy hierarchy:

a) Using less energy through energy efficient building design and construction, including thermal insulation, passive ventilation and cooling.
b) Ensuring all energy consuming equipment is as efficient as possible, and well managed.
c) Maximising use of renewable and low carbon energy generation systems within the constraints of the development.

These issues will be discussed in the section of this Energy Statement on Passive Design Principles, Energy Efficient Design Principles and Renewable and Low/Zero Carbon Technologies.

Building Description

The Comet Hotel site currently consists of the Main Hotel. The proposed Student Accommodation buildings will be built on the land to the south of the Hotel.

Development Proposal

The proposed development involves the adaption and extension of the existing Hotel together with the new development of student accommodation buildings. The proposal provides 56 serviced accommodation apartments and bed spaces for 308 students, each with en-suite facilities, arranged in the following unit mix:

- 236 x Studios
- 36 x Twin Studios (Twodio’s)

The total gross internal floor area for the new build portion of the project is circa 9990m^2.

Energy Demand Assessment.

The annual energy consumption for the proposed development has been estimated based on the benchmark figures contained within CIBSE Guide F Energy Efficiency in Buildings (2012). The benchmark figures selected are based on the good practice figures for further and higher education self-catering residential flats, as highlighted in the table below.

Table 20.1 Fossil and electric building benchmarks — *continued*

Building type	Energy consumption benchmarks for existing buildings / (kW·h·m^{-2}) per year (unless stated otherwise)				Basis of benchmark
	Good practice		Typical practice		
	Fossil fuels	Electricity	Fossil fuels	Electricity	
Entertainment: (continued)					
— social clubs	140	60	250	110	Gross floor area[b]
— bingo clubs	440	190	540	230	Gross floor area[b]
Education (further and higher)[3][c]:					
— catering, bar/restaurant	182	137	257	149	Gross floor area
— catering, fast food	438	200	618	218	Gross floor area
— lecture room, arts	100	67	120	76	Gross floor area
— lecture room, science	110	113	132	129	Gross floor area
— library, air conditioned	173	292	245	404	Gross floor area
— library, naturally ventilated	115	46	161	64	Gross floor area
— residential, halls of residence	240	85	290	100	Gross floor area
— residential, self catering/flats	200	45	240	54	Gross floor area
— science laboratory	110	155	132	175	Gross floor area

This approach has been adopted as the benchmark figures are based on energy usage within existing buildings and so provide a more accurate representation of the anticipated energy consumption than the National Calculation Methodology.

The CO_2 emission factors for natural gas and grid supplied electricity have been taken from Table 24 of the NCM Modelling Guide 2010 January 2013 Edition, as highlighted below.

Fuel emission factors

181 The CO_2 emission factors for fuels will be as defined in **Table 24**.

Table 24 Fuel CO_2 emission factors for non-domestic buildings

Fuel type	kgCO_2/kWh
Natural gas	0.198
LPG	0.245
Biogas	0.018
Fuel oil	0.297
Coal	0.35
Anthracite	0.318
Manufactured smokeless fuel (inc. Coke)	0.344
Dual fuel appliances (mineral + wood)	0.206
Biomass	0.013
Grid supplied electricity	0.517
Grid displaced electricity	0.529
Waste heat	0.058

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Design Principles

The design intent of the development is to reduce the annual energy consumption, whilst ensuring that the energy that is consumed is consumed in the most efficient manner possible, minimising CO_2 emissions. To achieve this, the following process has been applied:

- Incorporate passive design measures into the building design to reduce the energy requirement.
- Incorporate energy efficiency design measures into the services design to ensure energy is consumed as efficiently as possible.
- Assess the viability of renewable and low/zero carbon technologies to reduce the requirement for grid supplied energy.

Passive Design Measures

Building Fabric

The thermal insulation standards will be specified to exceed the minimum standards contained within Approved Document L2A 2010 to limit the heat loss through the building fabric. This will reduce the heat energy required to maintain internal comfort levels and so reducing the CO_2 emissions associated with space heating.

The building will also be designed to achieve air permeability standards in excess of the requirements of Approved Document L2A. This will reduce the infiltration of external ambient air and so reduce the heating requirement of the building.

Solar Gain

Performance glazing will be provided to the windows, as deemed necessary together with Internal blinds to limit summertime solar gains and overheating, so reducing the requirement for mechanical cooling systems and increased mechanical ventilation rates.

Energy Efficiency Design Measures

Heating Plant

Heating and hot water will be provided by centralised modulating gas-fired condensing boilers. These will be selected to have an efficiency that exceeds the minimum standards required by the Non-Domestic Building Services Compliance Guide 2010 Edition. Heating will be supplied to each room via a central distribution network feeding high efficiency radiators. TRV's will be provided to each radiator, with weather compensated controls varying the boiler flow temperatures. All central controls will be linked to the Building Management System to provide central monitoring and control.

Mechanical Ventilation

Where possible, Purge Ventilation will be employed by the use of opening windows to provide rapid ventilation of the area served as a passive measure.

Where this is not feasible a Combination of Mechanical Extract together with Mechanical Supply and Extract Heat Recovery systems will be employed to reduce Odour and Moisture and to provide Fresh Air requirements, Complying with Building Regulations Part F.

These systems will be selected to have a specific fan power (SFP) equal to or in excess of the requirements of the Non-Domestic Building Services Compliance Guide and shall incorporate heat recovery to minimise the CO2 emissions related to heating the incoming fresh air to the room temperature.

Internal Lighting

Internal lighting contributes to a significant proportion of the operational energy requirements of buildings of this type, and so offers significant scope for the reduction of annual CO_2 emissions. The energy consumption associated with internal lighting will be minimised by using efficient LED luminaires wherever possible, with high frequency fluorescent luminaires elsewhere.

Automatic lighting controls will be provided, via passive infra-red detectors (PIR's), throughout all communal and circulation spaces to ensure lighting is not left on unnecessarily.

External Lighting

The external areas of the development will be lit via high efficiency luminaires controlled via a combination of 7 day programmable time clock and photocell to ensure the lighting is only on when required.

Energy Metering

All main incoming utilities, major energy consuming plant, and individual electrical distribution boards will be metered to enable the end use to be identified. All meters will be linked to a Building Management System (BMS) to provide central monitoring. This will allow high energy consumption to be identified and targeted for improvements.

Renewable and Low/Zero Carbon Technologies

As part of the proposed development, it is intended to implement a range of renewable and low/zero carbon technologies to further reduce CO_2 emissions.

The provision of these technologies will be selected to meet the reduction in CO_2 emissions.

Each of the following technologies has been assessed for the potential implementation within the development.

Wind Turbines

Wind turbines in city centre locations experience poor yields for electricity generation as the obstruction caused by similar height buildings, and natural variations in topography, inevitably lead to turbulent air flow around the building.

Wind turbines are also generally considered to have a negative visual impact and therefore wind turbines are not considered to be viable for this development.

Solar Photovoltaic Panels

Roof mounted photovoltaic panels have been identified as a possible viable means of generating zero carbon electrical energy but will be assessed within the overall Energy strategy.

Due to the wide variation in occupancy of student accommodation and use, the electrical base load is generally inconstant throughout the day. However this can be, in part, covered by the output of the photovoltaic system.

Once the photovoltaic panels are installed, there are minimal maintenance requirements. However, access will be needed to roof level for annual cleaning of the panels and to enable panel replacement should any fail.

Combined Heat and Power (CHP)

A CHP unit generates electricity on-site, and recovers the waste heat from this process to be used for heating or domestic hot water generation. This means the electricity is generated in a much more efficient manner than grid supplied electricity which is subject to significant transmission losses.

To ensure that a CHP is running as efficiently as possible, a steady, continuous heat demand is required. The large quantity of domestic hot water required for high density residential developments satisfies this requirement. The electricity generated will also contribute to the building base load.

Therefore, a suitably sized gas-fired CHP unit will be provided to contribute to the building base electrical load and provide heat energy into the domestic hot water storage cylinders.

Solar Hot Water

Roof mounted solar thermal collectors are used to provide a pre-heat to the domestic hot water requirements from solar energy. The proposed development will have a high domestic hot water demand and so a solar hot water system has the potential to provide a significant reduction in CO_2 emissions.

However, a solar hot water system would reduce the roof space available for photovoltaic panels and also conflict with the provision and integration of a CHP unit. For these reasons, solar hot water is not deemed suitable for this development.

Air Source Heat Pump

An air source heat pump extracts heat energy from the ambient air and uses this to provide space heating, via either an air system or a wet system with radiators/underfloor heating. The process can also be reversed during summer months to remove heat from the building.

It is not deemed viable to provide the whole building heat load via air source heat pumps due the size of external condenser units required and the noise that these generate. A smaller system will be incorporated into the development to maintain comfort conditions within the back of house offices and reception area.

Ground Source Heat Pump

Due to the fact that the ground remains at a stable temperature of between 10-12°C, a ground source heat pump can be used to extract heat energy from the ground in winter and reject unwanted heat energy into the ground during summer.

The proposed development site has a large footprint with the potential to provide the required space to install a closed loop ground collector. However, due to the high cost of installation and internal plant space requirements, this system has been deemed inappropriate for the development.

Biomass Heating

Biomass in the form of logs, wood pellets or wood chips is classified as a renewable energy source because the CO_2 emitted during burning has been taken out of the atmosphere by the plant while it was growing. Therefore, locally sourced biomass fuel has the potential to significantly reduce the CO_2 emissions related to heating and hot water generation.

However, due to the city centre location of the development site, a number of difficulties exist in relation to the delivery and storage of the fuels and operation of the boiler. A large fuel store will be needed, requiring regular deliveries to keep the building operational. The Clean Air Act would also require a detailed analysis of the dispersal of the flue emissions to be carried out to ensure there are no air quality issues. Therefore, this technology is not proposed to form part of the development.

Summary

This report has calculated the amount of energy consumed by the proposed building, and the associated CO_2 emission, through the use of benchmark data taken from CIBSE Guide F Energy Efficiency in Buildings (2012) and detailed the passive design measures and energy efficiency design measures that will be employed to minimise the operational energy use as far as reasonably possible.

In additional to the measures employed to reduce energy consumption, this report has also analysed the feasibility of various renewable and low/zero carbon energy sources. A number of potential renewable and low/zero carbon energy sources, such as biomass, wind turbines, solar hot water and ground source heat pumps, have been shown to not be technically or financially feasible for this development.

It is proposed to incorporate a gas-fired CHP unit to provided low carbon electrical and heat energy to cover the electrical and domestic hot water base loads. Roof mounted photovoltaic panels will be considered, should the requirements of Part L dictate, to generate zero carbon electricity and an air source heat pump will provide low carbon heating and cooling to the back of house management office and reception area.

The provision of these technologies will be selected to meet the reduction in CO_2 emissions.

The development accords with Welwyn Hatfield Borough Council's scoping and planning policy.