

Sustainability and Energy Statement

Bowden Hey Industrial Estate

Trustees of the Ainley Pension Scheme

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1. Management Summary

An Energy and Sustainability Report has been carried out for the proposed new industrial storage and distribution warehouse at Bowden Hey Industrial Estate, High Peak. The report has been based on utilising best practice methodology in-line with the *Be Lean, Be Clean, Be Green* hierarchy.

Below indicates the measures to be included within the proposed development.

Be Lean (Use Less Energy)

To reduce energy demand and maximise energy efficiency, the development will benefit from:

- High thermal efficiency building materials (U-Value)
- Natural ventilation in occupied spaces
- Ventilation and incorporating MVHR technology in occupied spaces with no openable windows
- Low energy LED lighting.
- High Efficiency refrigerant heating systems to office areas
- Integration of photovoltaics into the system at a usage efficacy of >60%

Be Clean (Energy Efficiency)

To ensure 'clean' energy is utilised from low carbon technologies and to ensure demands are met as efficiently as possible:

- Fully dynamic heating control (programmer, delayed start room thermostat)
- LED lighting throughout
- MVHR ventilation control with summer bypass

Be Green (Use Renewable Energy)

Inclusion of renewable energy technology:

- Refrigerant based heating systems to utilise products with a coefficient of performance of 3+
- Utilise solar photovoltaics

The proposed building service strategy shows an 80% reduction in Co2 emissions when benchmarked against a notional similar new building. The significant energy saving is due to the introduction of the solar photovoltaics.

2. Introduction

ECS Consultants have been commissioned by The Trustees of the Ainley Pension Scheme to produce an Energy Report relating to the proposed new industrial warehouse unit at Bowden Industrial Estate, High Peak.

The report will consider any legislative and local policy framework.

It is noted this report is based on modelled building energy usage parameters as set out within the design stage part L energy calculations.

3. Policy Context

This section of the report reviews both local and national policy, establishing key principles that can be taken forward and applied across the development.

In addition to the national policies, a review of the local planning has been considered in relation to Worthing Local Plan – Development Management Policies DM 16 and DM 17.

3.1 Policy Context - National

National Planning Policy Framework

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- a) *An Economic Objective-
To help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity, and by identifying and co-ordinating the provision of infrastructure.*
- b) *A Social Objective-
To support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations, and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.*
- c) *An Environmental Objective-
To contribute to protecting and enhancing our natural, built and historic environment, including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

3.2 High Peak Local Plan – Development Management Policies

High Peak Local Plan S1 stipulates the requirements for the sustainability principles for the design of the new site. With regards to energy and sustainability the S1 plan refers to the use 'energy hierarchy'. This methodology is benchmarked within this document.

High Peak Policy EQ 1 stipulates the requirements for the reduction in Co2 emissions to combat climate change. The introduction of low or zero carbon technologies within the new development is demonstrated within this report.

4. Carbon Reduction Strategy

These measures relate to the conservation of the building energy demand and to its subsequent carbon dioxide emission. Passive measures relate to none building services solutions that aim to reduce the building energy demand. These typically include greater levels of thermal insulation resulting in reduced energy demand and subsequent reduction in carbon dioxide emissions.

Generally, when looking at Energy Strategy we look at 'Passive' measures as a first port of call, this then develops to 'Active' measures to try and achieve targets that cannot be met passively.

The following section details this design course.

Energy Hierarchy & Design Principles

The design process and decisions for the building follow the energy hierarchy's principles of Be Lean, Be Clean and Be Green.

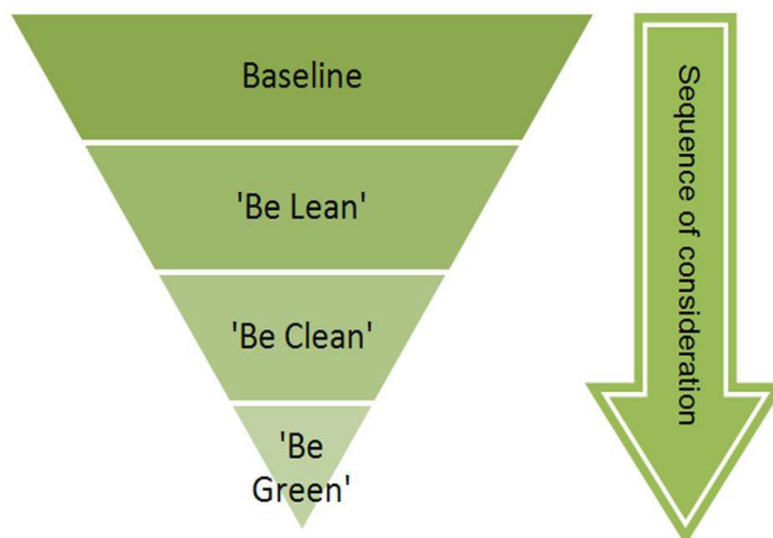


Figure 1 – Energy Hierarchy Diagram

The energy hierarchy is a classification of energy options, prioritised to assist progress towards a more sustainable energy system. The energy hierarchy uses a step-by-step process.

Be Lean:

In accordance with both national and local planning policy, a fabric first approach shall be taken in reducing energy demand / consumption. Below we have highlighted a number of aspects which shall be considered in achieving the reduction in overall energy demand.

- Ventilation and incorporating heat recovery technology in the building core.

- Low energy LED lighting.
- High Efficiency HVAC Plant, e.g. Refrigerant based heating systems.

In terms of fabric improvements there are no options available when set against the project constraints and budget.

Be Clean:

The aim of 'clean' improvements is to ensure that the energy that is required is sourced from a low-carbon technology and demands are met as efficiently as possible.

For the proposed scheme, it is possible to introduce clean measures which reduce carbon emissions. Such as the below systems:

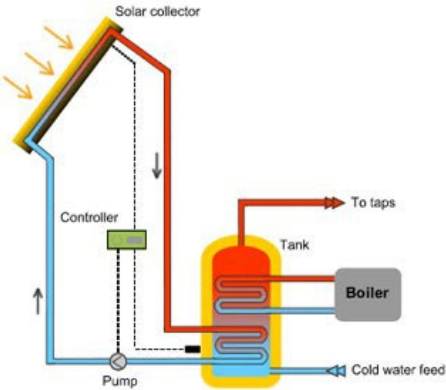
- Heating Control (programmer, delayed start room thermostat)
- LED Lighting throughout with automatic controls
- MVHR Ventilation in areas with no access to openable windows
- Integration of photovoltaics

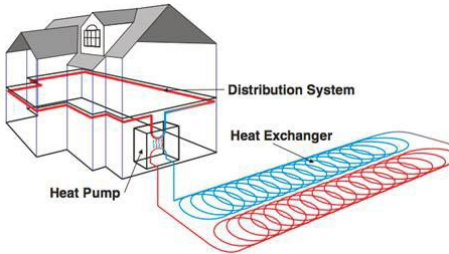
Be Green:

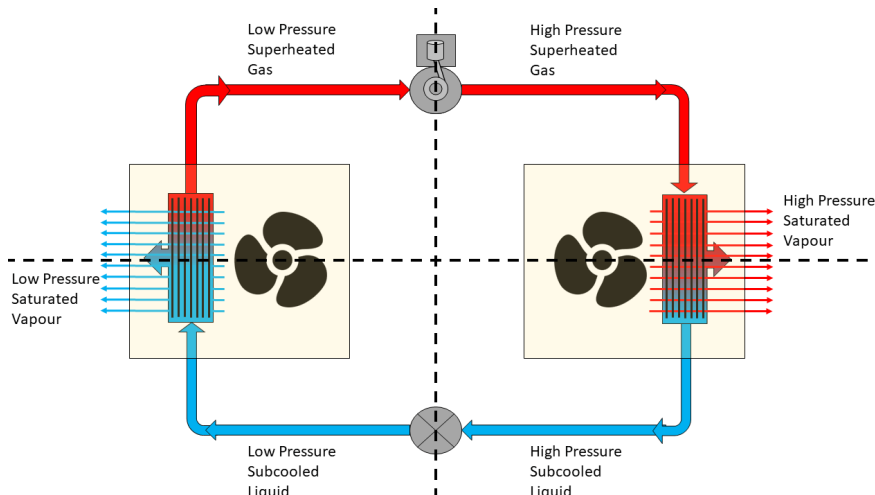
Promoting renewable technologies to further reduce the carbon footprint of the buildings; the appropriateness and size of renewables needs to be assessed at each design stage. Renewable technologies to be considered are listed below:

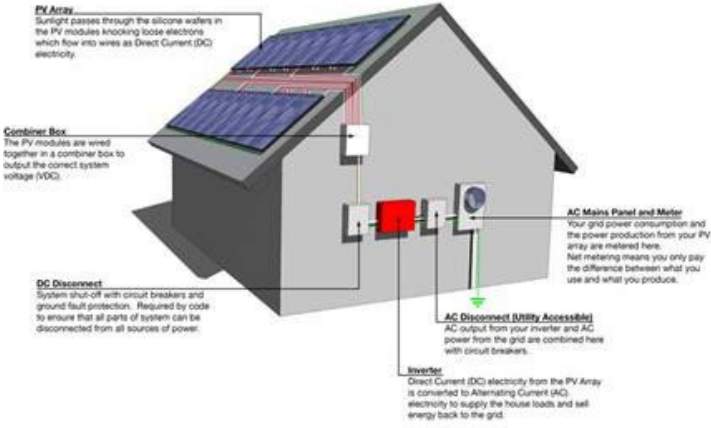
- Biomass Boilers
- Solar Water Heating
- Ground Source Heat Pump
- Air to Air Source Heat Pump
- Solar PV

Biomass Boilers	
These boilers operate using timber pellets or wood chip fed from an adjacent hopper. The timber pellets or wood chip are burned within the heating chamber producing heat that is then used in a conventional way to serve radiators or underfloor heating.	
Pros	Cons
Reduced Fuel Bills Reduced Carbon Footprint	Regular Pellet Delivery Required Large Plant Space Required Noise Issues Regular Maintenance Required
Suitability: Biomass boilers are not considered appropriate for this development due to the plant space required, regular maintenance requirement for pellet deliveries. In addition to this the fumes from the biomass combustion would not be suitable under the clean air requirements in High Peak.	

Solar Water Heating	
This system utilises solar panels to heat an antifreeze solution that provides a pre-heat to a hot water vessel. The system can work in conjunction with certain traditional boiler system. 	
Pros	Cons
Reduced Fuel Bills Reduced Carbon Footprint Low Maintenance	Collectors need to be south facing to increase efficiency Carbon saving is low in comparison to other technologies
Suitability: Solar water heating is not considered appropriate for this development due to the limited how water usage and system maintenance requirement.	

Ground Source Heat Pump	
This system operates like a domestic refrigerator but in reverse. The system comprises of a cold fluid that is pumped externally around to a bore hole or slinkie coil system. As the fluid passes through the bore hole / slinkie system it is heated by the surrounding earth and transferred to the dwelling. 	
Pros	Cons
Reduced Fuel Bills Reduced Carbon Footprint Low Maintenance High Efficiency	High capital cost Requires large ground area Requires larger radiators or UFH system due to reduced heat output
Suitability: This system is not considered to be appropriate as there is insufficient space heating demand for this development to give acceptable paybacks.	

Air to Air Source Heat Pump	
This system comprises of a cold fluid which is pumped around an external condenser. The fluid is heated from the air. The warmer fluid is then compressed raising the temperature. When the mixture is allowed to evaporate the heat is released internally via the internal cassette units 	
Pros	Cons
Reduced Fuel Bills Reduced Carbon Footprint Low Maintenance High Efficiency	Requires external plant space
Suitability: This system should be considered on the proposed site and utilising such methods could decrease the buildings expected annualised carbon emissions when benchmarked against traditional heating systems.	

Solar PV	
This system converts sunlight and borrowed light into direct current electricity via a chemical reaction. The electricity is transformed through a series of controls into mains electricity.  PV Array Sunlight passes through the silicon wafers in the PV modules knocking loose electrons which flow into wires as Direct Current (DC) electricity. Combiner Box The PV modules are wired together in a combiner box to output the correct system voltage (VOC). DC Disconnect System shut-off with circuit breakers and ground fault protection. Required by code to ensure that all parts of system can be disconnected from all sources of power. Inverter Direct Current (DC) electricity from the PV Array is converted to Alternating Current (AC) electricity to supply the house loads and sell energy back to the grid. AC Disconnect (Utility Accessible) AC output from your inverter and AC power from the grid are combined here with circuit breakers. AC Mains Panel and Meter Your grid power consumption and the power production from your PV array are metered here. Net metering means you only pay the difference between what you use and what you produce.	
Pros	Cons
Reduced Fuel Bills Reduced Carbon Footprint Low Maintenance Proven Technology	Requires space to locate kit Panels loose efficiency over time Roof orientation will dictate efficiency of each system
Suitability: Solar PV systems would be a suitable solution on this development. With an introduction of a PV system of 40KW it would give a net energy usage saving of 31,551KWH/annum achieving a carbon saving of 6,531KGCo2/Annum.	

Be Green

We have reviewed the renewable options available to this development and conclude that refrigerant based heat pumps would be a suitable low carbon technology for the site, when accompanied by the MVHR it will help operate an efficient heating system.

Summary of Be Lean, Be Clean, Be Green Proposals - Associated Carbon Savings

Notional Building

Heating Energy Usage/Annum	Lighting Energy Usage/Annum
6,082KWH	12,855KWH
Carbon Total – 3,920KgCo2/Annum	

Proposed Building

Heating Energy Usage/Annum	Lighting Energy Usage/Annum
5,771KWH	29,686KWH
Carbon Total – 7,340KgCo2/Annum	

Carbon Saving from PV/Annum	Proposed Building Total Carbon
6,531KGCo2/Annum	7,340KgCo2/Annum
Carbon Total – 809KgCo2/Annum	

The total carbon saving for the proposed development is averaged at 80%.

The strategies that could be employed to meet the client's aspirations should apply measures as outlined above.

This should include, but not be limited to:

- (i) MVHR Ventilation
- (ii) Air to Air Source Heat Pumps
- (iii) LED Lighting
- (iv) Solar Photovoltaics

Energy Meters

Energy metering systems should be installed to ensure that 90% of the estimated annual energy of each fuel type can be attributed to an end use category, e.g.

lighting, heating, cooling, etc. Where specified, Low and Zero Carbon technologies should be separately monitored.

5. Conclusion

It is recommended the proposed strategies outlined within this document are adhered to as failure to comply with these standards set out will result in a poorer performing building and be noncompliant in line with building regulations.