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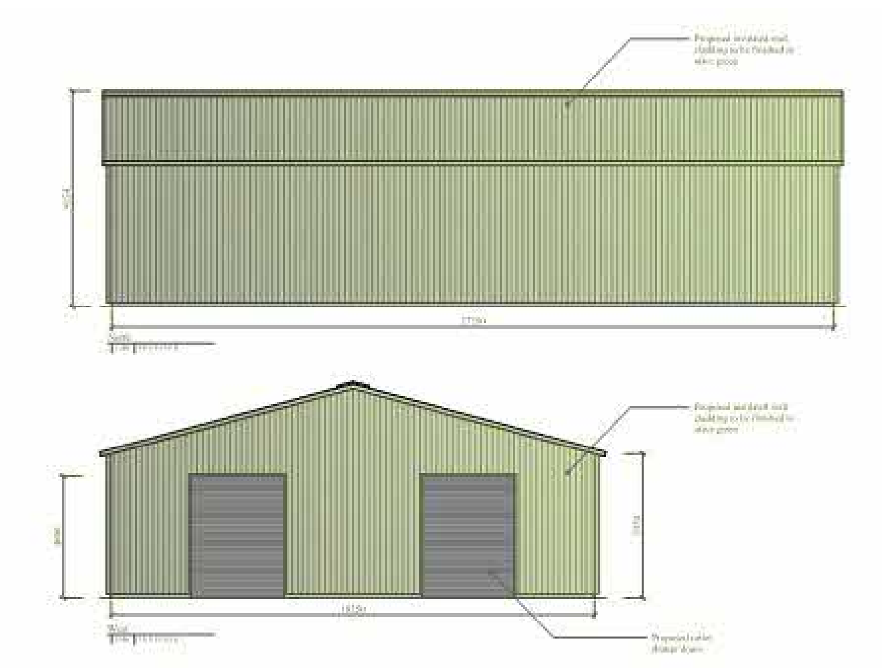
ENERGY STATEMENT

Demolition of existing industrial building and construction of a building for storage of wine at:

North Farm, Chanctonbury Game , London Road, Washington, RH20 4BB



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[1] Achieve Green and Energytest are trading names of Energytest (Commercial) Ltd, Company Registration No. 7013944

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1. Executive Summary

This Energy Statement has been prepared by Achieve Green in support of a full planning application for the construction of a building for the storage of wine at North Farm, Chanctonbury Game, London Road, Washington, RH20 4BB.

The design has been developed to address the energy performance policy requirements of The South Downs National Park Authority. A minimum target CO_2 reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy: 19% reduction through energy efficiency and a further 20% reduction through on-site renewable energy.

A base case has been developed, against which potential savings can be assessed. This base case is the notional building developed for the Building Regulations (2021) assessment and is quantified in terms of CO_2 emissions as the Target Emission Rate (TER) for the building(s).

As no part of the proposed building will be conditioned for human comfort, there will be no level of heating or cooling consumption that can be reduced through the specification of an enhanced fabric, or the specification of high efficiency systems. The only mechanical and electrical system that will be installed is lighting. Although the specification for lighting will surpass the requirements of Approved Document L2 2021, as the proposed building will not have any natural light, there is no ability to make energy savings for this either. The proposed building will therefore target the full 35% reduction in carbon emissions through the addition of renewable energy alone.

Having minimised energy consumption in the first instance, the potential for remaining energy demands to be met via a decentralised energy source has been considered. It is evident this proposed development is neither within the coverage of an existing district heating network, nor is there an expectation that a district heating network will be developed at this site in the near future.

Due to its size, this development is not suitable for combined heat and power.

An assessment has been carried out to determine the potential for renewable energy systems to reduce CO_2 emissions further. It is proposed that a 4 kWp photovoltaic system shall be installed upon the south facing roof of the building.

The total reduction in emissions resulting from energy efficiency measures and the installation of renewable technology is 41.5% compared to the regulated emissions from a building designed to just meet Building Regulations (2021) Part L2. This surpasses the on-site minimum target reduction of 35%, as required by The South Downs National Park Authority.

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2. Introduction

Energy use in buildings is a significant contributor to global CO_2 emissions and global warming. Designing energy efficient buildings and incorporating low and zero carbon energy generation is a vital part of ensuring this development incorporates sustainability as a core part of its design.

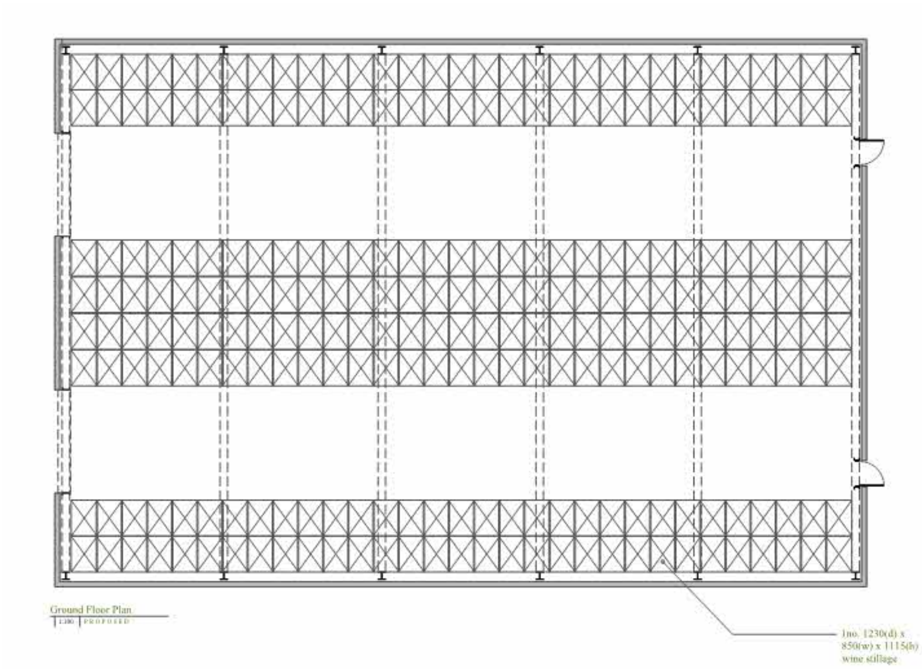
The purpose of the report is to assist evaluating parties to understand the energy consumption and performance of the proposed development and consider its performance against the "lean, clean, green" performance standard.

This application, seeks by its design to surpass the CO_2 emission target of Approved Document L2 2021 by a minimum of 35%, through the application of the energy hierarchy: 19% reduction through energy efficiency and a further 20% reduction through on-site renewable energy.

3. Overview of the proposed development

The proposed development consists of a single unconditioned warehouse for the storage of wine.

Proposed ground floor plan:



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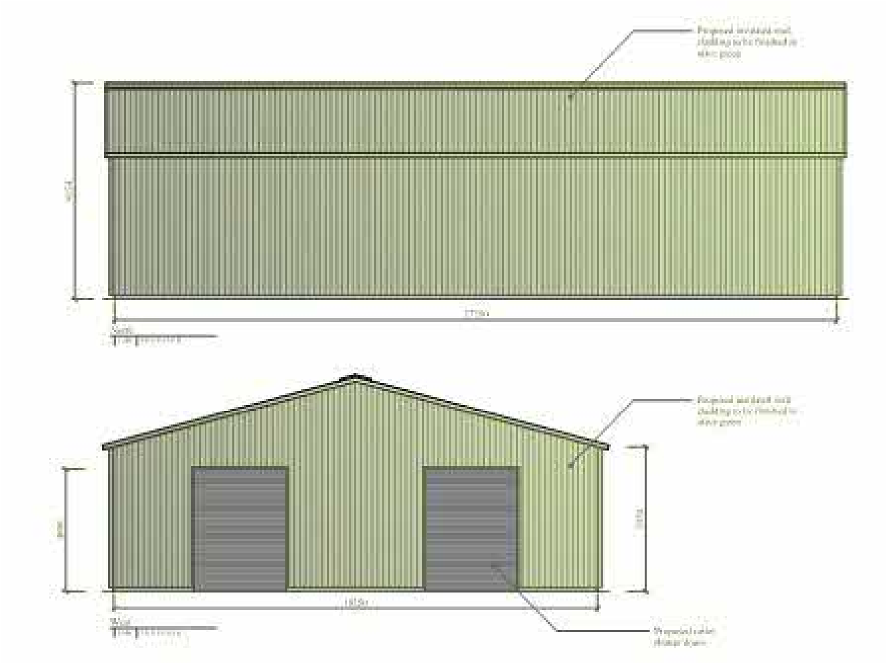
Proposed elevations:



4. Policies and Drivers

4.1. National and International Policy

The Climate Change Act (2008) sets a legally binding target for reducing UK carbon dioxide (CO_2) emissions to zero by 2050. It also provides for a Committee on Climate Change, which sets out carbon budgets binding on the Government for 5-year periods.

The National Planning Policy Framework (NPPF) 2021, reflects the requirements of the Climate Change Act 2008 in paragraphs 153 and 155 as follows:

"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure."

"New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards."

"To help increase the use and supply of renewable and low carbon energy and heat, plans should:

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."

4.2. Local Policy: The South Downs National Park Authority

Sustainability is key to The South Downs National Park Authority planning policy and should be considered with every planning application:

5. Prior to the commencement of the development hereby permitted a design stage sustainable construction report shall be submitted to and approved in writing by the Local Planning Authority. The report shall include:

- i) SBEM calculations
- ii) Product specifications
- iii) Grown in Britain or FSC certificates where applicable;
- iv) Sustainable material strategy;
- v) Building design details;
- vi) Layout or landscape plans demonstrating that the building has:
  - a) Reduced predicted CO_2 emissions by at least 19% due to energy efficiency and;
  - b) Reduced predicted CO_2 emissions by a further 20% due to on site renewable energy compared with the maximum allowed by building regulations; and further optional measures relating to:
    - Water consumption;
    - Adapting to climate change;
    - Sustainable materials;
    - Sustainable waste.

Thereafter the development shall be built in accordance with the approved details.

Reason: To ensure the development demonstrates a high level of sustainable performance to address mitigation of and adaptation to predicted climate change. This is required to be a pre-commencement condition because it is necessary to agree such details prior to commencing works.

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4.2.1. Project policy

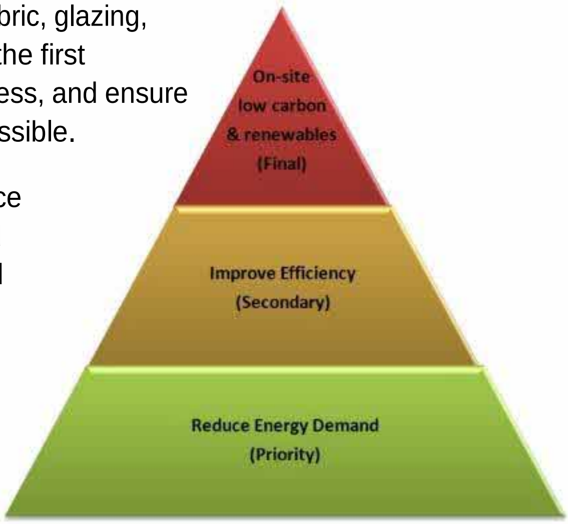
Planning policy leads to a minimum on-site target reduction in CO_2 emissions equal to 35% relative to the Building Regulations 2021, through the application of the energy hierarchy: 19% reduction through energy efficiency and a further 20% reduction through on-site renewable energy.

5. Energy hierarchy

In line with best practice the proposed energy strategy for this development will follow the principals of the energy hierarchy.

The energy hierarchy has three priorities, seeking to reduce energy use before meeting remaining demand by the cleanest means possible:

1) Be lean – use less energy: Optimise the building fabric, glazing, and structure to minimise energy consumption in the first instance by using low U-values and good air tightness, and ensure that active systems run as energy efficiently as possible.
2) Be clean – supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible, such as combined heat and power (CHP).
3) Be green – use renewable energy: When the above design elements have been reasonably exhausted, supply energy through renewable sources where practical.



6. Establishing the baseline

For dwellings that are wholly new in construction, the baseline is the Target CO_2 Emission Rate (TER) from Approved Document L2 2021.

The baseline calculations are based on buildings that are the same size and shape as the proposed buildings and have the same exposed facades.

7. Energy efficient design measures *("be lean")*

Enhancing the thermal performance of the building envelope helps to future-proof the structure and also yields the greatest CO_2 savings. Adding renewable technology will then yield maximum carbon reductions with lower long-term costs for the developer.

7.1. Non-domestic development

As no part of the proposed building will be conditioned for human comfort, there will be no level of heating or cooling consumption that can be reduced through the specification of an enhanced fabric, or the specification of high efficiency systems. The only mechanical and electrical system that will be installed is lighting.

This development shall seek to reduce energy consumption through the specification of mechanical and electrical systems with efficiencies that surpass the requirements of Approved Document L2 2021:

	Proposed development	L2 2021 requirements
Lighting efficacy	125 lm/W	95 lm/W

8. Energy efficient systems *("be clean")*

8.1. Combined heat and power

Combined heat and power (CHP) systems use relatively cheap and clean fuels (such as natural gas) to generate heat and electricity on site. A typical CHP system uses combustion of natural gas to drive a turbine that produces electricity. The heat generated is captured and used to produce hot water.

As losses are minimised the carbon footprint of the energy generated is very low. However this is dependent on there being sufficient year-round local heat demand to fully utilise the heat generated by the CHP plant. An example would be developments of at least 500 dwellings, universities or hospitals.

The feasibility of a gas-fired CHP for the site has been considered, however, in this case the base load is insufficient to make CHP feasible. CHP is therefore not considered to be feasible or desirable for this project, due to the scale of the development.

8.2. District heating networks

In a district heating network heat is supplied from one or more central energy ce
multiple buildings within the network. Supply to multiple buildings guarantees high year-round local heat demand which in turn allows the use of low carbon technologies within the energy centre, such as combined heat and power systems. Large plant and aggregated demand allows systems within the energy centre to run more efficiently.

Hot water is distributed within the network via highly insulated pipes. To connect to the network individual boilers are replaced with separately metered heat exchangers.

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Due to the fact this proposed development is neither within the coverage of an existing district heating network, nor is it within an area designated as having potential for a future network, district heating can be discounted as a viable option.

9. Low and zero carbon energy sources *("be green")*

9.1. Photovoltaics

Solar photovoltaics (PV) capture the sun's energy using photovoltaic cells. The cells convert sunlight into electricity, which can be utilised on site or transferred into the National Grid. PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on a roof.

The power of a PV cell is measured in kilowatts peak (kWp). This is the rate at which the cell generates energy at peak performance in full direct sunlight.

Photovoltaics offer high CO_2 savings, are simple to install and suitable for most buildings. The only limiting factor for PV is the availability of suitable roof space.

Feasibility assessment: Feasible and appropriate. There is sufficient unshaded roofspace available for a photovoltaic installation.

9.2. Heat Pumps

Heat pumps collect low temperature heat from renewable sources (such as the air or ground) and concentrate the heat to a usable temperature via a reverse refrigeration cycle. Useable heat is transferred to the building via a heat exchanger and can be used for low temperature heating and Domestic Hot Water, though an immersion top-up may be required for DHW.

Heat pumps have some impact on the environment as they generally use grid supplied electricity to run the pumps. It is common for heat pumps to have a coefficient of performance of three, meaning that for every 1kWh of electricity used, over 3kWh of heat can be generated. The renewable component of the output is therefore taken as the difference between the output energy and the input energy, in this scenario the heat pump will be deemed to have delivered 2kWh of renewable energy.

Ground source heat pumps require external horizontal ground loops, or as is more likely in built-up environments, vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space.

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Air source heat pumps have a slightly lower seasonal efficiency than ground source heat pumps, but require less space. Noise and space considerations should be assessed when determining an appropriate site for external condensing units.

Feasibility assessment: Not appropriate – unconditioned building with no hot water demand.

9.3. Solar thermal

Solar thermal systems, use free heat from the sun to warm Domestic Hot Water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable.

Solar thermal systems are most appropriate for buildings with high year-round Domestic Hot Water demand.

Many solar thermal systems will use electricity to run pumps within the system. This means the resultant CO_2 and cost savings in a building with a gas boiler will be relatively low.

Feasibility assessment: Not appropriate – unconditioned building with no hot water demand.

9.4. Wind turbines

Wind turbines use blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine: Pole mounted and building mounted. Pole mounted turbines are free standing and are erected in a suitably exposed position, and are often about 5kW to 6kW in size. Building mounted turbines are smaller and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Large scale turbines, in exposed locations offer one of the best financial returns of all renewable energy systems as the payback of the system increases dramatically with the size of the turbine. However small-scale systems offer much lower levels of performance and recent studies have questioned the viability and output from such systems, particularly in urban environments.

Feasibility assessment: Potentially feasible and appropriate – further investigation of site constraints would be required.

9.5. Biomass

Biomass heating systems, burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. The carbon dioxide emitted when wood is

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burned is the same amount that was absorbed over the months and years that the plant was growing. The process is sustainable as long as new plants continue to grow in place of those used for fuel. There are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, but as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels.

When specifying biomass heating systems is important to consider the potential technical issues surrounding delivery and storage of fuel.

Although the CO_2 savings from biomass are substantial, the high levels of NOx emissions can make biomass systems unsuitable for urban environments.

Feasibility assessment: Not appropriate – unconditioned building with no hot water demand.

9.6. Proposed low and zero carbon energy sources

With emissions within the building already reduced through energy efficient systems, it is proposed that further reduction will be achieved through the installation of a 4 kWp photovoltaic system on the south facing roof of the building. A 4 kWp PV system equates to 16 No. 250W panels, and requires approximately 26m^2 of the available roof area. A 4 kWp PV system will generate approximately 3,065 kWh of electricity (as calculated using SBEM), which equates to 0.3 tonnes of CO_2.

10. Results: Calculated CO_2 savings

10.1. Regulated CO_2 savings

	Carbon dioxide emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	0.8	8.2
After renewable energy (be green)	0.5	8.2

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Cumulative on-site savings	0.3	41.5 %

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11. Appendix A: BRUKL Report