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Former New Penn Housing Project Residential Development

Energy Hierarchy/Strategy - Report

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Stage 3 Report

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Prepared For:

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SCHEDULE OF AMENDMENTS

Date	Revision	Page No./Clause No./Schedule	Detail of Revision

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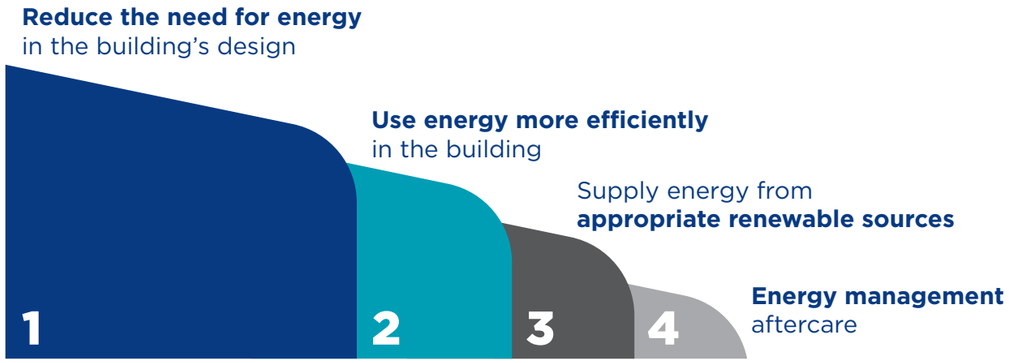
ENERGY HIERARCHY / STRATEGY

1.01 Houses SAP Assessment

Each House Type will be provided with a dedicated EPC, modelled using the Standard Assessment Procedure (SAP).

All dwellings are to achieve an EPC A rating.

The Energy Strategy for the Houses will be on the principles of the Energy Hierarchy.



The following building fabric performance figures are currently proposed to assist in achieving Building Regulation compliance:

Element	U Value
Ground Floor	0.12 w/m²/k
External Walls	0.17 w/m²/k
Pitched Roofs	0.10 w/m²/k
Flat Roofs	0.10 w/m²/k
Windows & Front Doors	1.2 w/m²/k
Front Doors	1.00 w/m²/k
Air Permeability	3.00 m³/Hr/m²

The energy performance of the Houses will be assessed under the Standard Assessment Procedure (SAP) to demonstrate compliance with Building Regulations AD L1A.

SAP calculations will be produced utilising approved software, Elmhurst 'Design SAP 10'. As part of the SAP assessment a draft Energy Performance Certificate will be generated which displays both the energy efficiency rating and the environmental impact of the dwelling.

For each House Type it is proposed to include Air Source Heat Pump technology to provide Heating and Hot Water demands, along with roof mounted Photovoltaic solar panels to generate electricity and help reduce CO_2 emissions.

1.02 Photovoltaic System

In order to achieve the required reductions of CO_2 emissions for Building Regulations Compliance, solar photovoltaic panels have been proposed on the roof of each House.

The PV panels currently proposed are 450W monocrystalline type SunPower panels.

Each system will also include an electricity export meter, so that during periods of low energy consumption, the system will be capable of exporting electricity to the electricity grid.

1.03 Lighting Strategy

Within each house type lamp holder pendants shall be fitted utilising low energy LED lighting throughout the property.

1.04 LTHW Heating and Domestic Hot Water

Each House Type will be provided with an individual Air Source Heat Pump Unit. This will consist of an Externally mounted condenser unit located at the rear of the property, from this condenser, primary pipework enters the property connecting to an internal module, which in turn serves a heating installation of wall mounted radiators and a Hot Water Cylinder to provide domestic hot water to all outlets.

1.05 Mechanical Ventilation with Heat Recovery (MVHR)

All properties will have a Mechanical Ventilation Heat Recovery (MVHR) unit installed. The MVHR unit will provide a system of whole house energy efficient low power mechanical heat recovery ventilation, utilising the heat from the air extracted from the Kitchens and Bathrooms to pre heat fresh supply air to Living areas and Bedrooms.

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1.06 Initial Stage Draft SAP Iterations

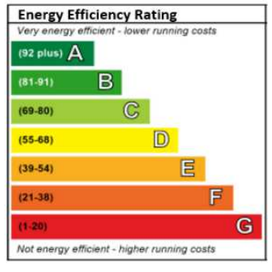
The following table shows the results of Draft SAP calculations carried out to illustrate the suitability of using differing Mechanical and Electrical Building Services technologies within a sample House Type which will be constructed on the New Penn site. The results of the table have allowed the Design Team and Client to decide to progress with the selected solution – Individual ASHP for radiator heating and domestic hot water services.

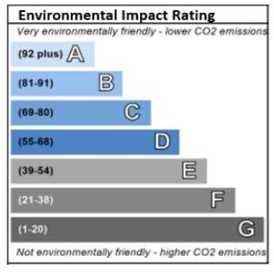
2B4P Semi Detached House

	Iteration 1 – Panel Heating	Iteration 2 – Individual GSHP	Iteration 3 – Individual ASHP	Iteration 4 – Storage Heating	Iteration 5 – Panel Heating	Iteration 6 – Storage Heating
Building Fabric	U-Value					
External Wall	0.16 W/m²K					
Roof	0.16 W/m²K					
Windows	1.00 W/m²K					
Doors	1.00 W/m²K					
Air Permeability	4 m²/hm²					
Window G-Value	0.5					
Window Frame Factor	0.7					
Thermal Bridging (Y-Value)	0.15 (Default)					
M&E Specification						
Primary Heating	Direct Electric (Efficiency - 100%)	Ground Source Heat Pump per apartment	Air Source Heat Pump per apartment	Storage Heater (Efficiency - 100%)	Direct Electric (Efficiency - 100%)	Storage Heater (Efficiency - 100%)
Heating Controls	Programmer and room thermostat	Programmer, TRV's and bypass	Programmer, TRV's and bypass	Controls for high retention storage heaters	Programmer and room thermostat	Controls for high retention storage heaters
Heating Emitters	Electric Panel Heaters	Radiators	Radiators	High heat retention storage heater	Electric Panel Heaters	High heat retention storage heater
Secondary Heating	None provided	None provided	None provided	None provided	None provided	None provided
Hot Water	Electric Immersion	From primary heating system – 210l Cylinder	From primary heating system – 210l Cylinder	Electric Immersion	Electric Immersion	Electric Immersion
Ventilation	Balanced mechanical ventilation with heat recovery: Nuaire MRXBOX-ECO2					
Lighting	100% low energy lighting					
Electricity Tariff	Standard Tariff	Standard Tariff	Standard Tariff	Economy 7	Standard Tariff	Economy 7
Renewables (PV)	2kW (South West Facing)	2kW (South West Facing)	2kW (South West Facing)	2kW (South West Facing)	4kW (South West Facing)	4kW (South West Facing)

Predicted EPC Results		
Iteration	**Energy Efficiency Rating**	**Environmental Impact (CO2) Rating**
1 - Panel Heating	B 85	B 86
2 - Individual GSHP	A 94	A 95
3 - Individual ASHP	A 95	A 96
4 - Storage Heating	A 94	A 95
5 - Panel Heating	A 96	B 86
6 - Storage Heating	A 106	A94

Total Emissions			
Iteration	**Dwelling Emission Rate (DER) kg/m²**	**Target Emission Rate (TER) kg/m²**	**Pass Margin %**
1 - Panel Heating	19.61	24.79	**20.90**
2 - Individual GSHP	9.92	24.79	**59.98**
3 - Individual ASHP	7.54	24.79	**69.98**
4 - Storage Heating	8.60	24.79	**65.31**
5 - Panel Heating	19.92	24.79	**19.65**
6 - Storage Heating	10.23	24.79	**58.73**





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