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BEST Decarbonisation Plan

ESCAPE Family Support Ltd, Ashington

29 February 2024

Version History

Version	Date	Author	Reason for issue
V1.0	29/02/2024	J.Brown	Issue to client
V2.0	04/03/2024	J.Brown	Amended following client review

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BEST Decarbonisation Plan.

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Contents

Executive Summary

Align Property Partners were commissioned by Newcastle City Council (NCC) to carry out a technical review of the available decarbonisation solutions for various SME's across Newcastle, North Tyneside, Northumberland and Gateshead.

ESCAPE Family Support is a counselling charity which is located in Ashington, Northumberland. The building is a single story which consists of a Reception, Office Space, Meeting Rooms, WC's and a Kitchen. The building has an estimated floor area of 340m2.

The report investigates options for the client to consider to reduce the buildings carbon emissions. The report also considers options to provide low carbon technologies and considers any fabric improvements along with any other efficiencies or developments.

Following the site visit and review of the existing site constraints, the conclusions reached because of this investigation are;

Recommendation	Payback Period (Years)	Budget Cost (£)	Potential CO2e Reduction Per Annum
Gas Fired Condensing Boiler	N/A	4,000.00	Approx. 0.060 Tonnes /CO2e/annum
ASHP Heating	N/A	48,250.00	Approx. 0.541 Tonnes /CO2e/annum
Electric Direct Hot Water Cylinder	N/A	4,500.00	N/A
Solar PV without battery	7.78	21,104.26	Approx. 2.897 Tonnes /CO2e/annum
Solar PV with battery	9.66	31,022.74	Approx. 2.897 Tonnes /CO2e/annum
LED Lighting	2.2 – 2.3	1,287.00	Approx. 0.512 Tonnes /CO2e/annum
The costs above are budget costs only and not a works quotation. The costs given do not include professional fees, preliminaries or inflation beyond the first quarter 2024.			

Energy efficiency improvements and energy generation technologies may be eligible for a grant contribution from BEST, and further information and guidance can be provided

The report makes recommendations to help reduce energy and hence CO2 emissions as much as possible by taking a holistic approach. All options reviewed would contribute to the building owners and occupant's commitment to carbon reduction and/or improve comfort condition within the building.

The building manager advised that the building was refurbished in 2014 which included installation of new loose roof insulation and new double glazed UPVC windows, no further fabric improvements are recommended.

If the existing combination boiler was replaced with a new like for like gas fired condensing combination boiler, a small carbon and running cost saving will be gained due to the increased efficiency of modern boilers.

If the ASHP installation is considered, this would demonstrate a carbon saving of approx. 0.541 tonnes per annum but will require additions or modifications to the existing radiator circuit to efficiently heat the building. However, there will be an increase in running cost due to the difference in cost between electricity and gas.

It is possible to install a solar PV array onto the East and West parts of the roof (subject to a structural review). The PV array (without battery storage) could provide 11,076kWh, towards the building's electrical usage. This would provide a saving of approx. £2,711.40 per year with payback in 7.78 years. The PV array (with battery storage) could provide 11,076kWh towards the building's electrical usage. This would provide a saving of approx. £3,212.04 per year with payback in 9.66 years.

Continuing with the light and lamp replacement to the building will cost an estimated £1,287.00 with carbon savings of 215kg/CO2e, with a payback of 2.2 – 2.3 years.

1 Introduction

Align Property Partners surveyed ESCAPE Family Support Ltd on the 15th February 2024 to obtain information which will be used within this Decarbonisation Report.

1.1 Current Building Layout.

ESCAPE Family Support Ltd is located off South View, in Ashington. The building comprises a single story brick-built building with a Reception, Office Space, Meeting Rooms, WC's and a Kitchen.

The building has an estimated floor area of 340m2.

1.2 Summary of Building Fabric and Usage.

The building is estimated to have been built circa 1980.

The building operates as office space which offers counselling services.

The wall construction of the building consists of red brick walls. There was a cavity present to the external walls, but we were unable to confirm the presence of cavity wall insulation. There was no evidence of post build injection holes, so any insulation would be from the original build.

The building has loose loft insulation laid on top of the suspended ceiling which is presumed to be 200-300mm mineral wool insulation. The building manager advised this was installed in 2014 as part of a refurbishment project.

The windows throughout the building consists of double glazed uPVC windows. The building manager advised these were also installed in 2014 part of a refurbishment project.

The roof is a pitched roof. The roof is tiled and approximately to 30°. It is orientated to the South, South West on the front elevation.

1.3 Good Practice Benchmark

The Chartered Institute of Building Services Engineers – Energy Benchmarking Tool Dashboard 2021 provides a comprehensive guidance on building energy benchmarks.

For an Office building it advises the following;

- Good practice Office using fossil fuels it is 79 kWh/m²
- Good practice Office using electricity it is 33 kWh/m²
- Typical practice Office using fossil fuels it is 151 kWh/m²
- Typical practice Office using electricity it is 54 kWh/m²

Based on the utility data obtained from the building users the annual gas consumption for the building is 6,000 kWh and the annual electricity usage is 9,600 kWh.

Using the CIBSE Energy Benchmarking data for a good practice Office building, the benchmark for fossil fuels is 79 kWh/m² and based upon the approximate floor area of the building is 340m², this would provide an annual total of 26,860 kWh for the heating.

Using the CIBSE Energy Benchmarking data for a good practice Office building, the benchmark for electricity is 33 kWh/m² and based upon the approximate floor area of the building is 340m², this would provide an annual total of 11,220 kWh for the electrical consumption.

As the actual recorded gas consumption and electricity consumption is lower than the benchmark data we will use the recorded data within this report.

2 Existing Mechanical Services Installation

2.1 Heating and Hot Water

The heating and hot water to the building is provided by a wall mounted gas fired condensing combination boiler located within one of the office spaces cupboard. The boiler is an 'Alpha InTec 34C' which has a maximum heat output of 35kW. The building manager advised that the boiler was installed as part of the building refurbishment in 2014. The boiler serves 15no low surface temperature radiators throughout the building.

The CIBSE recommended life expectancy for condensing combination boilers under intermittent operation is 10 years.

2.2 Building Gas Consumption and Carbon Emissions

If we consider the total gas consumption for the heating which was recorded as 6,000kWh.

The fuel CO2 emission rates associated with natural gas are taken from the UK Government Greenhouse gas reporting: conversion factors 2022;

- Natural gas – 0.2 kg CO2/kWh

Considering the annual heating demand, which was recorded at 6,000kWh, this would equate to the following annual carbon emission;

Natural gas – 0.2 kg CO2/kWh x 6,000kWh = 1,200kg/CO2

3 Existing Electrical Services Installation

3.1 Existing Electrical Services Installation.

The main electrical intake and meter for the building is located within the entrance cupboard and is three phase supply rated at 100Amp. The supply serves 1no 24way 125Amp metal clad wall mounted distribution board and 1no 36way 124Amp metal clad wall distribution board which are both located within the office store cupboard.

The buildings lighting is a mixture of fluorescent fittings and LED.

There was no renewable technologies installed.

3.2 Building Electrical Consumption and Carbon Emissions

If we consider the total electrical consumption which was estimated at 9,600 kWh.

The fuel CO2 emission rates associated with electricity are taken from the UK Government Greenhouse gas reporting: conversion factors 2022;

UK Grid Electricity – 0.26155 kg CO2/kWh

The kg CO2 for building would equate to the following annual carbon emission.

Electricity = 9,600kWh x 0.26155 kg CO2/kWh = **2,511 kg/CO2e**

4 Existing Building Fabric Construction

4.1 Existing Building Fabric Construction.

Building energy efficiency is an important consideration in any retrofit low carbon project as part of the 'fabric first' principal. Where possible appropriate measures should be implemented prior to the installation of renewable heating plant. Energy efficiency measures to reduce heat demand led to lower heating costs and CO2 emissions for a given technology and in addition can provide other benefits such as improving occupier comfort levels.

For retrofit heating projects, a reduction in heat demand will require smaller capacity heating plant, with associated lower capital costs.

The building has loose loft insulation laid on top of the suspended ceiling which is presumed to be 200-300mm mineral wool insulation. The building manager advised this was installed in 2014 as part of a refurbishment project. No further action is recommended.

The building appears to be constructed of brick/block (cavity) walls. The cavity wall insulation could not be reviewed without an intrusive survey. An intrusive inspection of the existing cavity leaf would be necessary to determine the actual construction make up. This will help identify if cavity closers and cavity insulation can be improved or introduced. An intrusive wall survey would involve the commissioning of a contractor with access equipment to inspect the external and internal walls. In doing so a building surveyor would use a borescope to inspect, confirm and review the findings. A survey of this sort would cost approximately **£1,000.**

All the windows throughout the building are double glazed uPVC units which were installed as part of the building refurbishment works in 2014. We recommend no further action as the existing window U-values would comply with current Part L building regulations for refurbishment to existing buildings.

The roof is a pitched roof. The roof is tiled and approximately to 30°. The roof is orientated to the East on the right elevation and orientated to the West on the left elevation. The right elevation is part shaded by a neighbouring property.

5 Carbon Reduction Technologies

5.1 Introduction

The energy efficient technologies to be considered for the building are;

1) Gas Fired Condensing Boiler
2) Air Source Heat Pump
3) Photovoltaics

5.2 Gas Fired Condensing Boiler

Building Heating

In this section of the report we will consider replacing the buildings current boiler plant with new like for like gas fired condensing plant.

The heating and hot water to the building is provided by a wall mounted gas fired condensing combination boiler located with an office space cupboard. The boiler is an 'Alpha InTec 34C' which has a maximum heat output of 35kW. The building manager advised that the boiler was installed as part of the building refurbishment in 2014. The CIBSE recommended life expectancy for condensing combination boilers under intermittent operation is 10 years.

The seasonal efficiency of the existing combination boiler is approximately 89%.

Replacing the combination boiler will see an increase in boiler efficiency up to 97%.

This represents an approx. energy saving of 8%. However, in reality the boilers will not always be in condensing mode and a more realistic saving would be 5%.

It is proposed that the existing boiler plant is replaced with 1no new 35kW like for like condensing combination boiler. The existing flow and return heating pipework shall be adapted to connect up to the new boiler.

Building Hot Water

The Kitchen area and the Disabled WC's hot water is provided by the combination boiler. The Male WC and Female WC's hot water is provided by localised electric point of use water heaters.

The proposal is to retain the existing point of use water heaters.

5.2.1 Total Works Cost

Parameters	Budget Cost (£)
New Gas Fired Condensing Boiler	
Supply, delivery and commissioning of wall mounted condensing boiler.	2,000.00
Condensing boiler installation including primary pipework adaptations.	2,000.00
Total Budget CAPEX	**£4,000.00**
The costs above are budget costs only and not a works quotation. The costs given do not include professional fees, preliminaries or inflation.	

The Capital Expenditure (CAPEX) table highlighted above indicated the funds required to upgrade the heating system to a new gas condensing boiler.

5.2.2 Gas Fired Condensing Boiler Running Costs

The estimated annual running cost for the exisiting gas condensing boilers = 6,000kWh x 7.42p/kWh gas = £452.00

If a new like for like gas fired condensing combination boiler was installed then an approximate annual 5% saving on the existing gas usage costs should be seen. This would represent approx. £22.26 annually.

5.3 Air Source Heat Pump

In this section of the report we will consider the installation of an ASHP system to replace the existing gas fired combination boiler.

Building Heating

ASHP's will operate at ambient temperatures of -20°C to +40°C. When operating at low external temperatures the efficiency in terms of Coefficient of Performance (COP) will reduce compared to times in spring and autumn when the outside temperature is much higher.

Typically, heat pumps are best suited for use with low temperature (low-grade) heating systems. This would require the buildings heating to be selected on radiators operating on 45-55°C rather than the traditional gas heating temperatures of 70-80°C.The lower operating temperatures will require larger radiators to compensate for the reduction in temperature. We will include a provision to replace or add extra radiators to the existing circuit to compensate for the reduction in temperature.

The proposed air source heating solution will comprise 1no 33kW ASHP unit subject to heating load design and calculations.

We have provisionally identified a location for the ASHP. The unit could be sited down the side of the right elevation of the building.

Building Hot Water

It is proposed that a new 300L direct hot water cylinder is installed to serve the Kitchen and Disabled WC's. The cylinder shall have 4 x 3kW (12kW) immersion heaters and a recovery rate of approximately 73 minutes subject to heating load design and calculations.

The existing localised electric point of use heaters serving the Male and Female WC's shall be retained.

There appears to be enough spare load and capacity on the existing building supply, however, it is advised that an electrical data logger is installed to record the building usage across all three phases. The electrical data logger results will determine the sites maximum electrical loads and spare capacity.

5.3.1 Total Works Cost

Parameters	Budget Cost (£)
New ASHP Heating	
Supply, delivery and commissioning of 1no ASHP unit.	22,000.00
ASHP Installation incl. thermal store, pipework, pumps, valves etc.	10,000.00
New Radiators	11,250.00
External compound	5,000.00
New Electric Direct Hot Water Cylinder	
Supply, delivery and commissioning of 1no electric direct hot water cylinder.	2,500.00
Installation and commissioning of hot water cylinder.	2,000.00
Total Budget CAPEX	**£52,750.00**
The costs above are budget costs only and not a works quotation. The costs given do not include professional fees, preliminaries or inflation.	

The Capital Expenditure (CAPEX) table highlighted above indicated the funds required to upgrade the heating system to a low carbon technology.

5.3.2 ASHP Running Costs

Based upon the heat pump efficiency/Coefficient of Performance (COP) at an estimated value of 300% (at 55°C) we can predict the annual running cost against the existing installation. The annual estimated heating and hot water consumption is 6,000kWh However, as the new ASHP is expected to only provide energy for the heating we assume a conversion factor of 0.8 (80%).

The estimated electrical heating demand is 6,000kWh x 0.8 = 4,800kWh

With the ASHP efficiency of 300% applied to this figure the estimated usage is 4,800kWh/3 = 1600kWh.

Estimated annual running cost of ASHP is 1,600kWh x 29.00p/kWh = £464.00

Estimated existing annual running cost of gas heating is 4,800kWh x 7.42/kWh = £356.16

The installation of a new ASHP system will provide an estimated annual running cost increase of £107.84.

The pay pack period for the ASHP system is significantly high due to the current electrical tariff of 29.00p/kWh compared to the current cost of gas of 7.42p/kWh.

6. Photovoltaics.

In this section we will consider the installation of a photovoltaics. The client has investigated the options to install Solar PV onto both the East and West roof elevations and has two quotations with and without battery storage.

The first quotation is from Glow Green (Ref GG-273812-6 dated 31st August 2023) with 40no 395W JA Solar PV panels to give 15.8kWp system. The system will generate 11,076kWh at an installation cost of £21,104.26.

A separate quotation has been provided by Glow Green (Ref GG-273812-7 dated 31st August 2023) to include battery storage. The system will generate 11,076kWh with an additional 13.5kWp battery storage at an installation cost of £31,022.74

Notification must be given to the Distribution Network Operator (DNO) on all Solar PV installations

If Engineering Recommendation G99 applies to the installation and the size of the installation is greater than 16 amps per phase, then prior permission to connect will need to be granted.

The proposed system will require a G99 application, and the cost of the application will need to be incorporated.

The Micro Generation Certificate Scheme (MCS) creates and maintains industry standards for certification of products, installers and installations of Solar PV (and other technologies). They have further guidance and a list of MCS accredited installers on their website https://mcscertified.com/.

Further guidance on planning requirements is available on this website.
https://www.planningportal.co.uk/permission/common-projects/solar-panels/planning -permission/.

The Smart Export Guarantee (SEG) is the successor to the legacy Feed-in Tariff (FiT) scheme, which closed to new customers in April 2019. The scheme applies to businesses and homeowners who are installing new renewable energy systems allowing them to be compensated for any excess electricity exported back to the grid. Under the scheme, each energy supplier will set the price they are prepared to pay for excess electricity. The legislation does not stipulate how much the tariff should be, only that it should be above zero. It will be down to individual energy suppliers to set the price.

As of 24 September 2023, Octopus Energy were offering 15p per kWh for exporting, through to EDF energy offering 3p per kWh. We have used British Gas rate of 6.4p per kWh.

6.2 Payback Without Battery Storage

The potential PV generation is approximately 115% of the total estimated annual usage, and the likely electrical generation will be used in the building and some exported.

We will assume 80% of the Solar PV will be used in the building and 20% will be exported to SEG generation meter at a cost of 6.4 per kWh.

	Proposed PV System (without battery storage)
Total Capital Cost	£21,104.26
Building Annual Usage	9,600kWh
Solar Generation	11,076kWh

Solar used	8,860.80kWh
Purchased from the Grid	739.2kWh
Energy Exported (SEG)	2,215.20kWh
Electricity Bill Saving (annual)	£2,569.63 based on 29p per kWh
Export Payments (SEG)	£2,215.20 based on SEG rate of 6.4p
Total Financial Benefit	£2,711.40

Total financial benefit per annum = **£2,711.40**

Therefore payback = install cost/saving per year = **7.78 years**

6.3 Payback With Battery Storage

For the battery storage 100% of the Solar PV will be used in the building and 0% will be exported.

	Proposed PV System (with battery storage)
Total Capital Cost	£31,022.74
Building Annual Usage	9,600kWh
Solar Generation	11,076kWh
Solar used	8,860.80kWh
Purchased from the Grid	1,476kWh
Energy Exported (SEG)	0kWh
Electricity Bill Saving (annual)	£3,212.04 based on 29p per kWh
Export Payments (SEG)	£0 based on SEG rate of 6.4p
Total Financial Benefit	£3,212.04

Total financial benefit per annum = **£3,212.04**

Therefore payback = install cost/saving per year = **9.66 years**

7 LED lighting

During our survey we estimated that there are approximately 39no internal lights that could be replaced with LED equivalent light fittings or lamps. The building has already started replacing lighting fittings and lamps to LED in the past 5 years.

From the first of September 2023, T5 and T8 fluorescent tubes are being phased out altogether; this doesn't mean you can't find them in the shops but that they are no longer being made.

Good quality LED lights consume less energy than equivalent conventional types such as fluorescent or tungsten and have a longer lifetime, some with a 5year warranties. However, there are many low-cost values engineered LED products on the market which should be avoided since they tend to fail prematurely based on the quality of the components, which can quickly wipe any savings made.

The European Union has funded the development of guidelines for specifying lighting projects. It is recommended that this advice is followed wherever possible. Another issue to be aware of is flickers. Some cheaper light fittings flicker at a frequency which is not obvious to the human eye, but research is emerging that it can cause adverse health effects. It is recommended that lighting products should comply with IEEE1789. Further guidance on lighting specifications is available here;
https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b6d1bf85&appId=PPGMS

The existing fluorescent fittings and lamps are:

Floor	Type	No of fittings	No lamps	Wattage	Total power (w)
Reception	Linear Fittings	2	2	18	72
Office 1	Linear Fittings	4	4	18	288
Kitchen	Linear Fittings	6	2	30	360
Meeting Room	Linear Fittings	4	4	18	288
Office 2	Linear Fittings	1	4	18	72
Office 3	Linear Fittings	2	2	18	72
Office 4	Linear Fittings	2	2	18	72
Office 5	Linear Fittings	4	4	18	288
Main Hall	Linear Fittings	12	4	18	864
Male WC	Linear Fittings	1	4	18	72
Female WC	Linear Fittings	1	4	18	72
					2520

This gives a total of 39no fittings with a total energy of 2520Watts.

Based on working hours for the internal lights of 8hour days, 7 days per week for 52weeks of the year, operating 80% gives 2,330 hours per year.

The total for the fluorescent, halogen, tungsten lights over a course of a year would be 5,871 kWh.

Based on the cost for electricity of 29.00p/kWh this give a cost per annuum of £1,702.59 pa.

Replacing the lights or lamps on a like for like basis and using the same hours of use the total energy for the LED equivalent is 3,914 kWh at a running cost of £1,135.06 per annuum, a saving of £567.53

7.1 Payback

With an average cost of £30 per fitting or lamp, the capital cost for the lighting replacement would be £1,287.00 The payback period for the new LED lights or lamps would be approx. 2.3 years in terms of energy savings.

If we add the replacement cost for the lamps (phasing out) and the time (labour) replace the lamps of £4 per lamp and £2 for labour for approx. 33% of the lamps per year give a cost of £78 per year.

The payback period including replacement costs, reduces the period to 2.2 years.

7 Carbon Savings

The fuel CO2 emission rates associated with the above heating technologies and electricity are taken from the UK Government GHG document and the Conversion Factors are:

Natural gas – 0.2 kg CO2/kWh

Electricity – 0.26155 kg CO2/kWh

7.1 Estimated Energy Savings

Gas Fired Condensing Boiler

The annual estimated heating and hot water consumption for the building is 6,000kWh.

- Existing gas fired condensing boiler – 0.2 kg CO2/kWh x 6,000 kWh = **1,200 kg/CO2e**

If new like for like gas fired condensing combination boiler was installed this would this provide the following carbon emissions;

- New gas fired condensing combination boiler – 0.2 kg CO2/kWh x 5,700 kWh = **1,140 kg/CO2e**

The estimated annual CO2 saving of **60 kg/CO2e**

ASHP System

From the annual gas consumption data we have estimated the buildings annual heating consumption (excluding the hot water). The estimated fossil fuel consumption is 4,800 kWh.

The following carbon emission associated with each installation are as follows:

- Natural Gas – 0.2kg CO2/kWh x 4,800 kWh = **960kg/CO_2**
- Heat Pumps – 0.26155 x (4,800/3) (SCOP) = **419kg/CO_2**

The estimated annual CO2 savings for an ASHP system is **541kg/CO_2**

PV Solar Generation

The CO2 emission rates for electricity consumed from the grid is 0.26155 kg / CO2/kWh.

The estimated annual generation of the PV system is 11,076kWh.

Therefore, the carbon saving would be as follows;

- PV system proposal – 0.26155 x 14,810kWh = **2,897 kg/CO2e**

LED lighting

The estimated annual generation of the existing fluorescent lighting and lamps is

a) Current fluorescent lighting and lamps – 0.26155 Kg C02/kWh x 5,871kWh = **1536kg/CO2e**
b) LED lighting replacement – 0.26155 Kg CO2/kWh x 3,914kWh = **1024kg/CO2e**

Replacing the remaining fluorescent lighting and lamps to LED would provide a carbon saving of:

LED system carbon saving = **512kg/CO2e**

8 Recommendations

Following our site survey and analysis of the current energy bills and the options available, we have the below recommendations.

Recommendation	Payback Period (Years)	Budget Cost (£)	Potential CO2e Reduction Per Annum
Gas Fired Condensing Boiler	N/A	4,000.00	Approx. 0.060 Tonnes /CO2e/annum
ASHP Heating	N/A	48,250.00	Approx. 0.541 Tonnes /CO2e/annum
Electric Direct Hot Water Cylinder	N/A	4,500.00	N/A
Solar PV without battery	7.78	21,104.26	Approx. 2.897 Tonnes /CO2e/annum
Solar PV with battery	9.66	31,022.74	Approx. 2.897 Tonnes /CO2e/annum
LED Lighting	2.2 – 2.3	1,287.00	Approx. 0.512 Tonnes /CO2e/annum
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Energy efficiency improvements and energy generation technologies may be eligible for a grant contribution from BEST, and further information and guidance can be provided

The report makes recommendations to help reduce energy and hence CO2 emissions as much as possible by taking a holistic approach. All options reviewed would contribute to the building owners and occupant's commitment to carbon reduction and/or improve comfort condition within the building.

The building manager advised that the building was refurbished in 2014 which included installation of new loose roof insulation and new double glazed UPVC windows, no further fabric improvements are recommended.

If the existing combination boiler was replaced with a new like for like gas fired condensing combination boiler, a small carbon and running cost saving will be gained due to the increased efficiency of modern boilers.

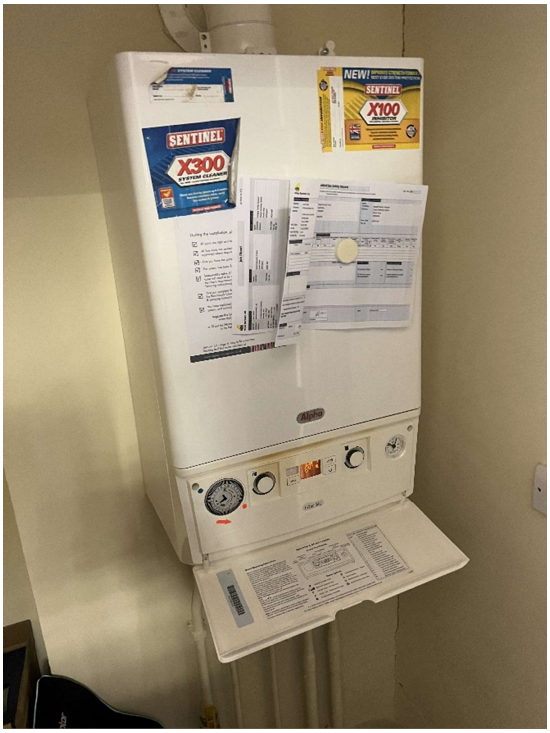
If the ASHP installation is considered, this would demonstrate a carbon saving of approx. 0.541 tonnes per annum but will require additions or modifications to the existing radiator circuit to efficiently heat the building. However, there will be an increase in running cost due to the difference in cost between electricity and gas.

It is possible to install a solar PV array onto the East and West parts of the roof (subject to a structural review). The PV array (without battery storage) could provide 11,076kWh, towards the building's electrical usage. This would provide a saving of approx. £2,711.40 per year with payback in 7.78 years. The PV

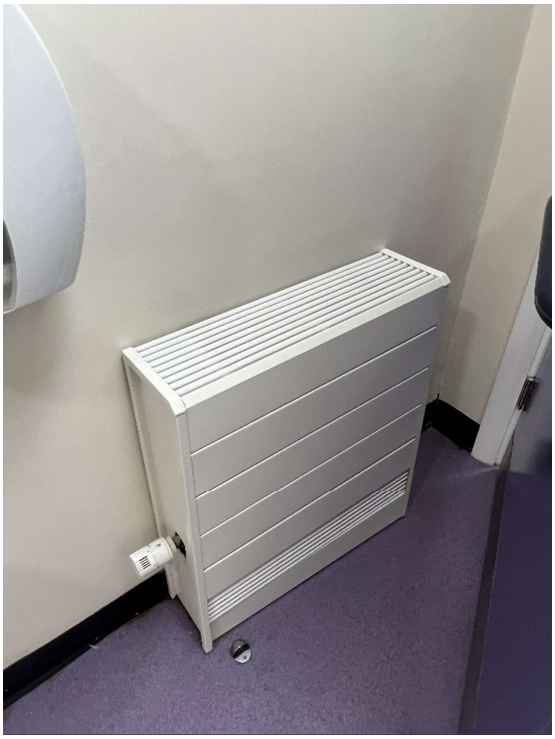
array (with battery storage) could provide 11,076kWh towards the building's electrical usage. This would provide a saving of approx. £3,212.04 per year with payback in 9.66 years.

Continuing with the light and lamp replacement to the building will cost an estimated £1,287.00 with carbon savings of 215kg/CO2e, with a payback of 2.2 – 2.3 years.

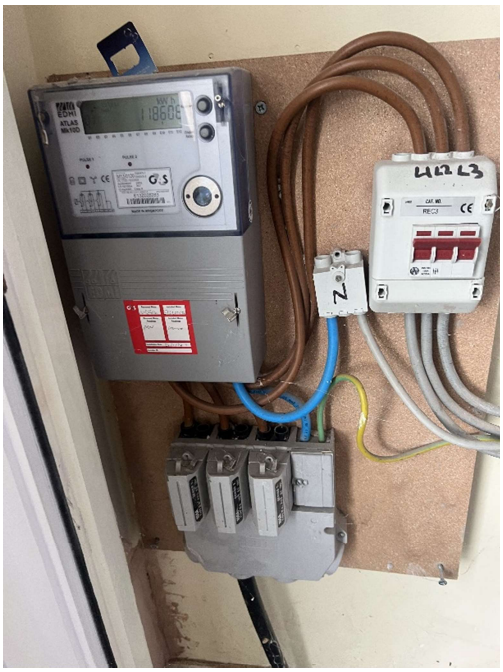
9 Photographs



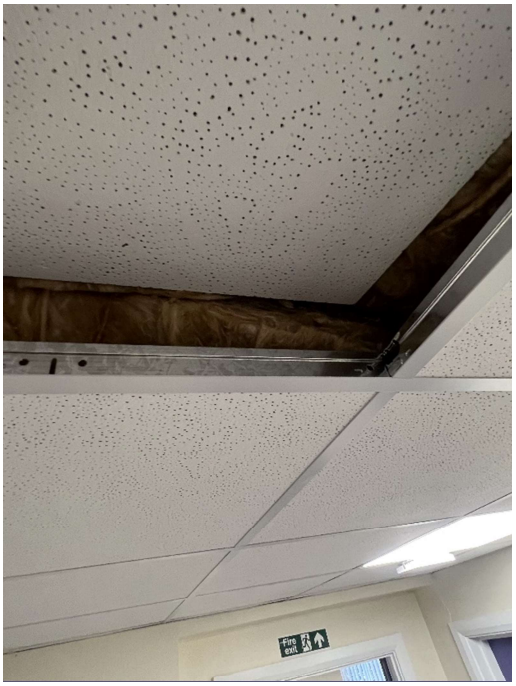
Photograph One – Gas Fired Condensing Combination Boiler



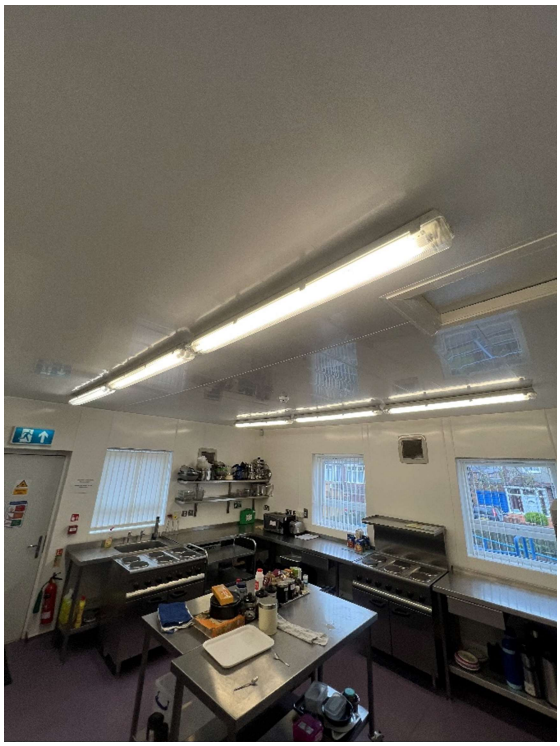
Photograph Two – Low Surface Temperature Radiator



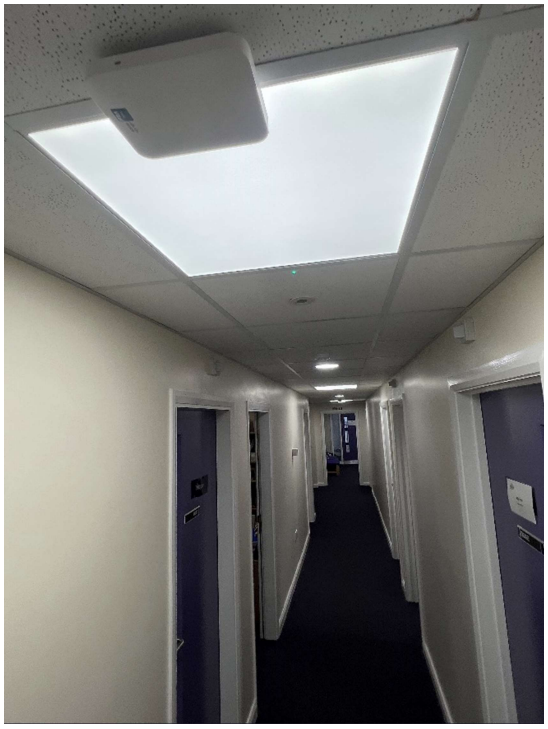
Photograph Three – Electrical Supply and Meter



Photograph Four – Roof Insulation



Photograph Five – Fluorescent Light Fittings



Photograph Six – LED Light Fittings