Free and impartial advice on
making your business greener

BUSINESS ENERGY SCOTLAND

Energy efficiency assessment

Prepared for:

Wick Community Hub

energy saving trust

Net Zero Scotland
Scottish Government

LET'S DO NET ZERO

Contents

1 Customer and advisor details

Customer details	
Contact name	Julie MacKinnon
Contact job title	Manager
Telephone/mobile	01955 603174
Email	wickyouthclub@hotmail.co.uk
Consultant details	
Consultant name	Jason Leon
Company	On Site Generation Ltd
Advisor details	
Advisor name	Ryan Felber
Telephone/mobile	07818 557897
Email	ryan.felber@businessenergyscotland.org
Service	Business Energy Scotland
Assessment details	
Assessment date	30th January 2024
Report approved by	Eva Rainey
Date approved	26th February 2024

Business Energy Scotland provides free support to help Scottish small and medium sized-enterprises (SMEs) save energy and reduce their carbon emissions. We identify savings opportunities and can also support the implementation of the opportunities identified. This can include helping to identify suppliers, design and assess the results of quote or tender specifications and identify and secure funding.

Obtaining our support on a particular project does not exclude you from obtaining further support.

2 Introduction

Wick Community Hub, run a busy youth club and community facility at premises in Lower Dunbar Street in Wick.

The Hub building is single storey and thought to be of cavity block construction, built in 1947 and refurbished in 1976. The main area is about 240 m^2 and is made up of lounges and meeting spaces, a café bar, kitchen and toilets. This area is heated by a 5 year old gas condensing boiler that also provides hot water. The gas boiler supplies radiators, with a programmer and thermostatic radiator valves control heating.

The northern part of the building comprises an unheated sports hall of approximately 250 m^2 in area with 4m high ceiling.

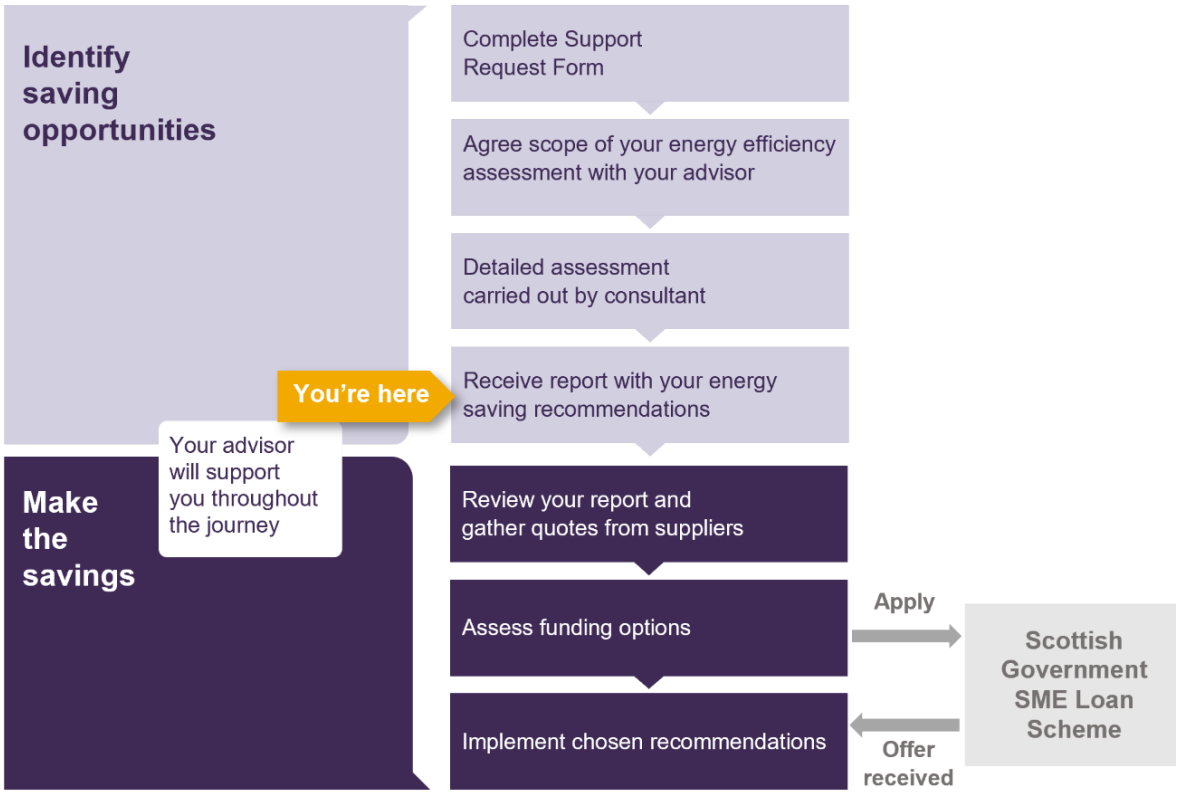
The roof of both parts of the building is made up of trapezoidal metal sheets and in poor condition and in need of replacement. Insulation levels are thought to be low in the roof and there is through to be no insulation in the walls and floors.

Glazing in the main area is part single and part older double glazing that is in poor condition. Double glazing in the sports hall is in better condition.

The organisation are looking into how they can refurbish the building and make it more energy efficiency and cheaper to run.

Business Energy Scotland support has involved a telephone audit with Julie MacKinnon (Manager) and Bryan Dods (Project officer) and review of information and energy billing details provided.

The diagram below highlights where you currently are on your journey with us and what the next steps are:



The assessment recommends that Wick Community Hub, insulate the walls and roof of the both the main building and the sports hall. We also recommend that windows in the main building are replaced with high efficiency double glazed units and all lighting is modernised to LED lights.

The currently unheated sports hall could be heated in a number of ways. We recommend that gas radiant heating is considered if the heating of the space is likely to be intermittent, requiring regular heating from cold. As alternatives, air source heat pump (air to air) heating and gas warm air heating is also considered as options.

The assessment also recommends that the organisation considers installing solar PV to supply renewable electricity into the building.

Recommended and alternative opportunities are summarised in the table in Section 5 and detailed further in Sections 6 and 7.

Potential savings from recommended opportunities are estimated as £14,391 per year and 12.5 tonnes of CO_2e per year. Savings include an estimate of savings compared to heating the sports hall with electric heating.

Financial support for installing eligible energy efficiency and/or renewable energy equipment in Scotland is available through the Scottish Government's SME Loan Scheme. This offers eligible SMEs (including charities) interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

For renewable heat measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £10,000. This cashback grant would be additional to any received for non-renewable energy-saving measures.

This report is regarded as a qualifying report for the SME Loan Scheme.

3 Your journey to net zero carbon emissions

Scotland has committed to becoming a net-zero society by 2045 which is in line with the advice from the UK Government's independent advisors, the Climate Change Committee.

To help you understand how your enterprise can support that transition, we have identified that your site has the following carbon emissions (CO_2e[1]) and we have identified how you can reduce them to support Scotland's net-zero goals:

Annual carbon impact		Equivalent average car miles
Current carbon emissions (tonnes CO_2e)	17.36	61,429
Potential carbon reduction	**72%**	**44,101**

Note that the total realised carbon saving may be less if all the recommendations from this report are implemented as the potential savings from each recommendation are calculated in isolation from each other. In reality, some measures may affect the potential carbon savings of other measures.

Please note that this analysis does not constitute a full carbon footprint.

[1] CO_2e means 'carbon dioxide equivalent'. It is a standard way of presenting the impact considering all associated greenhouse gas emissions.

4 Current energy consumption at your site

Estimated current annual energy use				
Resource	**Cost**	**Consumption**	**Units**	**CO_2e emissions (Tonnes)**
Natural Gas	£9,130	73,163	kWh	15.57
Electricity	£2,466	7,968	kWh	1.79
TOTAL	**£11,596**			**17.36**

Note:

- The costs in this table include standing charges and other costs including, where relevant, charges such as the Climate Change Levy.
- When calculating the potential savings of opportunities, unit costs which exclude standing charges have been used to calculate these as reducing consumption will often not reduce the standing charges.
- While there is volatility in current energy prices, Wick Community Hub requested that a unit rate of 27.26 p/kWh is used for electricity and 11.172 p/kWh for mains gas as they are the current contract prices and accurately reflect the cost of energy to the organisation and evidenced in the billing information provided.
- The organisation is currently paying for two, three phase electricity supplies to the building and should review / rationalise the supply arrangements.

The CO_2e emissions detailed above are not equivalent to a carbon footprint for the site.

- It may be beneficial to you to renegotiate your energy contracts if you are going to significantly change your consumption. It is also good practice to regularly review your energy tariffs to ensure they meet your requirements. By changing your tariff or supplier you may be able to decrease your energy costs. Contacting your current supplier to check you are on the most appropriate tariff can be a good place to start. We can also direct you to organisations that provide energy switching advice.

5 Our recommendations

Recommended opportunities								
	Finance estimates						Annual environmental saving estimates	
	Annual cost savings	Annual income generated	Investment required	Payback	Potential grant	Payback with grant	Energy	CO_2e
Description	**£ (ex VAT)**	**£ (ex VAT)**	**£ (ex VAT)**	**Years**	**£**	**Years**	**kWh**	**tonnes**
Cavity wall insulation (Main building)	£742	£0	£3,000	4.0	£2,250	1.0	6,645	1.4
Roof insulation (Main building)	£1,407	£0	£20,000	14.2	£15,000	3.6	12,594	2.7
Double glazing (Main building)	£615	£0	£10,000	16.3	£7,500	4.1	5,506	1.2
Cavity wall insulation (Sports hall)	£2,619	£0	£5,000	1.9	£3,750	0.5	9,609	2.2
Roof insulation (Sports hall)	£3,205	£0	£20,000	6.2	£15,000	1.6	11,758	2.6
Lighting systems, fitting and controls	£438	£0	£1,000	2.3	£750	0.6	1,607	0.4
Radiant heating units	£4,314	£0	£8,000	1.9	£0	1.9	4,006	1.1
Solar PV	£1,051	£193	£12,000	9.6	£0	9.6	3,855	0.8
TOTAL	**£14,391**	**£193**	**£79,000**				**55,580**	**12.5**
Alternative opportunities								
Air source heat pump	£4,368	£0	£12,000	2.7	£9,000	0.7	16,023	3.6
Warm-air units	£3,568	£0	£7,000	2.0	£0	2.0	-2,671	0.3

Please note that implementing multiple measures may impact on each other and this may result in the realised savings being less than is presented in this report. Unless otherwise stated, the identified savings presented in this report for each measure are calculated independently from other measures. If required, further support can be provided by Business Energy Scotland to quantify the impact of implementing multiple measures where they impact on each other.

Your Business Energy Advisor can support you to implement the recommendations we have suggested in this report.

Where appropriate, our finance estimates include a cashback grant from the Scottish Government's SME Loan Scheme. Please see Appendix 3 for further details on the SME Loan Scheme and cashback grant, including eligibility criteria.

6 Recommended energy efficiency opportunities

6.1 Cavity wall insulation (Main building)

6.1.1 Project description and recommended solution

The Wick Community Hub main building is thought to have been built in the 1940's and refurbished / rebuilt in 1976 and is thought have uninsulated cavity block external walls, that may be suitable for cavity wall insulation.

It is often relatively straightforward to improve the thermal performance of cavity walls as insulation can be pumped into the cavity, requiring no changes to the internal decoration or major works to the external surface of the wall.

The standard method of installing cavity fill is to drill 22mm holes in the outside of the building at approximately 1.5m centres and pump insulation material, either granules, foam, beads or fibre into the cavity from the base of the wall, upwards. The fill holes are then closed with mortar and painted to match the rest of the wall.[2]

Vents and other conduits through the cavity are sleeved prior to filling.

Suitability of the building for cavity wall insulation, should be determined by an accredited cavity wall insulation installer, based on the size and condition of the cavity, integrity of the walls and the exposure of the building.

6.1.2 Benefits, costs and finance

Adding cavity wall insulation would significantly improve the heat retention of the building by reducing heat lost through the walls.

A basic heat loss estimation has been carried out to provide an estimate of the potential savings from installing fabric insulation improvements to the building.

Assuming the current level of heating to 20^{o}C it is estimated that cavity wall insulation may improve the U value of the walls from around 1.4 to 0.45 W/m^{2}K and potentially save in the region of an estimated 9.5% of the buildings heating, saving an estimated 6,645 kWh per year, equating to a gas cost saving of approximately £742 per year and an estimated 1.4 tonnes CO2e per year. Please note that this heating cost saving assumes that all heating is provided by the gas heating system only, and that there is no additional heating provided by electric heaters.

A cost quotation should be sought from qualified cavity wall insulation installers.

The installation cost may be expected to be in the region of £3,000, providing a simple return on the investment of 4.0 years.

Please see Appendix 1 for calculations and assumptions made.

[2] CTL 176 How to implement cavity wall insulation

Financial support for installing eligible energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme. This offers eligible SMEs, (including charities), interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

Assuming the saving estimated above, and a cash back of 75%, the simple return on the investment for this measure would be reduced to 1.0 year.

This report is regarded as a qualifying report for the SME Loan scheme if required.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan and cashback grant.

6.1.3 Risks and further considerations

The options to insulate the walls either externally, or internally were discussed and neither method was considered a preferred option.

The installation of cavity wall insulation takes place externally and should cause minimal disruption to the running of the Hub.

A specialist cavity wall insulation contractor should be contacted to confirm that the walls are suitable and to provide and installation cost quotation. Installers should be approved, or recognised with a recognised association, bound by a code of practise and offer a 25 year CIGA guarantee.

6.2 Roof insulation (Main building)

6.2.1 Project description and recommended solution

Improving insulation levels of the building fabric saves energy and increases comfort.

The Hub's roofs are profile steel panels, and in poor condition, with limited insulation if any, providing any insulation from the outside air.

The organisation is considering replacing the roof with new insulated trapezoidal roof panels. Insulated panels incorporate a phenolic foam insulation core between an external roof surface covering and an internal ceiling sheet.

The insulation core thickness can be selected from between 40mm and 150mm insulation, providing U values of between 0.47 and 0.12 W/m^{2}K.

The total roof area extends over approximately 240 m^2.

6.2.2 Benefits, costs and finance

Based on a basic heat loss assessment for the roof of the building (see Appendix 1 for calculations), we estimate that installing a new trapezoidal sheet, insulated roof with an 80mm insulation layer and a U value of 0.23 W/m^{2}K we estimate that a potential energy saving of 12,594 kWh per year might be achieved, equating to a 18.1% saving.

If this saving was made through a reduction in gas consumption in the boiler an annual energy bill saving of approximately £1,407 per year can be estimated.

Roof insulation would also save an estimated 12.2 tonnes of CO_2e per year.

Assuming that replacing the roof with an insulated composite roof may cost in the region of £80 per m^2 and assuming the roof area to be insulated is approximately 240 m^2, a re-roofing and insulating cost in the region of £20,000 can be expected.

Assuming estimated savings in the region of £1,407 per year, a simple return on the investment of 14.2 years may be achieved.

See Appendix 1 for calculations.

Financial support for installing eligible energy efficiency and/or renewable energy equipment in Scotland is available through the Scottish Government's SME Loan Scheme. This offers eligible SMEs (including charities) interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

Assuming the saving estimated above, and a cash back of 75%, the simple return on the investment for this measure would be reduced to 3.6 years.

This report is regarded as a qualifying report for the SME Loan Scheme.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan Scheme and cashback grant.

6.2.3 Risks and further considerations

Assuming the insulation is professionally installed to current standards, there are no perceived risks associated with this recommendation.

6.3 Double glazing

6.3.1 Project description and recommended solution

Wick Community Hub are considering replacing the current single glazed windows and aging double glazed windows with new energy efficient double glazed windows.

Replacing the existing windows will improve their heat retaining properties and reduce draughts, improving comfort for customers and reducing heating bills. Windows in the sports hall are double glazed and look to be in reasonable condition.

6.3.2 Benefits, costs and finance

We estimate that replacing the poor quality windows in the main building with new double glazed units may save in the region of 8% of the current heating costs.

We estimate that new double glazed windows may save in the region of 5,506 kWh per year, and £615 per year in gas heating costs at current rates, and save an estimated 1.2 tonnes CO_2e per year.

Assuming a cost of approximately £10,000 to supply and install the new windows, a simple return of 16.3 years would be expected.

Please see Appendix 1 for calculations and assumptions made.

Financial support for installing energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme[1]. This offers eligible SMEs, (including charities), interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

Assuming the saving estimated above, and a cash back of 75%, reducing the cost to £2,500, the simple return on the investment for this measure would be reduced to 4.1 years.

This report is regarded as a qualifying report for the SME Loan Scheme.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan Scheme and cashback grant.

6.3.3 Risks and further considerations

New energy efficient double-glazed windows will improve the energy efficiency of the buildings and as long as fitted to current standards, pose no significant risk.

Adding curtains or shutters and encouraging users to close them at night, can also help reduce heat loss and draughts from windows.

Secondary glazing could be considered as an alternative to installing new windows. Energy efficiency improvements are likely to be less with secondary glazing, but cost would also be reduced.

6.4 Cavity wall insulation (Sports hall)

6.4.1 Project description and recommended solution

The Wick Community Hub sports hall is thought to have been built in the 1940’s and refurbished / rebuilt in 1976 and is thought have uninsulated cavity block external walls, that may be suitable for cavity wall insulation.

It is often relatively straightforward to improve the thermal performance of cavity walls as insulation can be pumped into the cavity, requiring no changes to the internal decoration or major works to the external surface of the wall.

Suitability of the building for cavity wall insulation, should be determined by an accredited cavity wall insulation installer, based on the size and condition of the cavity, integrity of the walls and the exposure of the building.

6.4.2 Benefits, costs and finance

Adding cavity wall insulation would significantly improve the heat retention of the building by reducing heat lost through the walls.

A basic heat loss estimation has been carried out to provide an estimate of the potential savings from installing fabric insulation improvements to the building.

The sports hall is not currently heated. If we assume full time heating to 18^{o}C for and estimate that cavity wall insulation may improve the U value of the walls from around 1.4 to 0.45 W/m^{2}K. Insulating the cavity walls may reduce heat loss by an estimated 12 % and potentially save approximately this amount of the potential heating of the hall.

If we assume full time electric heating and a 12% saving, cavity wall insulation can be estimated to potentially save an estimated 9,609 kWh per year, equating to an electric heating cost saving of approximately £2,619 per year and an estimated 2.2 tonnes CO2e per year.

An installation cost quotation should be sought from qualified cavity wall insulation installers.

The installation cost may be expected to be in the region of £5,000, providing a simple return on the investment of 1.9 years.

Please see Appendix 1 for calculations and assumptions made.

Financial support for installing eligible energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme. This offers eligible SMEs, (including charities), interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

Assuming the saving estimated above, and a cash back of 75%, the simple return on the investment for this measure would be reduced to 0.5 years.

This report is regarded as a qualifying report for the SME Loan scheme if required.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan and cashback grant.

6.4.3 Risks and further considerations

The options to insulate the walls either externally, or internally were discussed and neither method was considered a preferred option.

The installation of cavity wall insulation takes place externally and should cause minimal disruption to the running of the Hub.

A specialist cavity wall insulation contractor should be contacted to confirm that the walls are suitable and to provide and installation cost quotation. Installers should be approved, or recognised with a recognised association, bound by a code of practise and offer a 25 year CIGA guarantee.

6.5 Roof insulation (Sports hall)

6.5.1 Project description and recommended solution

Improving insulation levels of the building fabric saves energy and increases comfort.

The Hub's roofs are profile steel panels, and in poor condition, with limited insulation if any, providing any insulation from the outside air.

The organisation is considering replacing the sports hall roof with new insulated trapezoidal roof panels. Insulated panels incorporate a phenolic foam insulation core between an external roof surface covering and an internal ceiling sheet.

The insulation core thickness can be selected from between 40mm and 150mm insulation, providing U values of between 0.47 and 0.12 W/m^2K.

The total roof area extends over approximately 250 m^2.

6.5.2 Benefits, costs and finance

The sports hall is not currently heated. If we assume full time heating to 18^{o}C and estimate full time heating demand based on a basic heat loss assessment for the roof of the building (see Appendix 1 for calculations), we estimate that installing a new trapezoidal sheet, insulated roof with an 80mm insulation layer and a U value of 0.23 W/m2K we can calculate a potential energy saving of 11,758 kWh per year, equating to a 14.7% saving.

If this saving was made through a reduction in electric heating, an annual energy bill saving of approximately £3,205 per year can be estimated.

Roof insulation would also save an estimated 2.6 tonnes of CO_2e per year.

Assuming that replacing the roof with an insulated composite roof may cost in the region of £80 per m^2 and assuming the roof area to be insulated is approximately 250 m^2, a re-roofing and insulating cost in the region of £20,000 can be expected.

Assuming estimated savings in the region of £3,205 per year, a simple return on the investment of 6.2 years may be achieved.

See Appendix 1 for calculations.

Financial support for installing eligible energy efficiency and/or renewable energy equipment in Scotland is available through the Scottish Government's SME Loan Scheme. This offers eligible SMEs (including charities) interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

Assuming the saving estimated above, and a cash back of 75%, the simple return on the investment for this measure would be reduced to 1.6 years.

This report is regarded as a qualifying report for the SME Loan Scheme.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan Scheme and cashback grant.

6.5.3 Risks and further considerations

Assuming the insulation is professionally installed to current standards, there are no perceived risks associated with this recommendation.

6.6 Lighting systems, fitting and controls

6.6.1 Project description and recommended solution

Wick Community Hub is open every day and into the evenings, seven days a week and all year round. Lighting is used throughout the day and we recommended lighting improvements include replace the current fluorescent tube lights in various fittings with new LED light bulbs.

Lighting quotations have not been provided.

LED lights bulbs can reduce electricity consumed by approximately 50%. New lighting should also include investigating the controls of the lighting to ensure areas of the building switch off lighting when not required.

Further lighting improvements could include:

Time controls

Time control systems will switch off lights according to specified timings. This may be beneficial for outdoor lighting control.

Occupancy-linked controls

These systems use some form of presence detection, usually ultrasonic, infrared, microwave or acoustic to control the lighting. They will switch on for a certain length of time when occupants are detected. Occupancy sensors are good for areas where people are only present for short periods of time. This could be useful in corridors, changing rooms and toilets.

Daylight-linked controls

Daylight-linked controls can be used with both time and occupancy controls as an override dependent on available natural light. This type of control is based on photocell controls and can be used to switch off or dim lights when daylight is adequate which may be suitable for areas that receive good daylight levels and outdoor lighting.

Localised switching or labelled switching

Altering the light switching so certain lights can be easily identified and switched on or dimmed for certain areas is a good low-cost option. This would allow occupants to control the amount of lighting they require for the task being undertaken.

6.6.2 Benefits, costs and finance

It is estimated that around £438 per year could be saved by installing new LED lighting in the building. This will save approximately 1,600 kWh and 0.4 tonnes of CO_2 per year compared to the existing lighting. Assuming a replacement cost of £1,000 (not quoted) lighting improvements would provide a payback of around 2.3 years (before cashback grant).

Please see Appendix 1 for calculations.

Financial support for installing eligible energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme. This offers eligible SMEs, (including charities), interest-free loans from £1,000 to £100,000 for individual measures and packages of linked measures that have a payback period of 20 years or less. Loan repayments are made over an 8-year period.

For eligible non-renewable energy efficiency measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £20,000.

A 75%, £750 cash back, would reduce the overall cost to £250 and the return on the investment to an estimated 0.6 years.

Download the SME Loan application form: https://businessenergyscotland.org/smeloan.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan and cashback grant.

6.6.3 Risks and further considerations

New high efficiency LED lighting will improve the energy efficiency of the buildings and fitted to current standards, pose no risks.

6.7 Radiant heating (Sports hall)

6.7.1 Project description and recommended solution

The sports hall is currently unheated and Wick Community Hub are keen to install an energy efficient heating system that can heat the space quickly when needed and as cheaply as possible.

We recommend that gas radiant heating is considered as it allows heating to heat the fabric of the space and occupants without heating the full volume of air. Correctly designed, radiant heating should be able to provide heating to a comfortable temperature much quicker than other forms of space heating and provide significant savings.

We recommend that specialist suppliers such as Powrmatic[3] are contacted to provide design advice and a list of accredited local installers.

Figure 6.1 Example of suspended gas radiant heater

[3] https://www.powrmatic.co.uk/

6.7.2 Benefits, costs and finance

A basic heat loss calculation has been used to estimate the potential heating demand of the sports hall. The actual heating demand will depend on how the space is used and the weather at the time of use.

If we assume that the sports hall is in its current condition (not improved), and is heated to 18^{o}C for 30% of the time we can estimate a heating demand of around 24,000 kWh per year.

If this heating demand was provided by electric fan heaters for example, we can estimate that it would cost around £6,550 per year to heat.

If this level of heating was provided by gas radiant heaters we might expect savings in the region of 25% due to reduced heating up time. We estimate that gas radiant heaters would cost £2,238 per year to potentially saving around 4,000 kWh of energy and saving approximately £4,314 on space heating, reducing emissions by 1.1 tonnes of CO_2e.

See Appendix 1 for full calculations.

It is expected that supply and installation of new suspended gas radiant heaters might cost in the region of £8,000 and provide a simple return on the investment made of 1.9 years when compared to an electric direct heating alternative.

Financial support for installing energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme[1] which offers SMEs including charities interest-free loans from £1,000 to £100,000 for measures with a payback of 20 years or less. Loan repayments are made over an 8-year period. No grant is offered for gas heating systems.

This report on the cost savings is regarded as a qualifying report for the SME Loan scheme if required.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under European rules and are granted as de minimis aid. An estimate of how much aid this might equate to is provided in appendix 2.

A cost to provide basic electric heaters for the sports hall can be estimated as £2,000.

6.7.3 Risks and further considerations

The level of heating required in the sports hall is not known.

Mains gas radiant heaters are designed to quickly warm large spaces and are a good option for providing heating in the sports hall, assuming intermittent use and the need to heat the space efficiently from cold.

We recommend that Wick Community Hub, visit another similar space with a gas radiant heating system to experience its operation, before going ahead.

New radiant heaters would be controllable on timers and thermostats to allow efficient use.

We recommend that specialist suppliers / installers are contacted to provide design advice and installation quotations.

6.8 Solar PV – example 10 kWp

6.8.1 Project description and recommended solution

The Wick Community Hub is supplied by two separate three phase electricity supplies. Annual electricity consumption is approximately 8,000 kWh per year across both supplies.

The Organisation is interested in looking into installing solar PV on the south-east facing roof of the building.

Solar PV uses semiconducting material, usually silicon cells, to convert solar radiation into electricity. When light shines on the cell it creates an electric field across the layers, causing electricity to flow. Solar panels are linked together in arrays and either securely roof mounted on bespoke fixings, or ground mounted on a ground mount frame.

The main building or sports hall rear roofs are south easterly facing and would be a suitable location for a solar PV array. As the roofs are in poor condition, we recommend that they are replaced before solar PV panels are fitted.

An example 10 kWp solar PV system may be a suitable size to provide a good level of generation into the building. The example solar PV system proposed comprises 24 x JA solar 410W panels.

6.8.2 Benefits, costs and finance

The financial return from a PV system is optimised when the electricity generated is consumed on site, as savings from not having to buy the electricity used.

We recommend that Wick Community Hub look into the options for connecting the solar PV and consider how solar PV connects into the existing electrical set-up and where the generated electricity would be used. It may be worth considering rationalising the electricity supply situation and reducing the number of supplies to the site so that all electricity comes from a single supply and the solar PV can connect into all of the uses.

A 10 kWp system, facing southeast in this location would be expected to generate in the region of 7,700 kWh per year[4].

Assuming connection into the current supply, the import savings, will be worth the full current price of electricity of 27.26 p/kWh.

We conservatively estimate that 50% of the generation may be consumed by the electrical loads on site and the remaining 50% exported to the grid.

Assuming 50% self-consumption by the site uses, electricity savings of 3,855 kWh and bill savings of approximately £1,051 per year can be estimated.

An export payment (Smart Export Guarantee, SEG) of 5 p/kWh should be paid by a SEG supplier, for exported generation recorded on a smart meter.

The SEG is an obligation set by the government for licenced energy suppliers to provide an export tariff which meets certain criteria. Exported energy is paid to the generator by the energy supplier. The SEG is for anyone who has installed certified renewable technology. The SEG rates will differ depending on what rate energy providers give for the SEG, and but the client should be encouraged to achieve the highest SEG rate available.

[4] Estimate from Solar Edge Designer software.

SEG revenue at 50% export may provide an additional revenue of £193 per year.

An installation quotation should be sought from MCS accredited installers.

Assuming an installation cost for a stand-alone solar PV system (with no battery) of £12,000 (ex VAT) and total savings of £1,244 per year as estimated above, the investment in solar PV should have a simple return of around 9.6 years at current electricity supply and SEG rates.

The system would save approximately 0.8 tonnes of CO_2e per year.

Details of the calculations are provided in Appendix 1.

Financial support is not currently available for solar PV installations from the SME Loan scheme.

6.8.3 Risks and further considerations

It should be noted that solar PV is a daytime technology and generates electricity during the day, providing most of the generation in the spring and summer months.

The above assumes that the installation location is unshaded. Power optimisers could be considered to reduce the effect of any shading.

We recommend that good quality panels and inverter(s) and fixings are selected to give the business a robust system that will generate well for 25 years plus.

Panels can be selected to be black framed or all black in colour to minimise visual impact. Panels that are salt corrosion resistant and with product warranties of 10 years and over, as well as 25 year generation guarantees should be selected.

Solar PV requires very little maintenance and should last for over 25 years with no more than a 20% fall in generation over that time. The inverter may need replacing within this period. 20 year plus inverter warranty extensions are available.

The grid connection of a system that can export up to 11 kW onto the grid would be allowed for a three-phase supply by Scottish and Southern Energy (SSE) the Distribution Network Operator (DNO) under G98 regulations, without seeking specific permission.

Please note that the savings assume a maximum of 50% of the electricity generated is used on site and uses your current energy consumption figures. Depending on the way the site electrics are configured and actual daily consumption profile of the site, this assumption could be an overestimation meaning more energy is exported to the grid, lowering the potential savings.

Additionally, if all the measures described in this report were to be carried out, the self-consumption rate could be lower and savings from this measure could therefore decrease.

Once a solar PV system is installed, timing of use of appliances can be scheduled to make the most of renewable generation during the day and a power diverter could be considered to heat water via spare generation and increase the level of self-consumption.

7 Alternative energy efficiency opportunities

7.1 Air source heat pump (Air to air) (Sports hall)

7.1.1 Project description and recommended solution

The sports hall is currently unheated and Wick Community Hub are keen to install an energy efficient heating system that can heat the space quickly when needed and as cheaply as possible.

An air to air heat pump heating system could be considered to provide heating to the sports hall.

Wick Community Hub expressed an interest in installing an air to air heat pump heating system, as an alternative option to gas radiant heating. An air to air heat pump system would use fan coil units in ceiling cassettes to blow warmed air into the sports hall, heating the full volume of the space. They would be slower to warm the space, rather than to heat the fabric / users as provided by radiant heating and potentially reduce flexibility.

Air to air heat pumps are a renewable technology and use electricity to transfer heat from the outside air into a building to provide space heating. The technology is tried and tested and can be a very efficient form of heating, typically operating at efficiencies of around 300% to 400%[5]. Air to air systems can also provide cooling if required.

Air to air system accredited installers should be contacted to design and provide a cost quotation for the installation of an air to air system, considering the heating demand of the space and the indoor heat emitters required to spread the heat throughout the hall.

Individual outdoor split system units can provide up to 25kW of heating power and the indoor heat emitters could be a combination of ducted ceiling mounted cassettes.

Insulation improvements should be carried out prior to installing a heat pump heating system.

Figure 7.1 Example 14 kW air to air heat pump and ducted emitter

[5] https://ampair.co.uk/products/panasonic-cu-5e34pbe/

7.1.2 Costs, benefits and finance

A basic heat loss calculation has been used to estimate the potential heating demand of the sports hall. The actual heating demand will depend on how the space is used and the weather at the time of use.

If we assume that the sports hall is in its current condition (not improved), and is heated to 18^{o}C for 30% of the time we can estimate a heating demand of around 24,000 kWh per year.

If this heating demand was provided by electric fan heaters for example, we can estimate that it would cost around £6,550 per year to heat.

Operating at a seasonal efficiency of an estimated 300%, an air to air heat pump system, providing this amount of heat might cost an estimated £2,184 per year to run, potentially saving £4,368 per year and 3.6 tonnes of CO_2e emissions, when compared to direct electric heating.

The sizing of the system and emitters is not known. Estimating that an air to air heating system may cost around £12,000 to supply and install and provide a simple return on the investment made of 2.7 years.

See Appendix 1 for full calculations.

Financial support for installing energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme[1] which offers SMEs including charities interest-free loans from £1,000 to £100,000 for measures with a payback of 20 years or less. Loan repayments are made over an 8-year period. No grant is offered for gas heating systems.

This report on the cost savings is regarded as a qualifying report for the SME Loan scheme if required.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under European rules and are granted as de minimis aid. An estimate of how much aid this might equate to is provided in appendix 2.

A cost to provide basic electric heaters for the sports hall can be estimated as £2,000.

For renewable heat measures, the Scottish Government is offering a 75% cashback grant to SME Loan recipients for a limited time while funds last. Loan recipients may receive 75% of their project cost back, up to a maximum of £10,000. This cashback grant would be additional to any received for non-renewable energy-saving measures.

This report is regarded as a qualifying report for the SME Loan Scheme.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2. Please see Appendix 3 for further details on the SME Loan Scheme and cashback grant.

7.1.3 Risks and further considerations

We recommend that Wick Community Hub, visit another similar space with an air to air heating system to experience its operation, before going ahead.

The design of the air to air heating system needs to carefully consider how the sports hall is used and the time and input energy the system will need to heat the space from cold.

The heating system should be designed by a suitably qualified heating engineer.

Care should be taken in the siting of both the outdoor and indoor parts of the system and any outdoor units should be treated against salt corrosion.

Air to air heat pumps require servicing to clean filters and fans.

The sports hall space may be difficult to heat adequately with the low levels of insulation in the roof and walls at present.

An ASHP heating system would benefit from electricity supplied by solar PV if installed, potentially reducing running costs.

Planning permission may be required for the heat pump outdoor unit. It is recommended that the local planning department is contacted to ascertain their requirements.

7.2 Gas fired warm air heaters (Sports hall)

Project description and recommended solution

The sports hall is currently unheated and Wick Community Hub are keen to install an energy efficient heating system that can heat the space quickly when needed and as cheaply as possible.

Wick Community Hub expressed an interest in installing gas fired warm air heaters, as an alternative option to gas radiant heating. Gas warm air heaters would blow warmed air into the sports hall, heating the full volume of the space. They would be slower to warm the space, rather than to heat the fabric / users and reduce flexibility.

Correctly designed, warm air heating should enable heating the space to a comfortable temperature and provide savings when compared to electric heating, due to the significantly higher cost of electricity.

We recommend that specialist suppliers such as Powrmatic[6] are contacted to provide design advice and a list of accredited installers.

Figure 7.2 Example of suspended gas warm air heater

[6] https://www.powrmatic.co.uk/

7.2.1 Benefits, costs and finance

A basic heat loss calculation has been used to estimate the potential heating demand of the sports hall.

If we assume that the sports hall is heated to 18^{o}C for 30% of the time we can estimate a heating demand of around 24,000 kWh per year.

If this heating demand was provided by electric fan heaters for example, it would cost an estimated £6,550 per year to heat.

If this heating was provided by gas warm air heaters we estimate that heating would cost around £3,000 per year, saving approximately £3,568 compared to electric heating and reducing emissions by 0.3 tonnes of CO_2e emissions.

See Appendix 1 for full calculations.

It is expected that supply and installation of new suspended gas warm air heaters might cost in the region of £7,000 and provide a simple return on the investment made of 2.0 years when compared to an electric direct heating alternative.

Financial support for installing energy efficiency and/or renewable energy equipment in Scotland is available through the SME Loan scheme[1] which offers SMEs including charities interest-free loans from £1,000 to £100,000 for measures with a payback of 20 years or less. Loan repayments are made over an 8-year period. No grant is offered for gas heating systems.

This report on the cost savings is regarded as a qualifying report for the SME Loan scheme if required.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under European rules and are granted as de minimis aid. An estimate of how much aid this might equate to is provided in appendix 2.

A cost to provide basic electric heaters for the sports hall can be estimated as £2,000.

7.2.2 Risks and further considerations

We recommend that Wick Community Hub, visit another similar space with a warm air heater to experience its operation, before going ahead.

The design of the warm air heating system needs to carefully consider how the sports hall is used and the time and input energy the system will need to heat the space from cold. Noise levels should also be considered.

The heating system should be designed by a suitably qualified heating engineer.

The sports hall space may be difficult to heat adequately with the low levels of insulation in the roof and walls at present.

8 Opportunities requested but not included

Wick District Heating Scheme

Wick Community Hub have made enquiries to the Wick District Heating Scheme and been advised that the Hub building is located too far away from the network to be connected without excessive cost.

9 Next steps

Financial support for energy and carbon-saving upgrades is available through the Scottish Government's SME Loan Scheme.

Loans from £1,000 to £100,000 are available to eligible SMEs, including charities. You could also receive a cashback grant of up to £30k. Loans are unsecured, and repayments are made over an 8-year period.

If you decide to apply for an SME Loan then the interest foregone on your loan, and any grant received, are regarded as state aid under EU-UK Trade and Cooperation Agreement. An estimate of how much aid this might equate to is provided in Appendix 2.

Please see Appendix 3 for further details on the SME Loan Scheme.

If you wish to apply for an interest free loan for any of the eligible measures in this report, your next steps are:

1. Find suppliers and get quote/s

A supplier's quote must be included with your application to the SME Loan Scheme. If you are applying for a loan value of more than £25,000, at least two quotes must be included.

If you are looking to implement a particular solution, then the following link can help you to find a suitable trade body or organisation which lists providers of that solution.

https://businessenergyscotland.org/resource-efficiency-supplier-listing/

2. Make your application to the SME Loan Scheme

You can apply for the interest-free loan once you have quotes, and before you do any work or pay any deposits.

A PDF copy of the application form was sent to you with this report. Your advisor can help you to prepare this application and any relevant supporting documentation that is required.

Alternatively, if you would like to prepare your application by yourself, there is a self-service portal where you can do that. If you would like to use this portal, please let us know by emailing support@businessenergyscotland.org.uk or by calling 0808 808 2268 and we can arrange access for you - this usually takes 1 to 2 working days at which point you will receive log in instructions from the portal.

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12 Appendix 1 – Supporting calculations

Wick CH **Improvements to the existing property**

Main Building

Cavity Wall insulation

Summary

Degree days for Wick: 2545

	Current	improved
U'-Values	W/m²K	
External Walls	**1.37**	**0.45**

Before improvements

				External Wall			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	240.0	2.7	20°C	119	95	3124	714	17,140	2.0	428	10,264	27,404	27,404	114	69,743
Full heating estimate															69,743

Following Improvements

				External Wall			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	240.0	2.7	20°C	119	95	1026	627	15,042	1.9	406	9,751	24,793	24,793	103	63,098
Total															63,098

Saving		6,645	kWh
% saving		9.5%	
Gas supply rate		£0.11172	
Cost saving £		£742.33	per yr
CO2	0.2128	1.4	tonnes

Estimated cost for CWI	£3,000	
simple return on investment	4.0	yrs
Possible cash back	75%	
Possible cash back	£2,250	
Cost after cash back	£750	
simple return on investment	1.0	yrs

Wick CH

Improvements to the existing property

Main Building

Roof insulation

Summary

Degree days for Wick: 2545

	Current	improved
U'-Values	W/m²K	
roof	**1.00**	**0.23**

Before improvements

				Roof			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	240.0	2.7	20°C	240.0	240	5760	714	17,140	2.0	428	10,264	27,404	27,404	114	69,743
Full heating estimate															69,743

Following Improvements

				Roof			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	240.0	2.7	20°C	240.0	240	1325	529	12,704	1.9	406	9,751	22,456	22,456	94	57,149
Total															57,149

Saving		12,594	kWh
direct electric he	100%	12,594	kWh
% saving		18.1%	
Gas supply rate		£0.11172	
Cost saving £		£1,406.97	per yr
CO2	0.2128	2.7	tonnes

Estimated cost for composite roof	£20,000	
simple return on investment	14.2	yrs
Possible cash back	75%	
Possible cash back	£15,000	
Cost after cash back	£5,000	
simple return on investment	3.6	yrs

Wick CH — Improvements to the existing property

Main Building

Window improvements

Summary

Degree days for Wick: 2545

	Current	improved
U'-Values	W/m²K	
Mix to Double Glazing	**2.80**	**1.50**

Before improvements

				Glazing 1		Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	240.0	2.7	20°C	20.0	1344	714	17,140	2.0	428	10,264	27,404	27,404	114	69,743
Full heating estimate														69,743

Following Improvements

				Glazing 1		Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	240.0	2.7	20°C	20.0	720	688	16,516	1.7	364	8,725	25,240	25,240	105	64,236
Total														64,236

Saving		5,506	kWh
direct electric he	100%	5,506	kWh
% Saving		7.90%	
Gas supply rate		£0.11172	
Cost saving £		£615.18	per yr
CO2	0.2128	1.2	tonnes

Estimated cost for new DG windows	£10,000	
simple return on investment	16.3	yrs
Possible cash back	75%	
Possible cash back	£7,500	
Cost after cash back	£2,500	
simple return on investment	4.1	yrs

Wick CH - Sports Hal Improvements to the existing property

Cavity Wall insulation

Sports Hall Building Heatloss

External design temperature =

Summary

Degree days for Wick

-4°C

2545

	Current	improved
U'-Values	W/m²K	
External Walls	**1.37**	**0.45**

Before improvements

				Glazing 1		Doors		External Wall			Fabric		Infiltration					
Room	Area (m²)	Height (m)	Internal Design Temp	Area (m²)	Heat loss (W)	Area (m²)	Heat loss (W)	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Sports Hall	250.0	3.7	18°C	25.0	1540	4	264	200	171	5154	854	18,783	1.5	458	10,073	28,856	28,856	115	80,115
Full heating estimate																			80,115

Following Improvements

				Glazing 1		Doors		External Wall			Fabric		Infiltration					
Room	Area (m²)	Height (m)	Internal Design Temp	Area (m²)	Heat loss (W)	Area (m²)	Heat loss (W)	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Sports Hall	250.0	3.7	18°C	25.0	1540	4	264	200	171	1693	696	15,322	1.5	458	10,073	25,395	25,395	102	70,506
Total																			70,506

Saving		9,609	kWh
Direct electric he	100%	9,609	kWh
% saving		12.0%	
Elect. supply rate		£0.27260	
Cost saving £		£2,619.44	per yr
CO2	0.225	2.2	tonnes

Estimated cost for CWI	£5,000	
simple return on investment	1.9	yrs
Possible cash back	75%	
Possible cash back	£3,750	
Cost after cash back	£1,250	
simple return on investment	0.5	yrs

Wick CH - Sports Hal Improvements to the existing property

Roof insulation

Sports Hall Building Heatloss

Summary

Degree days for Wick
2545

	Current	improved
U'-Values	W/m²K	
roof	**1.00**	**0.23**

Before improvements

				Roof			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Sports Hall	250.0	3.7	18°C	250.0	250	5500	854	18,783	1.5	458	10,073	28,856	28,856	115	80,115
Full heating estimate															80,115

Following Improvements

				Roof			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Sports Hall	250.0	3.7	18°C	250.0	250	1265	661	14,548	1.5	458	10,073	24,621	24,621	98	68,357
Total															68,357

Saving		11,758	kWh
direct electric he	100%	11,758	kWh
% saving		14.7%	
Elect.supply rate		£0.27260	
Cost saving £		£3,205.20	per yr
CO2	0.225	2.6	tonnes

Estimated cost for CWI	£20,000	
simple return on investment	6.2	yrs
Possible cash back	75%	
Possible cash back	£15,000	
Cost after cash back	£5,000	
simple return on investment	1.6	yrs

Estimate of savings from lighting improvements

Lighting cost calculator (Current Lighting)

Site location reference	Lamp Type	Lamp wattage	Number of lamps used	Estimate Hrs/week in use	Estimate Weeks/year in use	Annual energy consumption (kWh)	Annual cost
Kitchen, office , bar	Fluorescent tube 5 ft T8	58	8	50	50	1,160	£316.22
Lounge	Compact T5 DD lamp	28	15	50	50	1,050	£286.23
Stores, WCs	Compact fluoresxcent 2ft T8	18	10	10	50	90	£24.53
Sports Hall	Fluorescent tubes, 6ft T8	72	8	20	40	461	£125.61
				Total energy cosumption (kWh)		2,761	
				Total annual lighting cost		£2,760.80	

Average unit rate for electricity (pence/kWh)	27.26

Lighting cost calculator - new LED lights

Site location reference	LED Replacements	Lamp wattage	Number of lamps used	Estimate Hrs/week in use	Estimate Weeks/year in use	Annual energy consumption (kWh)	Annual cost
Kitchen, office , bar	5ft LED tube	24	8	50	50	480	£130.85
Lounge	Compact T5 DD lamp	12	15	50	50	450	£122.67
Stores, WCs	Compact fluoresxcent 2ft T8	9	10	10	50	45	£12.27
Sports Hall	Fluorescent tubes, 6ft T8	28	8	20	40	179	£48.85
				Total energy cosumption (kWh)		1,154	
				Total annual lighting cost		£1,154.20	

Estimated savings		
Energy savings	1,607	kWh/yr

Cost savings	£438	£/yr
CO2 savings	361	kgCO2/yr
Estimated installation cost	£1,000	
Simple return on investment	2.3	yrs
Potential cash back grant	75%	
Cash back	£750	
Cost after cash back	£250	
Simple return on investment	0.57	yrs

Estimate of Sport hall heating demand

Wick CH
Sportshall
Estimated Full Building Heatloss
Summary

External design temperature = **-4°C**

Degree days for Wick 2545

	Current	improved
U'-Values	W/m²K	
External Walls	**1.37**	**0.45**
Single glazing	**5.20**	**1.50**
Double Glazing	**2.80**	**1.50**
roof	**1.00**	**0.23**
Floor - suspended / Solid	1.15	1.15
Doors	**3.00**	**3.00**

Before improvements

				Glazing 1		Doors		External Wall			Floor		Roof			Fabric		Infiltration						
Room	Area (m²)	Height (m)	Internal Design Temp	Area (m²)	Heat loss (W)	Area (m²)	Heat loss (W)	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Area (m²)	Heat loss (W)	Total Area (m²)	Calc Area (m²)	Heat loss (W)	Heat loss W/K	Fabric loss (W)	Ac/Hr	Total vent. heat loss W/K	Air loss (W)	TOTAL (W)	**Heating Power (W)**	**W/m²**	**Space heating Requirement (kWh/yr)** (0.024 x degree days x W/K)
Ground floor	250.0	3.7	18°C	25.0	1540	4	264	200	171	5154	250.0	6325	250.0	250	5500	854	18,783	1.5	458	10,073	28,856	28,856	115	80,115
Full heating estimate																								80,115

Sports hall heating

Estimated cost of heating sports hall with electric heaters		
Heat loss estimate - Assuming hall remains uninsulated		
Estimated heating energy demand full time heating	80,115	kWh/yr
Assume heated for 30% of time	30%	
Estimated heating energy required	24,035	kWh/yr
Electric heating rate	£0.2726	
Estimated cost to heat	£6,551.80	
CO2 emissions	5,408	kgCO2
Potential cost of electric heaters	£2,000.00	

Gas radiant heating

Estimated cost of heating sports hall with radiant heaters		
Estimated heating energy required	24,035	kWh/yr
Estimated energy saving from radiant heating	25%	
Estimated heating energy required	18,026	kWh/yr
Heating efficiency	90%	
Gas required	20,029	
gas supply rate	£0.1117	
Estimated cost to heat	£2,237.61	
CO2 emissions	4,262	kgCO2
Potential cost of gas radiant heaters	£8,000.00	
Estimated savings		
Energy saving	4,006	kWh/yr
Cost saving	£4,314.19	/yr
CO2 saving	1,146	kgCO2
Estimated installation cost	£8,000	
Simple return on investment	1.9	yrs
No cash back grant available		

Solar PV		
10 kWp roof mounted system generation and savings estimate		
Size of PV System	9.84	kWp
Current Electricity Price	£0.2726	£/kWh
Export tariff (B Gas customers)	£0.0500	£/kWh
Estimated kWh per kWp	783.54	kWh/yr
Estimated Annual Generation	7,710	kWh /yr
Estimated % Annual Generation used on Site	50.00%	
Estimated % Annual Generation exported	50.00%	
Approximate Installation Cost	£12,000	
Estimated Savings	**Year 1**	
On site energy savings	3,855	kWh/yr
Import Savings: kWh/yr x 50%	£1,051	
Export Revenue: kWh/yr x 50%	£193	
Total Revenue + Savings	£1,244	
Payback in years	9.6	
CO2 Savings: kWh/yr x 50% x 0.225 kgCO2 /kWh	819	kgCO2/yr

Alternative opportunity – Air Source Heat Pump (air to air) heating

ASHP (Air to air) heating in sports hall		
Heat energy supplied	24,035	kWh / yr
Estimated heating efficiency	300%	
Estimated electricity consumption	8,012	kWh / yr
Running cost	£2,184	
CO2 emissions	1.80	tonnes / yr
Estimated savings		
Energy Saving	16,023	kWh / yr
Cost saving	**£4,368**	£/kWh
CO2 saving	**3.61**	tonnesCO2/yr
Estimated installation cost	£12,000	
Simple return	2.7	yrs

Alternative opportunity - Gas warm air heating

Estimated cost of heating sports hall with gas warm air heaters		
Estimated heating energy required	24,035	kWh/yr
Estimated heating energy required	24,035	kWh/yr
Heating efficiency	90%	
Gas required	26,705	
Gas supply rate	£0.1117	
Estimated cost to heat	£2,983.48	
CO2 emissions	5,115	kgCO2
Potential cost of gas warm air heaters	£8,000.00	
Estimated savings		
Energy saving	-2,671	kWh/yr
Cost saving	£3,568.32	/yr
CO2 saving	293	kgCO2
Estimated installation cost	£7,000	
Simple return on investment	2.0	yrs
No cash back grant available		

13 Appendix 2 – Subsidy controlee/state aid information

Advice from Business Energy Scotland

The advice that has been provided in this report is funded with support from Scottish Government but is NOT classed as aid under the EU-UK Trade and Cooperation Agreement or European Commission's de minimis state aid regulations.

If you would like further advice to implement the recommendations or to look at further opportunities, then contact your advisor and they will help you. This support is also NOT classed as aid delivered under the EU-UK Trade and Cooperation Agreement. This means that the advice you receive does not count towards the limits that are set on Special Drawing Rights under the EU-UK Trade and Cooperation Agreement.

Funding from the SME Loan Scheme

If you decide and are eligible to apply to the SME Loan Scheme for interest-free financial support then the interest foregone on your loan, and any grant received, are regarded as an exempted subsidy under Article 3.2(4) of the EU-UK Trade and Cooperation Agreement (which replaces de minimis aid under Commission Regulation (EU) 1407/2013 (general de minimis), Commission Regulation (EU) 1408/2013 (production of agricultural products) and Commission Regulation (EU) 717/2014 (fisheries and aquaculture products)).

The value of the interest foregone will depend on which measures you apply for and whether a grant is available however we have estimated the potential value of the Special Drawing Rights that could apply to the recommendations made if there was no grant or cashback grant:

Estimated special drawing rights associated with accessing the SME Loan					
Item	**Description**	**Investment required**	**Potential SME loan**	**Interest rate applied**	**Interest forgone**
1	Cavity wall insulation (Main building)	£3,000	£3,000	0%	£646.06
2	Roof insulation (Main building)	£20,000	£20,000	0%	£4,307.05
3	Double glazing (Main building)	£10,000	£10,000	0%	£2,153.52
4	Cavity wall insulation (Sports hall)	£5,000	£5,000	0%	£1,076.76
5	Roof insulation (Sports hall)	£20,000	£20,000	0%	£4,307.05
6	Lighting systems, fitting and controls	£1,000	£1,000	0%	£215.35
7	Radiant heating units	£8,000	£8,000	0%	£1,722.82

The information provided above is just an estimate and does not include any Special Drawing Rights aid resulting from any supporting grants. The actual state aid that applies will be supplied to you in the offer letter from Energy Saving Trust's SME Loan team if you decide to apply for the loan.

There is a ceiling of £325,000 Special Drawing Rights for subsidies provided to any one economic actor under this Article over a 3-year period. Any Article 3.2(4) subsidies (or similar aid, including "de minimis" aid granted prior to 31 December 2020 under Commission Regulation (EU) No 1407/2013) awarded to the Grantee will be relevant if the Grantee wishes to apply, or has applied, for any Article 3.2(4) subsidies.

14 Appendix 3 – SME loan and cashback information

The loan

Scottish SMEs can apply for an interest-free loan, funded by the Scottish Government, of between £1,000 and £100,000, repayable over eight years, to help pay for energy efficiency projects.

Eligible measures can also receive a cashback grant of up to £30,000.

What can it be used for?

A Scottish Government SME Loan can be used to finance the installation of eligible energy efficiency systems, equipment or building fabric, including:

- Heating, ventilation, and air conditioning upgrades.
- Renewable technologies such as replacing a boiler to an air source heat pump.
- Improving insulation, draught-proofing, double or secondary glazing.
- Installing solar thermal systems, wind turbines and biomass boilers.

Who is eligible?

The loan is available to Scottish businesses that fall within the EU definition of Small and Medium-sized Enterprise , including not-for-profit organisations and charities.

Key eligibility criteria include:

- The organisation has been trading for at least 12 months.
- The organisation is not owned by or owns 25% of another organisation.
- The organisation passes the credit check carried out by Energy Saving Trust.
- The payback for individual measures or a package of linked measures have a payback period of 20 years or less.

Can I get a cashback grant?

Currently, eligible installations can qualify for a cashback grant:

- 75% of eligible costs up to a maximum of £20,000 can be claimed by qualifying applicants for permitted energy efficiency measures.
- 75% of eligible costs up to a maximum of £10,000 can be claimed by qualifying applicants for any air/ground/water source heat pump, biomass boiler or solar thermal renewable heating technologies.
- 0% is applied to other eligible renewable electricity generating technologies, such as wind turbines.

A maximum of £30,000 cashback can be awarded to a single business for eligible technologies and across all of their applications (previous or current).

How do I apply?

You can apply for the interest-free loan once you have quotes, and before you do any work or pay any deposits.

A PDF copy of the application form was sent to you with this report. Your advisor can help you to prepare this application and any relevant supporting documentation that is required.

Alternatively, if you would like to prepare your application by yourself, there is a self-service portal where you can do that. If you would like to use this portal, please let us know by emailing support@businessenergyscotland.org.uk or by calling 0808 808 2268 and we can arrange access for you - this usually takes 1 to 2 working days at which point you will receive log in instructions from the portal.

Key things to note

The SME Loan cannot be applied for retrospectively, so you cannot carry out work and then secure the loan afterwards.

The quote(s) you obtain for implementing the measures must meet the following criteria:

- Be on company-headed paper or have a company stamp.
- Be addressed to the applicant at the correspondence address for the application. This must also include the business name.
- Have the installation address on the quote.
- The details of the measures to be installed must match the measures applied for with a breakdown of the cost of the improvement.
- Include the total cost of the installation with VAT breakdown if applicable.
- Must be dated.

BUSINESS ENERGY SCOTLAND

For more information

0808 808 2268

businessenergyscotland.org

support@businessenergyscotland.org

@busenergyscot

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Net Zero Scotland Scottish Government

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