

## St Ninians Old Parish Church Hall Air-to-Air Heat Source Pump

### Introduction

St Ninians Old Parish Church in Stirling had been looking for some time at ways to reduce the carbon footprint and energy bills of the church and church hall. The church is normally only used once or twice a week, and so the most cost effective action was to simply insulate the loft. However, the church hall had far higher energy bills as it was used almost daily, and the existing overhead radiant electric heaters were ineffective and costly to run.

### Equipment

#### Four Mitsubishi Heavy Industries Air-to-Air Source Heat Pump (ASHP) units.

The church hall had no radiators or existing heat distribution system, and renewable options for the hall were restricted due to its Grade-C listing. This Grade-C listing meant external biomass units would be difficult to locate sensitively and were therefore ruled out. Heat pumps were considered a sensible alternative, and boreholes were considered at one stage for a ground-source pump, but this was considered expensive and not entirely suited to the needs of the hall. Air-source units seemed more viable, and air-to-air units had the advantage of providing a warm airflow without the requirement of extra heat emitters. This saved a considerable amount of internal disruption and cost.

Internal heat units were installed throughout the building, enabling individual rooms to be heated without having to warm the whole building. These units are fed from four external ASHP units, which are located at either end of the building. Their location means they are largely hidden from view, which was an important factor in securing listed building consent for the work.

It was also identified that the stone building had very poor thermal qualities and required significant insulation work to reduce heat loss. A Climate Challenge Fund grant was secured to pay for secondary glazing, internal solid wall insulation, loft insulation, associated building work and energy-efficient lighting. This ensured that the building was as thermally efficient as practicable.



### Cost and Grant Funding

Total project cost	£24,869	The remaining funding was obtained through the Church's own contributions.
CARES grant	£17,905.68	
CARES grant percentage	72%	

### Fuel Bill Savings

The scheme is estimated to save around 7,886kWh of electricity a year, which is worth around £812 at current prices, although the cost savings are likely to increase as electricity prices rise in the future. Further savings will also occur through the insulation and energy efficiency measures carried out.

### Emission Savings

Estimated kWh savings p.a.	7,886kWh
Annual CO <sub>2</sub> savings (kg)	3,390kg
20yr lifetime CO <sub>2</sub> savings (kg)	67,800kg

### Project Monitoring

The system is difficult to monitor for heat output, because the output is air rather than hot water, but a variety of electrical meters and loggers have been fitted to show savings both from the electrical efficiency work and the ASHPs. So far the readings are showing a 65% decrease in energy use compared to previous years, which is a great success.

### Local Impact

The hall area is far quicker to reach ambient temperatures than previously with the electric heaters, and the type of heat being delivered (warm air) is much more comfortable. Insulation and secondary glazing also mean that heat is also retained in the building for longer. This has led to a significant uptake in hall usage, and in turn a more valuable local asset with a higher income.



### Lessons Learned

Michael Adam, Treasurer, said:

“Think carefully about patterns of usage for a building when deciding what type of renewable system to install; ground-source heat pumps might be more efficient than air-to-air systems, but only if they operate at a fairly constant level. The air-to-air systems are more flexible, providing almost instant heat, and can be turned off when not required, making them more cost-efficient to run for buildings with sporadic or variable use. Make sure you clean the dust filters regularly though or the efficiency will drop!”

### For further information, contact:

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