Towards Zero Carbon Cumbria

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Cumbria Action for Sustainability

# Case Study: Lowick Community Hall

## The journey from an 1880s building in need of repair to a sustainable, comfortable community venue

**Residents of Lowick in Cumbria took on the challenge of restoring an 1880s building in their village to create a warm and comfortable hall for the whole community to enjoy. This case study charts their journey to creating a sustainable, high-tech venue, sharing their successes and the lessons they learnt along the way.**

### The community's need for a village hall

Since before World War One, villagers had been looking for a venue to establish a community hall – Lowick's first. It would be a place where the community could come together for events, from workshops and dance practice to church meetings, parties and sports classes. It would also be a place that would serve the community as an emergency venue and a polling station, among other things. The idea was to create a space not just for the community of Lowick, but for anyone who wanted to rent it, generating revenue for the upkeep of the hall and to improve its fabric.

### A building is found

The building that was to become Lowick's village hall dates back before the 1880s. Originally, it was a Sunday school and belonged to the church next door. Time had taken its toll on the building and the church considered selling it. It was decided to lease the building to the Lowick Community Hall Trust, on a thirty-year lease. The hall needed to be made dry and warm, however, so redevelopment work started in 2009.

The Trust was supported by the Claren Project and National Energy Action. Funds were received from various sources – among them were Scottish Power, the National Lottery, Lowick Parochial Church Council, Hadfield Trust and anonymous donations.

## Principles for the village hall

There were three underlying principles that have guided the development, and later the management of the community hall:

- **that all works should be undertaken by local businesses, and, whenever possible, materials should also be sourced locally;**
- **that the building should be as sustainable as possible; and**
- **that the village hall should be a low-cost, high-tech venue.**

## The work undertaken

The poor condition of the roof made it necessary to invest in a new one. In keeping with the Trust's principles, they decided to incorporate photovoltaic (PV) panels into the new roof. An air-source heat pump was also installed, and the income generated from the PV panels makes an important contribution to the running cost of the heat pump and the hall. (See table A.) A buffer tank for the heat pump was not included in the original installation but was added five years later.

The roof and the walls needed to be insulated properly to prevent heat escaping to the outside. New flooring was installed which further helps with the building's insulation. The Trust sourced wooden double-glazed windows and wooden doors from a local joiner.

# The technologies used

### *Solar PV*

The PV panels were installed by Sundog Energy and were manufactured in Spain. They generate approximately £480/year, which covers about half of the annual electricity bills. The electricity generated isn't used directly; it is sold to Scottish and Southern Electricity, while the hall buys theirs from British Gas.

As the village is within the Lake District National Park, the PV panels had to be put up in a way that makes them less visually intrusive. They are not mounted on the roof, but built into it, making the hall more aesthetically pleasing.

The smart meters originally installed with the system had to be switched off. As there's no mobile phone signal, they cannot send information to the supplier and so the meter has to be read every month.


### *Heat pump*

The heat pump is of Swedish design. It is a NIBE Fighter 2005. It is normally set to run at a fairly low level (18°C), however this is comfortable for many of the physical activities held inside the community hall (dance practice, tai chi, pilates and parties, for example), or when there are a large number of participants. The heating can also be turned up when needed.

### *Insulation*

The roof was insulated with Thermafleece (1 foot thick), which is a local product made from sheep's wool. The walls of the main hall were insulated with a rubber lining called Thermatap, while the more recent kitchen had cavity wall insulation.

The insulation worked so well that fans originally installed to push down the heat from the ceiling are hardly used. The insulation both warmed and dried the building out, however, causing the original wooden floor to shrink. This shrinkage led to draughts, so an engineered oak floor was installed on top.

## Organisation

The organisation that manages the hall is Lowick Community Hall Trust, a registered charity. It has three trustees and eleven committee members, drawn from different sectors of the community, such as the church, Young Farmers and the Women's Institute. There are a couple of people on the committee who have technical expertise and look after the PV panels and the heat pump.

If you'd like to learn more, or would like to book Lowick Community Hall, please email: **robwdove@outlook.com**

## Successes

- ☑ **The PV panels supply enough electricity to cover almost half the electricity bills and this leads to $CO_2$ savings.**
- ☑ **The insulation has made the hall more energy efficient and keeps the running costs as low as possible.**
- ☑ **Renting the building out generates enough revenue for the Trust to have a savings account for future maintenance or upgrading works. The Trust has been able to keep the hire costs very low, at £12 for three hours.**
- ☑ **Community members are happy with the hall. It fulfils its intended purpose at a low cost.**
- ☑ **The way the Trust runs the hall functions as a model. If you would like to know more about it, come and see it for yourself!**


Perhaps the greatest sign of its success is that if you ask the Trust, **"Would you do this again?**", the answer is, ***"Absolutely!"***

## Lessons learned

- ⚠ **"Insulation! Insulation! Insulation!" Insulate before you generate, since without proper insulation you would be heating the street instead of the building.**
- ⚠ **Heat pumps can be complicated and it's better to trust a refrigerator engineer with maintenance work.**
- ⚠ **Heat pumps have to run all the time, even if the setting is very low. This consumes electricity.**
- ⚠ **Ground-source heat pumps may be a better alternative to air-source heat pumps, since they operate better if the outdoor temperature drops below -2 to -3°C. Available space is a limiting factor, however. At Lowick, there was not enough space at the time to install one.**
- ⚠ **Look for professionals among your community members who have interest in engineering and technologies. Even if they don't wish to undertake the work or their specialisation is different, they will have valuable insight.**

# About the renewable technologies used at Lowick

## *Photovoltaic panels (PV panels)*

This technology is based on the conversion of light from the sun into electricity. PV systems are usually made up of more than one panel. Their number depends on the available area and on how much electricity is needed. They can be put on the ground, on rooftops or even mounted on walls. They don't generate pollution or greenhouse gas emissions while operating. Their power output is dependent on sunlight, but if installed correctly they can generate electricity even in cloudy weather, as long as light is available, although the output will be smaller than under a clear sky. This quality makes it a viable technology in colder climates. Dust in the air will affect its power output after a while, but cleaning them easily solves that problem. It may be possible to use the electricity at the place of generation or it can be sent to the grid.

## *Air-source heat pumps*

Air-source heat pumps work by absorbing heat from the air outside a building into a fluid. The fluid is passed through a compressor where its temperature is increased, and the higher temperature heat is transferred to the heating and hot water circuits of the building. The way an air-source heat pump operates is often likened to how a refrigerator works – extracting heat from the inside of the fridge. They can operate even at air temperatures as low as -15˚C. They are not completely carbon neutral, as they need electricity to operate the compressor and pump. This can be offset by producing electricity from renewable sources, such as photovoltaic cells, as Lowick Community Hall has done.

**There are two main types of air-source heat pump systems:**

### *Air-to-water*

An air-to-water system distributes heat via your wet central-heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. This makes them more suitable for underfloor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time.

### *Air-to-air*

An air-to-air system produces warm air that is circulated by fans to heat your home. They are unlikely to provide you with hot water as well. (Source: Energy Saving Trust)

**Table A**

| Renewable technology | Funding source | Amount |
|---|---|---|
| Heating system: air-source heat pump, fans, radiators, control system | Scottish Power | £17,500 |
| Buffer tank | From funds | £250 |
| PV array and grid connection | Low Carbon Buildings Phase 2 and Lotteries grant | £23,465 |
| **Total** | | **£41,215** |

**Table B**

| Energy efficiency technologies | Funding source | Amount |
|---|---|---|
| Thermafleece roof void insulation | CWMET – Sustainable Community Buildings grant | £1,665.87 |
| Insulated new floor | The Hadfield Trust | £3,500 |
| Sempatap wall insulation | CWMET – Sustainable Community Buildings grant | £2,322.31 |
| Window double glazing | CWMET – Sustainable Community Buildings grant | £4,648.87 |
| **Total** | | **£12,137.05** |

**Table C**

| Others | Funding source | Amount |
|---|---|---|
| New electrical circuits and appliances | LDNP Sustainable Buildings grant | £8,467.74 |
| New front door | Keswick to Barrow Walk Committee | £1,000 |
| Planning permission for PV roof | From funds | £135 |
| **Total** | | **£9,602.74** |

**Table D**

| Cost of running | £/year (approx.) |
|---|---|
| Insurance | 600 |
| Electricity bills | 1000 |
| Other | 300 |
| **Total** | **£1,900/year** |

**Table E**

| Income | £/year (approx.) |
|---|---|
| Electricity | 480 |
| Rent | 1,800 |
| **Total** | **£2,280/year** |

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