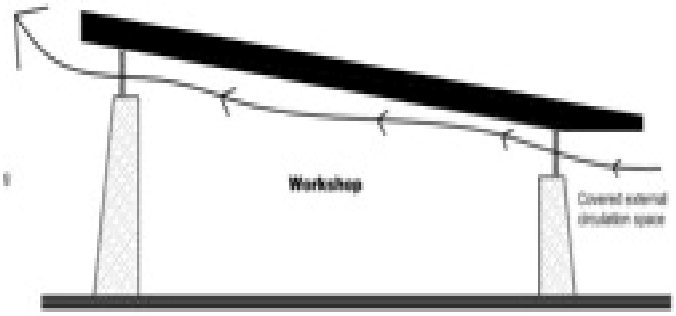
Derbyshire Eco centre

DESIGN AND CONSTRUCTION



The Derbyshire Eco Centre has been designed and constructed to meet the following principles:

- Integrate with the environment and natural assets of the site.
- Eliminate internal circulation space.
- Use local, reclaimed and natural materials where possible.
- Minimize energy consumption.
- Building to be a teaching tool in own right.
- High thermal mass with high levels of insulation and air tightness.
- Promote alternative transport methods.
- Keep energy consumption to a minimum.
- Keep carbon footprint as low as possible during construction and through the life of the building.
- Meet the BREEAM excellent standard in sustainable building.

BREEAM (the Building Research Establishment Environmental Assessment Method) is the leading and most widely used environmental assessment method for buildings. It sets the standard for best practice in sustainable design and has become the standard measure used to describe a building's environmental performance. This is an international measure. We are currently on track to be the first building in Derbyshire to achieve this.

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TIMBER FRAME

The timber frame is supporting the whole roof and is made from Siberian Larch, which grows very slowly in harsh conditions. This gives it a natural oil so no preservative is needed.

Using smaller trees the timber is cut into layers and glued together to form what is called a Glulam Frame. This gives the timber more strength and has enabled large spans to be covered without the use of internal pillars.

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EXTERNAL WALLS

The external walls are non-load bearing and are constructed from natural Derbyshire stone. The coursed stone is cut limestone from Longcliffe, which demonstrates two techniques.

The wall panels are split faces and the piers are polished faces otherwise known as ashlar.

This shows how limestone can be used in different ways and emphasizes the linear contrast to the vertical wooden frame.

The large plinths at the bottom are Gritstone from Birchover . This has been cut to give a solid mass appearance.

GREEN ROOF

The green roof is designed to reduce energy costs, reduce drainage and water storage requirements and help meet building standards on energy performance. It also provides and retains a wildlife habitat and helps the building to blend into the natural surroundings of the site.

The major components of the roof are;

The vegetation. This is a special seed mix of limestone loving plants to match native local flora.

The growing medium. Predominantly 100% recycled limestone formed into an uneven layer to replicate a natural habitat.

The drainage system. Consists of a filter fleece, which allows the rainwater to drain into a 25mm reservoir board that fills with water to feed the vegetation. The remaining water, estimated about 45% of the actual rainfall, will be collected in the rainwater harvesting system.

The waterproofing. Consists of a single ply butyl rubber sheet over 165mm rigid insulation.This is bonded onto 25mm plywood that sits on top of the Glulam frame and can be seen from the underside of the roof.

In total there is approximately 160tons of material on the roof so you can see why the roof timbers have to be strong.

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INTERNAL WALLS & FLOOR

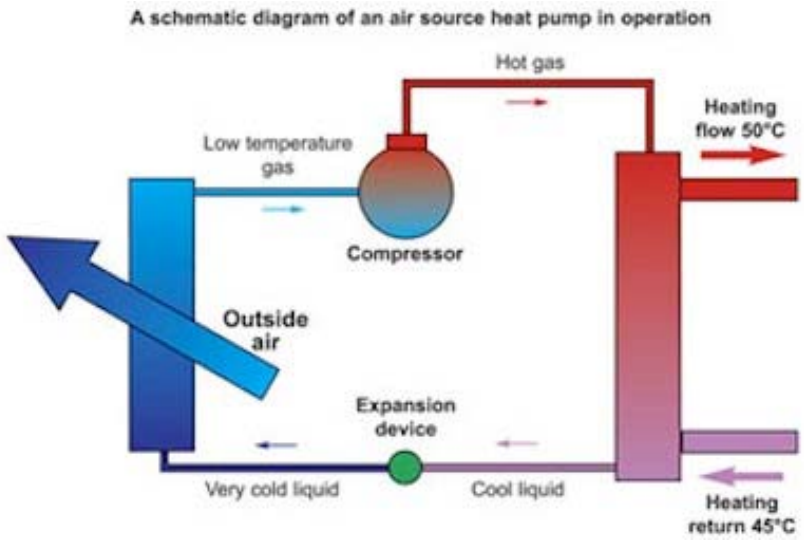
The internal walls are heavily insulated with recycled mineral wool and finished with an Enviromasonry building block that is manufactured in the UK from over 65% recycled aggregate under strict environmental and social legislation.

The remaining internal walls are constructed from an ecological board made from strands of wood bound together with minerals which are certified ecobiocompatible.

The floor in the social area, classroom and office is made from concrete and local aggregate, which has been polished, to help reflect light.

HEATING SYSTEM

The building is heated by an air source heat pump. This extracts heat from the outside air in the same way that a fridge extracts heat from its inside and can extract heat from the air even when the outside temperature is as low as minus 15° C.



By using the heat from the outside air it can generate the equivalent of 3-4 units of electricity for every unit used (kWh). This is enough to service the under floor heating system.

The under floor heating system consists of rows of pipes filled with fluid. These are placed between a bottom layer of insulation and a top layer of concrete to give a high thermal mass. This enables the system to run on low-grade heat. no higher than 43c. The actual construction of the under floor heating can be seen in the floor panel in the social area and the manifolds are displayed just inside the workshop.

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RAINWATER HARVESTING

Rainwater from the green roof is collected in the large 6000 litre water tank near to the front entrance.

This provides recycled water to the toilet facilities that would otherwise use drinking quality water. Apart from reducing our water bill it will also reduce the carbon footprint of the building.

There is a display panel in the front entrance of the building, which shows how much water we are collecting and recycling

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SOLAR ENERGY

The first phase of the building has included examples of ways to produce energy from the sun. It is planed that the second phase of the building will expand these options to enable the building to run without the use of mains electricity.

Solar thermal

A small solar thermal system is positioned on the roof of the cycle shed. This will use solar energy to generate some of our hot water and will help to reduce the amount of mains electricity used to heat water throughout the year.

Solar Photovolaic

Phase one provides a 1.5kWp array of panels to generate electricity, which are mounted onto a pole at the back of the cycle shed.
This system will track the movement of the sun to get the maximum benefit converting daylight into electricity.

Phase two of the building will provide an array of 15kWp with an estimated carbon dioxide saving of 5381kg/year.

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