GREEN ENERGY AT HAG DYKE

From its early days in 1947 Hag Dyke was lit only by Hurricane lamps or Tilley lamps until the 1960's when gas piping was installed throughout the building to supply mantles in each room from a central supply. The gas bottles were originally in the pantry but later moved to a safer location in the barn and the gas delivered underground.

In 1989 inevitable pressure from the authorities to improve safety and fire precautions required some changes. While installing new fire resistant ceilings it was decided to put in wiring so that we could have electric light. Other improvements such as pumped central heating and a refrigerator were also added.

Power was provided for over 10 years by petrol generators converted to run on the central gas supply. Two generators were installed with a spare on standby. 12-volt batteries were charged from the generator to provide nighttime and emergency lighting.

The system worked well enough but there were some disadvantages: -

1. It was always necessary to run the generator even if only one or two lights were required. The fridge and heating could not run overnight.
2. The generators designed for intermittent building site use did not take kindly to continuous running and reliability was sometimes disappointing

As a pilot project we installed a small (910mm diameter) wind turbine and a 56-watt solar panel which we use to charge the 12-volt batteries. This provided valuable data about the amount of energy we could expect from renewable sources and encouraged further research into a full size project.

At this time there was increased interest in renewable energy systems, the Internet was available for research and grant funding could be applied for.

An approach to the Ecopower trust run by Eastern Electricity (now part of TXU energy) was favourably received and we decided to proceed with a system based on a large storage battery charged by solar panels. Two grants totalling £8500 paid for the batteries and solar panels, other equipment was donated by generous suppliers or built to order.

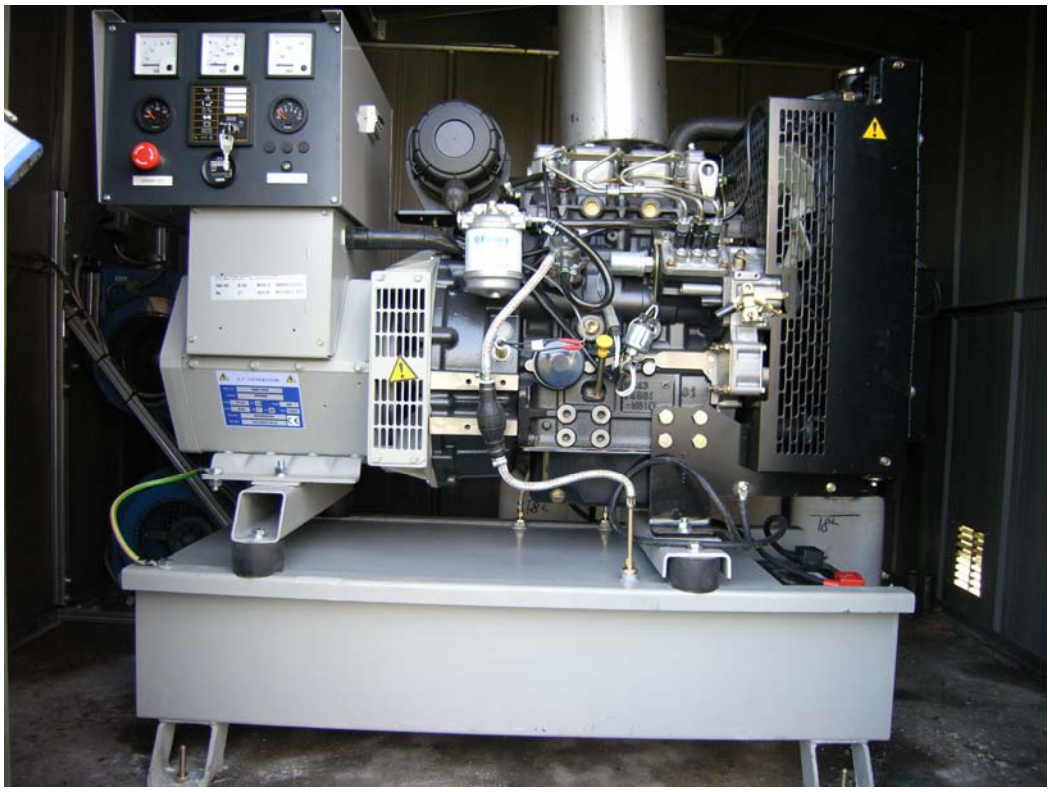
The present system consists of 4 banks of 48 volt batteries with a total capacity of 1520 Amp hours and a secondary 12-volt battery of 320 Amp hour capacity.

The main lighting system uses low energy fluorescent fittings, which run directly from the 48-volt supply via individual inverters. Forty-six lamps use around 580 watts in total, drawing 12 amps from the battery. In addition we use a 1-kilowatt inverter to provide 230-volt A.C. power which runs the central heating pump, fans and other equipment which cannot easily be converted to run on the 48 volt D.C. supply. The total electrical load on a dark winters afternoon when the hostel is full is around 900 watts.

At night the main lighting system is shut down and the nightlights provide sufficient light to move quietly around the building and for evacuation in emergency. The nightlights mostly use high intensity LEDs for minimum maintenance as only low light levels are required. The 12 volt system also powers a modern fire alarm system with smoke and heat detectors throughout the building. The inverter continues to run at night to power the central heating if required.

Power for the main batteries is provided by 12 x 85 watt solar panels on the roof of the main building. A 900 watt 2.1m wind turbine on the hill behind the chapel provides further power especially during winter.

For the small number of occasions when there is insufficient energy from these sources we have a modern 11kVA diesel generator in a shed behind the main building. This can charge the batteries at over 75 amps or provide energy for large power tools or other occasional requirements.



The generator is presently housed in a temporary shed while the permanent stone building is under construction. A simple lamp indicator system in the kitchen alerts the residents if the batteries are running too low and need charging from the generator.

The 12-volt battery can be charged by the wind turbine, its own small solar panel, by a 25-amp rectifier from the generator or via another power unit from the 48-volt battery. Thus the chance of this battery running low is very remote, the battery is more than large enough for its purpose.

A comprehensive control panel in the pantry monitors all aspects of the system and houses the electronic controller for the solar panels.

The controller for the wind turbine is sited in the drying room so that any waste heat during high winds can help to prevent freezing in winter.

Saving energy is something of an obsession at Hag Dyke and we go to great lengths to reduce power usage as much as possible.

All light fittings except those in the common rooms, corridors and stairs are fitted with PIR sensors so that they are turned off when the rooms are unoccupied or if there is sufficient daylight.

The night-lights can only be turned on when the main system is shut down and they are also prevented from coming on during daylight.

The fridge is a multi-fuel type, which works on the absorption principle - there is no pump motor, it only requires a heat source, which can be electric, or a gas flame. Usually it runs most efficiently on gas but it can also use the electrical supply if required.

So what of the future?

This project is successful.

For that we have to thank the Ecopower Trust who provided the initial funding, the suppliers and manufacturers who donated time and materials, but mostly the Hag Dyke Wardens and supporters who determined to make it work despite the many problems we encountered.

Development of low energy systems and alternative energy supplies continues apace and we are continually looking for improvements in efficiency and reduction of maintenance.

A useful addition would be a larger inverter so that we can run more appliances without using the generator. More batteries will extend the life of those already installed and further reduce the use of the diesel - provided we can find the space!

Perhaps most important of all – We hope that the opportunity for a large number of young people to see a real alternative energy system in operation might inspire them to take some of the ideas back to their day to day lives for the long term benefit of the environment.