

CASE STUDY 12 - MIXED RENEWABLES ON A FARM Caerfai Farm, St. Davids

The ultimate aim of Wyn & Christine Evans is to produce all the heating, lighting and energy needed to run their organic milk and cheese farm near St. Davids. Caerfai Farm covers 160 acres and also contains a popular camp site.



They are well on the way to achieving their energy goal with an anaerobic digester turning cattle slurry into methane gas to power the Aga cooker and a wind turbine producing 25 per cent of all the electricity used on the farm, the farmhouse and a holiday cottage.

Solar panels also produce enough hot water for a campsite shower block.



They have installed two Ground Source Heat Pumps. GSHPs use the relatively constant temperature of the ground to provide space heating, cooling and domestic hot water.

Radiating out from a sunken chamber at the centre of one of the fields are three trenches, each 2.4m deep by 1m wide. At the base of each 45m long trench there are coils of 25mm black alkathene piping, looped together to provide around 400m before being covered with sand for protection and partly backfilled. Half way up each trench there is another coil of the same sized alkathene, adding a further 300m to the equation, before the trench is totally top filled with soil.

They chose this particular field because it contains natural springs and has a higher water table. A better heat transfer from the soil occurs in wet rather than dry ground. Black surfaces also provide a better transfer of heat than coloured surfaces, hence the choice of black alkathene. The pipes contain a mixture of antifreeze and water with the concentration set to prevent freezing as low as minus 10°C. All the pipes come together in the central chamber



and are linked on a flow-and-return basis to a heat pump housed in a disused garage adjacent to the bungalow.

From the garage the heat is transferred to the bungalow's central heating and hot water system by means of a fully-automated condenser unit and plate exchanger linked to a hot water storage tank. Since using this system instead of the old oil boiler the bungalow has been significantly warmer. The cost of the entire system, including the pipes, excavation work, plumbing and the heat pump is just under £11,000.

After some teething problems and overcoming planning difficulties the farm's Gazelle wind turbine is now working well. Rated at 20kW, it is producing around 17.5kW, though minor adjustments to the blade angle will increase efficiency. It also promises to be far more cost effective in the years ahead.

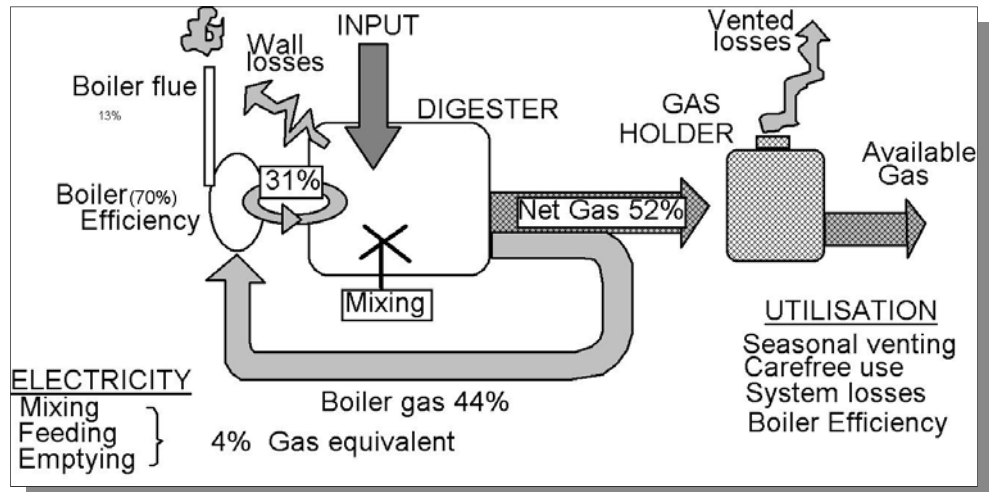
Wyn believes that when Peak Oil production hits in a few years time energy prices will be far higher than today's levels. Therefore, since 2000, he has been doing as much as he can to reduce fuel use, as well as cutting greenhouse gas emissions – which he is doing for the sake of his grandchildren. "I actually started down this trek when I was 14 by looking into anaerobic digesters" He says "That led to a 70m³ farm-built version being installed in the late 1970s and it is still going strong today."

He wants to take other energy saving measures on board, but time, getting technical assistance and finance are the main stumbling blocks. But higher energy costs make payback time shorter. Wyn has already put in more solar hot water panels and heat pumps. "There is heat to be captured in everything above absolute zero degree. It is simply a case of finding a way of harnessing it," he said.



He is also looking at ways to produce organic oilseed rape to produce biodiesel to run the tractors and pressed pulp, which is a good protein source for feeding the cows. "In my opinion many farmers are throwing away money by failing to make use of what nature provides – not least renewable energy."

How Does An Anaerobic Digester Work?



Contact Caerfai Farm for visits by appointment only, to stay at campsite or to buy produce - 01437 720548