



Introduction to Renewable Energy Technologies

Solar panels (generating electricity)



Solar radiation emitted from the sun can be used to generate electricity through a Photovoltaic (PV) system. The electricity can be used on site, exported to the National Grid or stored in batteries for later use. Its great attraction is that it delivers electricity to the point of use. This can be done at different levels - anything from a household to an industrial estate or Solar Park. The largest UK community energy project to date is a 5MW solar park at Westmill, Oxfordshire. PV costs are falling fast and by 2030 it may well be one of the cheapest ways of generating electricity.

For more detailed information go to www.solar-trade.org.uk.

Hydropower (generating electricity)



Hydropower is produced when the kinetic energy of flowing water is converted into electricity by a turbine connected to an electricity generator. The UK generates 1.3% of its electricity from hydroelectric schemes. Hydroelectric is proven to be an efficient and reliable technology, with most modern installations achieving efficiencies above 90%. The amount of energy produced from these schemes depends on the flow rate of the river and the volume of water in the river. One of the best known community-owned hydroelectric projects is at Settle.

For more detailed information go to www.british-hydro.org

Geothermal (generating heat and electricity)

99% of the earth's mass is over 100 degrees centigrade, with this temperature being maintained by natural radioactive decay. This has been exploited since Roman times by tapping into naturally occurring hot springs and aquifers. Recent developments mean that it is increasingly possible to engineer at depths of up to 5km, but there are still high initial exploration risks and high early capital requirements. These emerging developments are mainly urban based (Newcastle is currently exploring deep geothermal at Wearside). The technology has the potential to produce 10% of the UK's electricity demand and a third of the UK's heat demand.

For more detailed information go to www.r-e-a.net.



Wind power (generating electricity)



Windmills, wind turbines and wind pumps can be used to produce renewable energy. Wind power ranges from small turbines to power water pumps and caravan batteries to large multi-megawatt wind turbines, arranged in wind farms that supply power to the National Electricity Grid. This equipment has a range of power outputs, from under 100watt to 3 megawatts onshore (getting up to 7 megawatts offshore). Site conditions affect the size and type of turbine required. The first community-owned wind farm was at Haverigg in West Cumbria.

More detailed information is available at www.r-e-a.net.

Anaerobic Digestion (generating electricity, heat, vehicle fuel or injection to gas grid)



Biogas is produced from the natural breakdown of organic matter such as plant materials (e.g. grass silage) and animal wastes (e.g. slurry and farm yard manure) in the absence of oxygen (anaerobic digestion). Because of its ability to make use of wet wastes and manures it can play an important role in the reduction of greenhouse gases. Currently most Anaerobic Digestion (AD) plants in the UK are generating electricity for the National Electricity Grid and heat for a range of local uses. In addition, AD plants are being used to inject biogas directly into the National Gas Grid, and one is converting biogas into vehicle fuel. Close to

Brampton there is an operational 500 kilowatt AD plant at Linstock Castle and a 1 megawatt plant at Silloth.

For more detailed information go to www.adbiogas.co.uk.

Biomass (generating heat, electricity, combined heat and power, transport fuel and biomethane)

Biomass Boilers can be scaled from household level up to industrial level (one of the largest wood fuelled power stations in the UK (44 megawatts) is at Lockerbie). Fuel can be wood fuel (logs, woodchips and pellets), bioenergy (crops such as short rotation coppice and miscanthus), wastes and residues (municipal, commercial and industrial waste) and sewage gas (produced by digestion and incineration of sewage sludge from waste water plants).

For more detailed information go to www.r-e-a.net and www.biomassenergycentre.org.uk