Future of low carbon energy

Fact Sheet

Lesson1: Low carbon energy – is it all about renewable energy?

Renewable energy – energy created by natural resources which are naturally replenished

In 2008 there was an estimated $120 billion global investment in renewable energy capacity, a 100% increase from 2006. In terms of outpoint, solar capacity increased to more than 16 gigawatts (GW), wind power to 121 GW, biofuel to 12 billion litres per year and overall, total power capacity increased to an estimated 280 GW.

Solar energy – can be converted into electricity in two ways

- Photovoltaic or solar cells – changed sunlight into electricity
- Solar Power Plants – indirectly generate electricity by capture of heat from the sun is used to heat a fluid which produces steam which in turn powers a generator

Major advantages

- Energy is 'free'
- Unlimited supplies
- No air or water pollution

Major disadvantages

- Sunlight amount is not constant and irregular
- Large surface areas is needed to collect enough energy
- If not managed properly, large solar thermal farms in desert locations can damage the fragile ecosystem

Wind power

Wind farms are generally located in areas where winds are strong and constant and as a result offshore and high altitude sites are often favoured locations. At present is it estimated that wind power produces 1.5% of global electricity; a figure which has doubled in the last four years. In 2007, the BBC reported that the UK reached more than 2GW operational generation capacity (read the article) In the UK today there are 203 grid-connected wind farms with the capacity to generate 3 257MW (The British Wind Energy Association)

Major advantages

- Energy is 'free'
- No pollutants
- Can produce local energy supplies, especially for remote areas
- Land can still be used for other purposes e.g. farming

- Strength of wind is not constant, so amount of electricity produced can vary

- Turbines regarded by some as not aesthetically pleasing
- Pollution produced during manufacture of turbines
- Large wind farms are needed to produce electricity on a large scale (one large turbine, working at full capacity can only produce enough electricity for 475 homes)

Biomass

Biomass refers to the organic matter which is burnt to generate heat and power. Biomass, whether crops or timber, is grown specifically for the purpose of being burnt to generate energy. Biomass is considered sustainable and by some as carbon neutral as the carbon releasing during burning is offset by the carbon held in the organic matter. However, it is not sustainable if the planting and management of plants or trees is not sustainable in the first place. In the UK biomass includes Oil Seed Rape, Willow, Coppice and Poplar. At present Cambridge is home to the world's largest straw fired power station. It is able to generate over 270GWh of electricity a year which is enough heat and light 80 000 home.

Major advantages

- As long as plants and trees are replanted, it is an inexhaustible fuel source
- Easy to convert to a high energy fuel
- May encourage use of unused agricultural land and provide jobs in rural communities
- Very low sulphur output therefore slowing the production of acid rain

Major disadvantages

- Expensive energy source
- Some biomass crops are seasonal and not available all year
- Large scale crop production could lead to deforestation and widespread land degradation

It is predicted that the world's energy needs will grow by 55% between 2005 – 2030 which highlight the very real need to investigate and invest in alternative energy sources. UK stocks of oil and gas have decreased to the point where the UK used to be a net exporter but now it has to import some of its energy. By 2020 the UK will be importing 50-60% of its gas but that figure could rise to 80%. Malcolm Wick, Minister for Energy highlights the EU target of all energy to be generated by renewable by 2020 but he also argues that renewable alone will not provide the UK with the energy sustainability or energy security that it needs. Instead it will be a combination of and investment in a variety of alternative energy sources that will enable the UK to move towards low carbon energy sources and a low carbon economy.