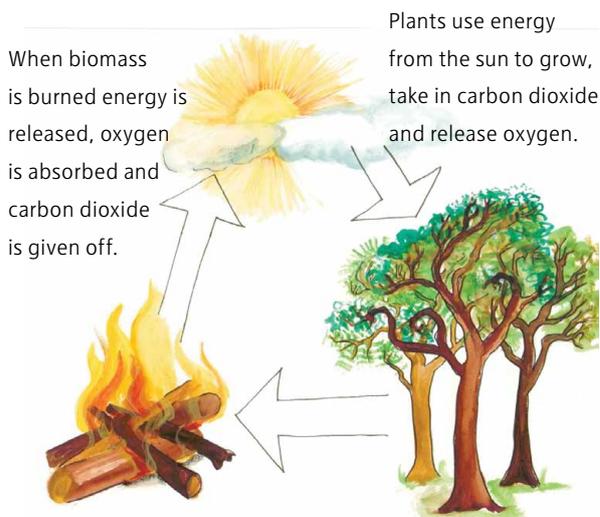


FACT SHEET – BIOMASS POWER

Biomass is the term used for any plant or animal based material. When plants grow they use the sun's energy to photosynthesise. When plant material is burned this process is reversed, releasing the energy absorbed from the sun.

Biomass is a bit like a battery storing solar energy, and is a renewable energy source provided that it is used sustainably.

The Carbon Cycle



History

Burning biomass is the oldest form of energy humans have used. Humans started using wood fires for cooking and warmth hundreds of thousands of years ago. Until the 19th century when fossil fuels started to be widely used, biomass, mainly in the form of burning wood, provided nearly all of mankind's energy needs and drove the start of the industrial revolution.

Hundreds of millions of people around the world still rely on burning wood for their energy. Biomass used for both heat and electricity generation is the largest source of renewable energy in the UK.

How it works

Biomass fuel can come from any plant material, this can either be crops grown specifically as energy crops or by-products of plants grown for other purposes, such as sawdust or straw. Biomass fuel can also be extracted from many waste streams, such as discarded food, old furniture, farm manures and green waste.

Some examples of energy crops are fast growing trees such as willow and poplar, grown as a short rotation coppice; miscanthus (a very tall grass), sugar cane, grains such as corn and plants that produce oil like oilseed rape.



Miscanthus grown for fuel. The stems are cut every few years to near ground level and new shoots grow up from the base, which can grow 4m in 1 year.

BIOMASS POWER CONT...

Biomass can be converted into more readily useable forms of energy in a number of ways. For example:

- 1 It can simply be burnt to produce heat and/or to create electricity. Moreover, to reduce fossil fuel use in a power station, co-firing with biomass is possible. RWE npower replaces a proportion of the coal used with biomass products such as wood (in the form of sawdust) and palm kernel expeller (PKE), at three of its large coal fired stations: Aberthaw, Tilbury and Didcot.
- 2 Biogas can be derived from a wide range of biomass materials. For example, biogas can be produced in a process called anaerobic digestion, where bacteria break down the biomass in the absence of air, producing a methane rich gas called biomethane.

There are an increasing number of anaerobic digestion plants being developed in the UK. The biogas produced can be collected and used as a fuel for generating heat, power and transport, or treated and injected into the gas network.

Biogas is also produced in large quantities in landfill sites as rubbish decomposes. In 2008, 22% of electricity from renewable sources in the UK was generated from landfill gas.

Another process for converting biomass into gas is gasification, where the biomass is reacted with a controlled amount of oxygen and steam at high temperatures. The resulting gas mixture is called synthesis gas, or syngas, which contains carbon monoxide and hydrogen. Gasification is likely to be widely used within the next decade.

- 3 Liquid biofuels can be used for transport instead of petrol or diesel. The two main liquid biofuels are bioethanol and biodiesel. Bioethanol is made by fermentation, and can be used instead of petrol. Biodiesel is made from vegetable oil, and can be used instead of diesel.



A landfill site

Biomass can be used on any scale, from a household heating system to a power station. Modern biomass boilers can be used in the home, are fully automated, and so can be used in exactly the same way as a gas boiler.

Advantages

- Biomass is renewable, and, provided it is used sustainably, will never run out.
- Biomass can be stored and used when it is needed.
- Using landfill gas prevents methane from being released into the atmosphere. Methane (CH₄) has 25 times the global warming affect of CO₂.

Disadvantages

- Burning biomass can, if it is not done efficiently, produce smoke, resulting in air pollution.
- If poorly administered or regulated, growing energy crops can displace food production, leading to food price increases or food shortages.
- Using biomass in an unsustainable way can lead to deforestation and greenhouse gas emissions.