



## **Earth's physical resources: renewable energy.**

*What is biofuel?*

### **Narrator:**

Biofuels are perhaps humanity's oldest terrestrial source of renewable fuel.

New technologies allow biofuels to be used on a large scale to produce electricity.

At this power plant in California, 22,000 tonnes of wood chippings and agricultural residues are burned every month.

The steam raised produces a continuous output of 25 megawatts of electrical power.

In Europe, wood-fuelled power stations are well established in Sweden, Denmark and Austria.

Britain's first wood-fuelled power station, the 10 megawatt ARBRE plant in North Yorkshire, was due to open in 2002, but the developers have encountered financial difficulties.

Municipal waste is another fuel that can be burned to produce both electricity and heat.

Although there's a constant supply, it can decrease the incentive to recycle waste in other ways.

And incinerators must always meet stringent standards to avoid toxic emissions.

Most environmental organisations dispute the inclusion of domestic waste incineration as a renewable energy source

### **Narrator:**

In the UK, relatively small quantities of commercial biogas are obtained from organic waste rotting down in landfill sites.

Biogas from this grassed-over site powers a set of three generators supplying 3 megawatts of energy to the regional electricity company.

But EU directives now discourage the future use of landfill for waste disposal.

Here in Denmark, organic waste is taken directly to a local biogas plant.

Any material that rots quickly is suitable for making biogas.

It can be household waste, agricultural slurry or animal dung.

Inside the biomass digesters, there's a thick soup of organic waste. In the warm, dark, oxygen-free conditions anaerobic bacteria convert the waste into biogas.

It takes 2 to 3 weeks to turn a batch of waste into biogas, a combustible mixture of methane and carbon dioxide. It's used to produce both heat and electric power. And it can be a substitute for petrol in specially modified motor cars.

The residue from the digester provides farmers with a free source of odourless organic fertiliser.

But more ambitious bio-fuel projects are at the planning stage.

**Erik Lysen:**

My estimate would be that biofuels would primarily be produced from woody biomass for example, in large bio-refineries, and those refineries can be made in such a way, that you produce not only fuel, but also heat as well as electricity, and so long, the the so called tri-generation concept. And my guess would be that these refineries are fairly large, in general it's far more efficient to produce them in large quantities,