

CUTTING CARBON PART III

Why biomass energy is booming

Burning organic material as an alternative to fossil fuels is increasingly cost-effective but it is not without drawbacks, says Fiona Harvey

Lees Court, one of the oldest estates in England, is home to one of the newest trends in farming. Across the rich acres of the Kent countryside, non-food crops such as calendula and echium are growing alongside wheat. Some are destined for use in cosmetics and innovative alternatives to plastics and other materials, but others will simply be burned.

"This will be the next revolution in agriculture and the drive will come from industry. It is in the early days, but it is not a question of if but when [such crops become a farming staple]," explains the Countess Sodes, who has championed non-food crops at Lees Court in order to provide an example to other farmers.

Burning crops is becoming more popular because it is good for the planet. The soaring price of oil also means now is one of the few times, since the power to extract oil and gas efficiently from the earth was developed, that doing so is cheaper than burning fossil fuels. As more land is devoted to non-food crop production, the economics of crops for fuel are likely to become even more favourable.

Using wood pellets - highly compressed waste sawdust - for heating is now cheaper than using heating oil or liquefied petroleum gases in the UK, according to the British Pellet Club. "The cost of heating oil delivered to most customers in England has almost doubled over the past two years. In contrast, pellet prices have been quite stable and with the current rate of increased use continuing can be less per kilowatt hour than fuel oil," says Gavin Gulliver Goodall, former chairman of the organisation. Similarly, ethanol is now cheaper than petrol in many places (see below).

Humans have been burning biomass - organic materials derived from plants or animals - since they discovered fire. Coal's use in the industrial age was a great step forward: as the residue of organisms that lived millions of years ago, it packed more calorific value into a smaller space and could be mined intensively. But the discovery that burning fossil fuels could have catastrophic consequences has brought biomass back into fashion.

Burning fossil fuels releases carbon dioxide into the atmosphere and the gas traps infra-red heat on earth that would otherwise escape into space. For this reason, scientists fear the global temperature rise of 0.6°C in the last century was just the start. The search is on to find alternatives to fossil

fuels.

Burning biomass also releases carbon dioxide but plants take up carbon dioxide from the atmosphere as they grow so when the carbon dioxide is released by combustion, the effect overall on the climate is neutral.

Even allowing for emissions of carbon dioxide from fuel used in planting, harvesting, processing and transporting biomass fuel, replacing fossil fuel with biomass can typically reduce greenhouse gas emissions by more than 90 per cent.

Biomass has a wide variety of forms. The most prized plants for energy production tend to be those that grow fast and produce either woody, relatively dry material that can be easily burned or oil that is high in calorific value. Examples of the former are willow and miscanthus, while the latter include soy and palm oil. Plants high in sugar can be fermented to make ethanol, a clean burning "biofuel".

Powerstations around the world are experimenting with forms of biomass to add to their coal or oil, with encouraging results. Kevin Akhurst, managing director of generation and renewables at RWE npower in the UK, says: "We have been trialling carbon-neutral biomass fuels like sawdust, forestry byproducts and palm kernel extract in most of our conventional power stations. We are planning to increase our investment in this area and are moving from trials to regular biomass operations."

Indeed, given the price of biomass compared with conventional fuels, power companies could profit by turning to biomass, especially when the subsidies that many governments offer for using renewable energy sources are taken into account. In the UK, power stations can make margins of more than 90 per cent when they use biomass along with coal, according to research from Platts Power UK. A typical 2 gigawatt generator could make £12.5m (\$22.5m) a year in profit by burning 200,000 tonnes of biomass.

Farmers can benefit from growing biomass. In Europe, the erosion of subsidies for certain crops is exposing farmers to market forces. Instead of being paid for whatever they produce, farmers must seek a clear demand for their product. Many believe, like Lady Sodes, that the demand for alternatives to fossil fuels could be just such a driver.

Farmers can also find a market for the waste.



Energy Power Resources operates the world's biggest power plant that uses chicken litter – droppings and used bedding – for fuel, capable of generating 38.5 megawatts.

Cow dung can also be used for fuel, as can "olive cake" – leftovers from making olive oil, used as biomass in one pioneering Spanish power plant since 1995. The methane that often escapes from agricultural manure can be used as fuel for industrial processes: the US government has championed a scheme that targets these sources of the gas.

Waste management companies can incinerate rubbish to produce energy. Some companies specialise in generating electricity from "landfill gas" – methane resulting from the decomposition of rubbish.

But while biomass offers a variety of potential alternatives, the world's infrastructure has developed around burning fossil fuels to such an extent that switching to biomass involves a shift in perception that many companies have not accepted.

Also, there are problems with using biomass. Although most coal-fired power stations could easily take a small proportion of their fuel from biomass without significant modification, few are built to run on biomass alone. Using biomass outside the electricity sector can be difficult. Using it to heat buildings, for example, is common in some Scandinavian countries but rare across much of the rest of the developed world and requires special equipment.

Burning some forms of

biomass also causes environmental problems. Oils and waste can be smelly, while wood produces smoke unless burned properly.

The supply chains for fossil fuels are well-established, but those for biomass are still in their infancy. Sources of supply for biomass rely on farm production and can therefore be less reliable than those for conventional fuels. Sources of supply are necessarily limited – biomass alone could never replace fossil fuels, and it would not make sense to turn a very large proportion of valuable agricultural land away from food crops. But as the world adjusts to oil at more than \$60 a barrel, and the need to rein in greenhouse gas emissions from coal-burning, these problems may receive more attention.

For previous articles, go to www.ft.com/carbon

RURAL REVOLUTION

- Farming non-food crops for fuel is said to be "the next revolution in agriculture".
- Burning biomass does release carbon dioxide but the effect is neutral since the gas had earlier been taken up by the plants.
- Power stations around the world are experimenting with biomass to add to fossil fuels.
- A switch to biomass is far from simple, however: so much of the world's infrastructure has developed around burning fossil fuels.

THE ETHANOL INDUSTRY IS DRIVING

CHANGE IN VEHICLE POWER

Ethanol is one of the easiest forms of biomass to bring to widespread use. Produced from grain or sugar, it can be added to petrol and used in cars.

Standard vehicle engines need no modification to use a small quantity of ethanol mixed with petrol. Estimates of exactly what this quantity is vary: the ethanol business says up to 30 per cent, but some suppliers, vehicle manufacturers and governments say 10 per cent is safer.

Ethanol producers in the US cheered the recent passage of the Energy Bill, which set targets for how much ethanol should be used in powering vehicles. Chris Thomas, chairman of Renova Energy, says: "The ethanol industry in the US has been growing at an unprecedented rate in the past few years and this new legislation will ensure continued growth in the industry over the next five years." Current ethanol production capacity in the US is 3.9bn gallons a year, according to Renova, while petrol consumption stands at about 140bn gallons a year.

A byproduct of ethanol production is a high-protein cake that is sold for cattle feed.

However, some environmentalists worry about the impact of producing ethanol, as corn can cause soil erosion and is often sprayed with more insecticides, herbicides and fertiliser than other crops.

Biodiesel can also be used to power vehicles, but is generally made from oils such as sunflower or soy oil, or even waste cooking oil or animal tallow. Not surprisingly, these can smell unpleasant when burned.



Sweet thought: sugar cane is used to produce ethanol, a clean burning biofuel

Reuters

Argus Ref 20484251