Biofuels: no magic bullet for EU

THE EUROPEAN Union (EU) will be hard pressed to meet its targets for increasing the use of biofuels. The high price of feedstock and the shortage of suitably large areas of land for growing the crops make them a much more marginal commercial proposition than in other markets, such as Brazil, writes Dan Lewis, director of environmental affairs, at the Stockholm Network.

By this year, the EU had hoped that blended biofuels (conventional diesel and gasoline diluted with fuels sourced from organic materials) would account for 2% of the automotive fuels consumed in the EU. But this figure will probably reach just 1.4%.

Targets beyond that date look even more difficult to achieve. The EU wants biofuels – biodiesel and bioethanol – to account for 5.75% of automotive-fuels consumption by 2010 and by up to 20% by 2020. This policy has two objectives: reducing pollution and increasing security of energy supply by producing the fuel from locally grown crops.

Rising demand

Transport fuels account for around 25% of the EU's greenhouse gas emissions and demand for diesel and gasoline is rising fast. In 2004, consumption amounted to 270m tonnes, compared with 180m tonnes in 1985, and is forecast to reach 325m tonnes in 2020.

In May 2003, partly in an effort to improve energy-supply security, the EU introduced a directive that set up non-binding targets for biofuel penetration in the transport-fuels mix that would see consumption rising from 1.4m tonnes in 2001 to 19m tonnes in 2010.

Biodiesel is a clean-burning, diesel-like fuel produced from energy crops – typically rapeseed – which produce vegetable oil, tallow or cooking oils. In an unmodified modern diesel engine, it can be blended into conventional diesel at up to 20%.

Biodiesel will have to make a larger contribution than bioethanol because of diesel's growing popularity in the EU – accounting for 60% of transport-fuel consumption. But there are considerable variations from country to country. Germany has the highest absolute and *per capita* consumption of biodiesel in the EU because of its favourable tax regime – the country consumed 1.1m tonnes in 2004. It is also the largest consumer of conventional diesel, at 30m tonnes. The UK, at the bottom of the EU league, consumed just 300,000 tonnes of biodiesel in 2004.

The perceived benefits of biodiesel are reduced carbon emissions and – more significantly – reduced particulates pollution. Containing no sulphur or aromatics, biodiesel is a far cleaner-burning fuel than conventional diesel.

Yet while many consumers are attracted by its green qualities, most are unaware of the true cost of the fuel, which is obscured by the way tax is applied. In the UK, the duty derogation is £0.20 a litre ($0.35/l) below the rate levied on ultra-low-sulphur diesel. But this has not been enough to offset the additional production cost of biodiesel – estimated to be twice that of conventional diesel.

Large-scale production will also be costly in terms of land. It has been estimated that just to meet the 5.75% target, over 9% of the EU's agricultural area will be required. Rapeseed requires almost twice as much land as bioethanol-producing grain to produce the same quantity of fuel.

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The cost of biodiesel could be cut considerably if it were produced from crops grown outside Europe. D1 Oils, whose stock on London's Alternative Investment Market has risen substantially this year, is developing huge jatropha tree plantations in Africa, India and Saudi Arabia, to create low-cost feedstock for biodiesel. But this approach will do nothing to improve energy-supply security.

Bioethanol is a petroleum additive and substitute that can be blended with gasoline or, as in Brazil, used as a 100% fuel substitute in specially modified engines. An unmodified gasoline engine can run on up to 5% bioethanol. It is an alcohol made from renewable sources such as corn, wheat or sugarcane. Grains are processed with enzymes, biologically fermented and the mash is distilled to produce a fuel-grade alcohol.

Globally, bioethanol production outstrips output of biodiesel by 20 to one. Brazil is the world's biggest bioethanol producer and consumer, producing 15m tonnes in 2004 – 40% of the world total – exporting 2.4m tonnes to India. The US is the next biggest producer and consumer, at up to 14m tonnes in 2004.

Bioethanol production is large in Brazil mainly because of government incentives, aimed at curbing expensive oil imports. In addition, locally grown sugarcane is a cheap feedstock – half the price of the corn used in the US for the same purpose. With its enormous land resources, Brazilian bioethanol exports could be expanded, especially if the US government removed the $0.54 a gallon import tariff it has placed on the product.

However, in Europe, as with biodiesel, land and feedstock costs are high. The European Commission says that to produce 13m tonnes of bioethanol requires 5.1m hectares for grain and 0.6m hectares for sugar beet. Producing bioethanol from sugar beet costs more than twice as much as producing it from sugarcane in Brazil and nearly 40% more than from corn in the US. In addition, the energy density of ethanol is vastly inferior to that of gasoline – only 19.59 megajoules a litre (MJ/l) compared with 29.1 MJ/l for gasoline. Even if bioethanol cost the same per litre as gasoline, a driver would have to buy 50% more in volume to make the same journey.

A great future

Some optimists claim bioethanol has a great future, although this is dependent on oil prices staying high. Spain's Abengoa, which has a bio-energy division, says bioethanol in Europe becomes competitive when the oil price reaches $70 a barrel, while, in the US, cheaper feedstocks mean it is competitive at $45-50/b. Some would argue that Brazil has already saved large sums by not importing oil when the price is over $30/b.

Despite barriers to widespread biofuels commercialisation – import tariffs; lack of consumer awareness; resistance of carmakers to modify engines; unfavourable tax rates; and, above all, a lack of refining and production capacity – progress continues to be made as genetic engineering lowers costs. Yet the biggest external factor in determining the rate of uptake is the cost of crude. If oil prices remain high, the world will increasingly allocate resources to biofuels.

But there is another way. The EU could try to reach the same policy goals by making use of other technologies and imported bio-feedstocks. It could encourage investment in hybrid electric-engine technology, which has greater potential to deliver reduced emissions at a much lower cost than EU-subsidised programmes for home-grown biofuels. Hybrid engine statistics are impressive – they travel up to 60 miles a gallon and have virtually no carbon dioxide or particulates emissions when driving under 30 miles an hour.

Greater use of hybrid technology could be complemented by a level playing field in biofuels. This would make possible imports of low-cost sugarcane-based ethanol from Brazil, the cheapest biofuel in the world.

But, for now, the scale of the EU's challenge is held back by the shortage of land resources, high feedstock costs, agricultural protectionism and an unshakeable dependency on oil. Biofuels are no magic bullet. □