

CHAPTER 12

PUTTING TROUBLE IN YOUR TANK

At the rate at which the European Union and its member states are supporting the production of ethanol, they could have gone to the world market and bought twice as much energy in the form of petrol for slightly less money.

2007 report by the Global Subsidies Initiative.

Not all biofuels are equal – there should be no favouring of EU production of biofuels with a weak carbon saving performance if we can import cheaper, cleaner biofuels.

European trade commissioner Peter Mandelson, July 2007.

Despite biofuels being cast as the culprit for pressure on world food prices, there is a case for *some* further increase in the use of biofuels in Europe.

Road transport accounts for nearly one third of Europe's total energy use. Around 98 percent of road transport is fossil-fuelled. Most of the future growth in Europe's CO₂ emissions will come from transport. And biofuels are the only cleaner alternative road transport fuel on the horizon. Moreover, replacing some of Europe's imported oil with home-grown fuel improves energy security, and in a small way moderates the rise in oil prices. According to the International Energy Agency, 'biofuels have become a substantial part of faltering non-Opec supply growth, contributing around 50 percent of incremental supply in the 2008–13 period.'¹

So in March 2007 European Union leaders decided biofuels should, in principle, account for at least 10 percent of all transport fuel in all 27 states in the Union by 2020. In the January 2008 draft legislation to implement this goal, the Commission proposed the 10 percent minimum should be of 'renewable

energy', not just biofuels. This redefinition was retained in the December 2008 legislative agreement, which made clear the 10 per cent renewable energy minimum should be of the EU's total fuel consumption in all forms of transport. The final deal gives a preference to the development of so-called second generation biofuels – such as fuels made from residue, waste and woody biomass – which unlike crop-based first generation biofuels do not compete with food or feed production. So second generation biofuels will get a double credit towards the 10 percent target, while renewable electricity powering electric cars will be counted at 2.5 times their input towards the target. Green electricity powering trains can also count towards the target, but only once as with all first generation biofuels.

But before delving into the controversy behind this shift in emphasis, it is important to establish why a mandatory across-the-board minimum was felt to be necessary in the first place. It is not just that it suits European farmers and those EU states with a big farm lobby as a continuation of the Common Agricultural Policy by other means. There is another reason. If biofuels were bundled in with other forms of renewable energy, and left without a specific target, many people and governments in the EU would think it more environmentally or economically rational to focus on wind or solar power or even other uses of biomass.

For if you wanted to use biomass – crops, wood and waste – to get maximum reduction in greenhouse gases you would use it for electricity, and if you wanted to turn biomass into energy most efficiently, you would use it for heating. So, if there were no compulsion to develop biofuels, nothing would be done to clean up Europe's vehicle emissions. (The only profitable form of biofuels developed so far remains alcoholic spirits for human consumption. 'Biofuels are basically booze', a vice-president of the ExxonMobil oil company recently told a conference, 'and we don't do booze'.)

For those who savour trade-offs and policy dilemmas in energy policy, biofuels are a gem. The biofuel industry will compete with the food sector for agricultural crops. It may, while helping to combat global warming and to clean up the atmosphere, also damage the terrestrial environment by encouraging monoculture

1 IEA Medium Oil Market Report, 1 July 2008

of energy crops and reducing bio-diversity. As a relatively clean home grown form of energy, biofuels would appear to appear to serve the cause of both energy security and climate stability. But there could be friction between these two goals, especially if, because of its protectionist biofuel lobby, the EU were to aim at biofuel self-sufficiency by growing biofuels that only marginally reduce carbon and by shutting out imports with a far higher 'carbon-saving' capacity. That in turn could lead to conflict with many developing countries that see in biofuels a valuable new export. The climate could also suffer if Europe were to import biofuels heedless of whether these had been produced on land cleared of rain forest; for halting tropical deforestation is by far the most effective way of slowing the rise in carbon emissions.

Aware of some of these pitfalls, EU leaders attached some conditions to their March 2007 summit's endorsement of the 10 percent biofuel target for 2020. They said it should be introduced 'in a cost-efficient way', and added that 'the binding character of this target is appropriate subject to production being sustainable, and second generation biofuels being commercially available'. But, perhaps unwisely, the Commission did not take this too seriously. It entered a statement into the minutes of the March 2007 summit that it 'does not consider the binding nature of the target should be deferred until second generation biofuels become commercially available'. Subsequently the Commission official in charge of renewable and biofuel policy told a conference that the rider about second generation development should not be regarded as 'absolute conditionality'. However, as we shall see, the European Parliament has taken this condition rather more to heart.

Although used in Europe during periods of war or excess agricultural production, biofuels only became the object of serious scientific research and political attention after the first oil shock of the early 1970s, and of industrial production since the early 1990s. The first policy measures to benefit biofuels were not specific to the industry at all – the CAP was reformed to divert agricultural surpluses to industrial uses. As part of its deal with the US concluding the Uruguay round of world trade negotiations, the EU instituted a scheme whereby farmers had to set aside a portion of their arable land, on which they could

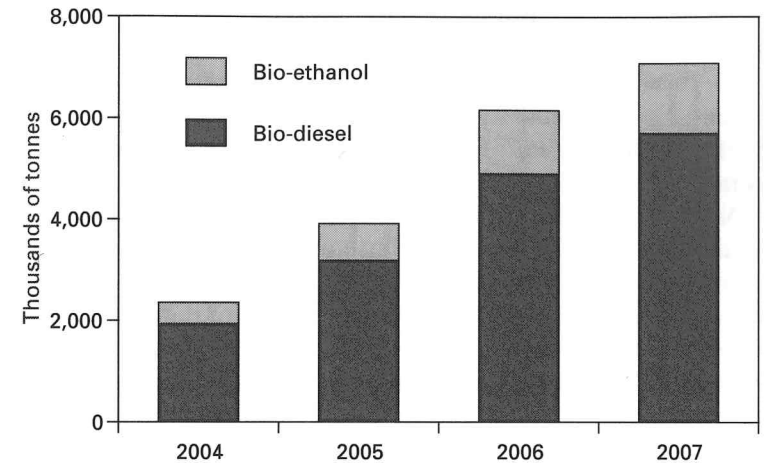


Figure 6: Biofuel Production in the EU

Source: Sources: European Bio-diesel Board, European Bio-ethanol Fuel Association.

grow non-food crops, such as oilseed rape for biodiesel. The Commission reported in 2006 that more than 95 percent of the 'non-food set-aside areas' had been used for energy crops.²

A 2003 directive on the voluntary promotion of biofuels set a non-binding target for a 2 percent biofuel share of the EU road fuel market by 2005, and 5.75 percent by 2010.³ But by 2005 the actual biofuel share was only 1 percent, and it became clear that voluntary means alone would be insufficient to meet the 2010 goal, despite the existence of sizeable fiscal incentives.

Economic costs

The biggest financial prop for biofuels has been exemptions from, or reduced rates of, excise duty on fuel. There is no EU-wide exemption from excise duty for biofuels – partly because there is no EU excise duty or common EU-wide level of national

2 COM (2006) 500, Report from the Commission to the Council on the review of the energy crops scheme, p. 7.

3 EU directive, see 2003/30/EC.

excise duty on fuel. But there is EU legislation allowing member states to give biofuels exemptions from their standard rate of excise on fuel. In the 1990s these fiscal advantages were limited to biofuels produced in pilot plants, but since the passage of the 2003 Energy Taxation Directive they can, and do, cover commercial biofuel production.

As of mid-2007, 16 member states were offering such tax breaks to their biofuels sectors. Since the aim is to enable biofuels to compete on equal terms with fossil fuels in the marketplace, the tax break is supposed to cover no more than the gap between oil prices and biofuel production costs. Nonetheless, these tax exemptions constitute by far the largest part of financial support for biofuels in the EU. By one calculation, they amounted in 2006 to over Euros 900m of the Euros 1.3bn total financial support that went to bioethanol in Europe, and Euros 2.1bn of the total Euros 2.4bn that went to biodiesel in Europe.⁴

However, the burden of support will spread more widely to consumers as well as taxpayers, as the compulsory minimum market share for biofuels comes into effect. Some such quotas are already here on a national level. By 2008 nine member states had already, on their own initiative, imposed mandatory biofuel market shares or blending targets on themselves. They included, ironically, the UK, a country that lags behind almost all others in its take-up of biofuels. The UK introduced its 'renewable fuel obligation' on April 1 2008, only to respond to growing public disquiet about the biofuel impact on food prices by announcing a couple of days later a review of the policy by Ed Gallagher, chairman of the UK Renewable Fuel Agency.

To clean up conventional road fuels, the EU also agreed at the end of 2008 on a revision of its 1998 Fuel Quality Directive. As well as raising the amount of biofuel that can be blended with petrol from 5 percent to 10 percent, the revision would require a 6 percent reduction in greenhouse gas emissions per energy unit of fossil fuel by 2020.

The cost of supporting biofuels is bound to increase in the

future. The biggest element in that support – exemption from excise duty – would evaporate if biofuel production costs fell below that of oil. Even at the very high oil price of mid-2008, this is unlikely to happen, partly because some fossil fuel is needed to make biofuels. As the Organization for Economic Cooperation and Development (OECD) has pointed out, 'higher oil prices will both raise the production cost of biofuels (as fossil fuels are an important input in the production process) and exert upward pressure on agricultural commodity prices as a result of the increased demand for them.'⁵ So by expanding biofuel production, the positive link between oil prices and biofuel costs might awkwardly get stronger, not weaker. If the cost of biofuels moves in the same direction as oil prices, the biofuels would be unlikely to reduce transport prices.

If all that mattered was producing biofuels, the EU could do a great deal. According to the Commission's Biofuel Research Advisory Council, 'in 2030, EU biomass would hold the technical potential to cover between 27 percent and 48 percent of our road transport fuel needs, *if all biomass would be dedicated to biofuel production*' (emphasis added).⁶ But, in the absence of war or total and prolonged interruption in oil imports, devoting all biomass to making biofuel is a quite unrealistic proposition. So the advisory council settled for a quarter share of EU road transport fuel needs being covered by biofuels in 2030 as 'realistic', half from domestic production and half from imports.

Even a quarter-share could be fanciful, however, according to a report done for the OECD. It believes the economics of biofuels will remain unfavourable. 'Although there is scope for production costs for biofuel feedstocks to decline as a result of improvements in yields, it is not clear that such improvements will be enough to compensate for rising prices due to production factors and the combined pressures on prices of rising demand for food, feed and biofuels. Increasing competition with biomass feedstocks – woody material as well as agricultural products – is

4 'Biofuels – At What cost? Government Support for Ethanol and Biodiesel in the European Union – 2007 Update' Global Subsidies Initiative, Geneva, October 2007.

5 OECD report, 'Biofuels: Is The Cure Worse Than The Diseases?', 12 September 2007, p. 5.

6 Final report by the Biofuel Research Advisory Council, Office for Official Publications of the European Communities, 2006, p.18.

actually pushing feedstock prices and production costs up. Higher oil prices will have the effect of increasing biofuel production costs while simultaneously making fossil fuel alternatives such as tar sands and coal-to-liquids increasingly competitive.⁷ All of these are factors that would threaten the economics of all but the most competitive biofuels such as Brazilian ethanol.

Environmental costs

The most obvious tensions in promoting biofuels are the risks to food production and the environment. Controversy rages over biofuels' share of the blame for higher world food prices. The US administration and the European Commission put this share as low as 3 percent, but an internal World Bank report was reported to blame biofuels for 75 percent of the 140 percent rise in the price of a basket of food commodities over the period of 2002–8.⁸ For its part, the UK's Gallagher review concluded in July 2008, 'the demand for biofuels contributes to raise prices for some commodities, notably for oil seeds, but that the scale of their effects is complex and uncertain to model.'

The Commission claims to be relatively confident that, at least in the short to medium term, the strains on EU crop resources would be manageable, provided that the EU lets in adequate imports and makes progress, over the longer term, on second-generation biofuels made out of wood and cellulose that would not compete with food. EU production of ethanol is relatively modest, using less than 1 percent of the Union's cereal and sugar beet harvests. But any further surge in biodiesel production in Europe could put serious pressure on rapeseed oil output, of which 60 percent already goes to biodiesel. The scientific committee of the European Environment Agency, an EU body, gave in April 2008 its view that the proposed 10 percent target was 'over-ambitious', carried too many environmental risks, and should be suspended pending further research and replacement by 'a more moderate long-term target, if sustainability cannot be

guaranteed'.⁹ Increasing concern has also been expressed about the 'displacement effect' of increased cultivation of biofuels in Europe, leading to more land being cleared in developing countries for the food that Europeans would no longer be growing. Moreover, the food industry is not biofuels' only competitor for the produce of Europe's fields and forests. Outside the energy field, there are other industrial users of biomass, especially chemical companies that draw many substances from agriculture and forestry, and the packaging and construction sectors that use a lot of wood products. The governments of Austria, Belgium, Finland, France, Germany and Luxembourg – all with forestry interests – made a joint appeal in December 2007 for the EU not to let its drive for biofuels short change these other industries of renewable raw material.

The environmental calculation has to weigh what a given biofuel process does for the atmosphere and the land. Specifically, can it 'save' enough greenhouse gases, compared to conventional petrol and diesel, to justify the extra strain it might put on the land? OECD studies claim only three current technologies meet this test: Brazil's sugarcane-to-ethanol process; ethanol produced as a by-product of cellulose output as in Sweden and Switzerland; and manufacture of biodiesel from animal fats and used cooking oil (requiring little or no further input of fossil fuel). Other conventional biofuel technologies typically deliver savings of greenhouse gases of less than 40 percent, compared to their fossil-fuel alternatives, which therefore may be insufficient atmospheric improvement to warrant extra strain on the terrestrial environment. 'When such impact as soil acidification, fertilizer use, biodiversity loss and toxicity of agricultural pesticides are taken into account, the overall environmental impacts of ethanol and biodiesel can very easily exceed those of petrol and mineral diesel.'¹⁰

The eventual EU legislation agreed in December 2008 took many of these considerations into account. For a biofuel to be counted towards a member state's 10 percent minimum

7 OECD report cited above, p. 6.

8 Reported in *The Guardian* newspaper, 4 July 2008.

9 EEA Committee press statement, 10 April 2008, see also www.eea.europa.eu

10 OECD 2007 report cited above, p. 5.

renewable energy share in transport fuel, it must save at least 35 percent of greenhouse gas emissions compared to fossil fuels. The GHG saving threshold for target-qualifying biofuels will rise to 50 percent from 2017 onward, and from that date new installations must produce biofuel with emissions at least 60 percent lower than fossil fuels. The chosen fossil fuel benchmark for judging for GHG savings is the fairly tough one of Middle East oil, whose relatively easy extraction and refining requires little fossil fuel input (by contrast, virtually any biofuel would show enormous GHG savings if compared to, say, oil from Canadian tar sands).

The legislation sets out, for various biofuels, 'default' GHG savings rates which are generally below 'typical' rates. The default rate is the emission saving that a biofuel will be assumed to produce, in the absence of any evidence to the contrary. But, if they take the trouble to do so, producers can generally show to the EU authorities that their manufacturing technique will produce higher GHG savings, approaching the typical rate for that particular biofuel.

The table below has some examples of estimated GHG savings for different biofuels taken from annexes to the legislation. It illustrates, with the example of wheat ethanol, that the process fuel in making a biofuel can be crucial. It shows that corn or maize ethanol, the biofuel staple in the US, makes reasonable savings, but would only just meet the 50 percent EU threshold from 2017 on. It underlines that sugar crops produce a good GHG reduction, but that sugar cane (as grown in Brazil for instance) outperforms EU-grown sugar beet. It highlights that rape seed diesel, currently a European staple, may struggle under the new legislation to count towards national or EU targets. It points to the savings gained in using waste product, such as vegetable or animal oil, that has already been refined, or simply using gas as gas in the case of biogas from municipal organic waste being used as compressed gas to power vehicles. Finally, with the last three categories, it estimates the savings to be made from so-called second generation biofuels made from non-food crops.

But note that the chart below assumes that there has been no net increase in carbon emissions as a result of the change in

Table 13: Not all Biofuels are Equal

<i>Biofuel production pathway (on the assumption of no net carbon emissions from land use change)</i>	<i>Typical greenhouse gas emission saving*</i>	<i>Default greenhouse gas emission saving*</i>
Sugar beet ethanol	61 %	52%
Wheat ethanol (process fuel not specified)	32 %	16%
Wheat ethanol (natural gas as process fuel in CHP plant)	53 %	47 %
Wheat ethanol (straw as process fuel in CHP plant)	69%	67%
Corn (maize) ethanol EU-produced (natural gas as process fuel in CHP plant)	56 %	49 %
Sugar cane ethanol	71 %	71 %
Rape seed biodiesel	45 %	38 %
Sunflower biodiesel	58 %	51 %
Waste vegetable or animal oil biodiesel	88 %	83 %
Biogas from municipal waste as compressed gas	80 %	73 %
(Future) wheat straw ethanol	87 %	85 %
(Future) waste wood ethanol	80 %	74 %
(Future) farmed wood	76 %	70 %

* Greenhouse gas saving compared to oil from the Middle East

Source: Annexes to resolution adopted by the European Parliament, 17/12/08

use of the land on which the biofuels are grown. For there are types of land that would release such large amounts of carbon on being converted to biofuel cultivation that biofuel 'saving' could never make up the carbon loss from the original land use change. Top in carbon storage are wetlands, followed by forests, because of the foliage in both. According to the United Nations' International Panel on Climate Change wetlands on average hold 686 tonnes of carbon per hectare, forests 275 tonnes per hectare and grasslands 181 tonnes per hectare, compared to only 82 tonnes per hectare of arable land.

Obviously, maintaining land so good at capturing and storing carbon is essential. So the Commission has proposed that no financial support or compliance credit should go to biofuels

grown on land that, as of January 2008, was classed as wetland, mature forest, undisturbed forest, protected nature zones or highly bio-diverse grassland. Green groups criticized the Commission for setting the cut-off date so late that many of the slash-and-burn tropical clearance schemes of recent years will get into the EU biofuels scheme. The Commission said it had considered pushing the cut-off date back to 2003, the date of the previous EU directive on renewable energy, or even to 1992, the date of the UN Framework Convention on Climate Change. But it said it concluded that January 2008 was the appropriate cut-off because only then did its sustainability criteria become clear, implying that any earlier cut-off might unfairly penalize biofuel producers working on different assumptions about Brussels' eventual attitude. It is a pity that the EU did not think more about sustainability at the outset of its biofuel policy.

Many of the objections to the first 'booze' generation of biofuels would fall away if a second generation could be developed from 'lignocellulosic' biomass, from farm by-products such as straw, from wood products and from pulp and paper processes. Use of these inedible raw materials would avoid direct competition with the food industry, though there would still be some environmental concerns about what might be called 'factory forestry'. Indeed some first-generation biofuels only make sense as a bridge – and a short bridge at that – to the next generation. 'One reason that first generation biofuels continue to be promoted as serious solutions to the twin challenge of climate change and energy security is the notion that they will soon be supplanted by more advanced technologies now in development', according to the OECD study.¹¹

But the same report goes on to cast doubt on whether second generation biofuels will become economically viable any time soon. It bases part of its doubt on logistics, not science. 'The logistical challenge of transporting biomass material to large production facilities is likely to impose a floor below which production costs cannot be lowered. This leads some to believe that the second generation biofuels will remain niche players, produced mainly in plants where the residue material is already

available in situ, such as bagasse (cellulosic residue from sugar cane pressing) and wood-process residues.' Such conditions are likely to be confined to Brazil and Finland.

Biofuels in moderation

For some years, however, the EU will have to make do with the current set of biofuels and cope with the dilemmas they cause. Having a mandatory biofuel target at some level is not a bad idea; the 2003 voluntary target produced little progress. Equally, putting too much stress on first generation biofuels is unwise, as many in the European Parliament pointed out. We have already seen in the previous chapter how Claude Turmes, the ponytailed Green MEP from Luxembourg, had a considerable influence on renewable electricity as the European Parliament's rapporteur on renewables legislation. On biofuels Mr Turmes wanted no mandatory target at all to encourage first generation biofuels. In the end he failed to get the 10 percent target killed, but he was very instrumental in scaling back incentives for first generation fuels by giving such favourable weighting to second generation biofuels.

One important advantage of scaling back the target, bringing demand more in line with sustainable supply, would be to reduce the incentives for producers to cheat on environmental standards. This is particularly important outside the EU, where the sustainability of biofuel production will inevitably be harder to police than in Europe.

Trade in biofuels will grow. Indeed it should grow. At present it only accounts for around 10 percent of global biofuel consumption. This is almost certainly too small, given that the wide differences in biofuel production costs around the world ought to make a higher proportion of commerce beneficial to all. But the EU, like the US, is generally keen to protect its biofuels sector from imports.

One instrument of protection is technical. The EU prescribes an iodine threshold below that generally in the soya bean oil grown by the big North and South American soya producers, while the tendency of palm oil, produced in quantity in south

¹¹ Ibid.

East Asia, to go cloudy and waxy in cold weather inhibits to some extent its use in Europe.

But Europe's other means of protection are tariffs. These are relatively low (3.2–6.5 percent) on biodiesel. But because the EU is by far the biggest world producer of biodiesel, imports of it are equally low, except bizarrely imports from the US because of a US export subsidy (which Brussels has been contesting). EU duty on ethanol is much higher, 39 percent on denatured (rendered unfit for human consumption) ethanol and 63 percent on pure ethanol. Nonetheless Sweden in particular has become a very big importer of Brazilian ethanol, by importing it as a product for blending with petrol and thereby paying a much lower duty on it.

The EU needs to strike a balance on biofuel trade. It needs to persuade the domestic EU biofuel industry that Europe cannot hope to meet even scaled-down biofuel targets without a reasonable level of imports. At the same time, it needs to persuade foreign biofuel producers that they cannot hope to get into the EU market without observing environmental standards.

Neither task will be easy, as became evident at a biofuels conference that the European Commission hosted in Brussels in July 2007. While Swedish trade minister Sten Tolgfors argued that biofuel trade needed to be freed of all distortions so as to use 'the full potential of the international trading system to halt global warming' (and presumably to let Sweden import Brazilian ethanol duty-free), Ramon de Miguel, president of the European Bioethanol Fuel Association, claimed his industry continued to need import protection. Otherwise, he claimed, imports from countries like Brazil would jeopardize European investment in the sector, especially important research into second generation biofuels, and would undermine the extra energy security that home-grown fuels were beginning to offer Europe.

Most non-European biofuel producers at the Brussels conference grasped the need to convince their customers of the environmental acceptability of their product. President Luiz Inacio Lula da Silva said most of Brazil's sugar cane (for ethanol) was being grown far from the Amazon rain forest. While most biofuel producers stressed that they were using marginal or waste land, Yusof Basiron, chairman of the Malaysian Palm Oil Promotion

Council, acknowledged that some of his country's palm oil was grown on prime land. But he said that this had been opened to farming so long ago – as far back as 1917 – that it made no recent difference to the climate.

But Argentine farm minister Javier de Urquiza warned against the imposition 'from the outside' of sustainability standards. EU attempts to impose its standards unilaterally may be resisted by many countries, but mutually agreed international standards for certification of 'good biofuels' would also be difficult to negotiate. It would raise the tough issue – as with carbon compensation measures discussed in Chapter 10 – of whether it is possible and legal in international trade to discriminate, on environmental grounds, between *processes*, not just between *products*.

In sum, then, some further increase in biofuels is needed as the only way of tackling road transport emissions pending the commercial development of electric or hydrogen fuel cell cars. Some degree of compulsion is necessary to achieve this increase, because the biofuel share in road transport fuel is still only 1 percent despite sizeable tax exemptions in more than half EU states as well as quota obligations in some countries. Why should there be compulsion at the EU level? One reason is the alternative of increasing the biofuel tax exemption and spreading it across all 27 states would be hard to agree politically, and create a very uneven instrument, given the lack of any common EU level of fuel tax that biofuel would be exempt from. The broader reason for common action on biofuels is to avoid distortion in Europe's internal and external markets. Some imports are vital to prevent environmental damage in Europe. But some sustainability standards are vital to prevent environmental damage outside Europe.

In retrospect, the EU should have established its environmental criteria for biofuels some years ago in less politically charged circumstances. If the debate becomes too polarized, it condemns the EU to the kind of inaction, which, as we shall see in the next chapter, is evident with nuclear power.