BIOFUELS

Biofuels build up

The European biofuels market faces major challenges and opportunities, which could improve with the new European Commission Green Deal, reports *Brian Davis*.

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Dr Ausilio Bauen, Director, e4Tech

The biofuels industry faces a significant challenge from the electrification of transport. In the interim, hybrid vehicles offer an opportunity. And in the long-term, the biofuels sector expects to play a major role in heavy duty vehicles, shipping and aviation.

'Full electrification of passenger cars will take a long time, so there will be space for fuel blends with biofuels. Increasingly there will be a shift towards using biofuels for heavy duty vehicles, shipping and aviation, because those areas are more difficult to decarbonise through electrification,' says Dr Ausilio Bauen, Director, e4Tech.

Market development of European biofuels has been challenged by policy uncertainty and changes in direction at both EU and member state levels. As the Sub-Group on Advanced Biofuels (SGAB) in the European Commission pointed out in a major report (2017): 'Since 2003, EU legislation on biofuels has changed twice substantially and become more complex.'

While there was significant investment in production capacity to produce biodiesel and bioethanol to fulfil the biofuels mandates in the EU Fuel Quality Directive and Renewable Energy Directives (RED I and RED II), significant capacity is under-deployed. What's more, there is only a limited market framework for advanced biofuels, which may be insufficient to provide security to potential investors.

The European Commission issued a Winter Package in November 2016, which included a comprehensive revision of RED (RED II) with provisions for the biofuels sector from 2020–2030 and encouraged some stability in this sector. These include a fixed mandate on market operators for renewable fuels of about 7%; including Annex IX-A for advanced biofuels of 3.5% which is double counted, so 1.75% in real terms.

In December 2018, the revised RED II was formally adopted. Under Annex V for liquid biofuels, greenhouse gas (GHG) emissions must be cut by 65% after January 2021. Limits are set on high ILUC-risk (indirect land use change) biofuels. A 14% renewable energy target is set for the transport sector, with dedicated targets for advanced biofuels of 0.2% by 2022 rising to 3.5% by 2030.

The biofuel associations EBB (European Biodiesel Board) and ePURE complain about the ability of member states to double count the contribution of certain waste-based biofuels to GHG emission reduction. There is also call for a pan-EU certificate trading system for purposes of traceability, with a penalty for non-compliance.

'The biofuels industry is increasingly under pressure because of the requirements it has to meet in terms of sustainability,' remarks Bauen. RED II has a cap on biofuels derived from food crops. For high ILUC biofuels, that cap decreases to zero by 2030, while biofuels certified as low ILUC will remain within the 7% cap.

Currently, there is growth in the production of biofuels from hydrotreated vegetable oils (HVO), including used cooking oils and animal fats (tallow). These are used in combination with raw vegetable oils like rapeseed and decreasingly with palm oil (because of strong environmental opposition). European HVO production is forecast to grow 20% this year and a further 30% by 2030. To a large extent HVO is going to the diesel market and increasingly will be processed as HEFA (hydrotreated esters and fatty acids), a renewable aviation fuel.

In Europe there are three key HVO producers, Nesté, Total and Eni, while companies like BP and Preem in Sweden are co-processing waste oil and fats in refineries along with crude products. Sky Energy, KLM and SHB Energy are also building an HVO plant to supply the aviation fuel market.

Biodiesel

Biodiesel production in 2018 was 2.8bn litres globally and is expected to rise 10% in 2019 and 30% in 2020. 'While biodiesel FAME (fatty acid and methyl ester) and HVO from used cooking oil and tallow have benefited from double counting, it's been tough times for biodiesel producers relying on raw vegetable oils, because of sustainability concerns and high feedstock costs,' comments Bauen.

There are about 120 biodiesel plants operating in Europe, mainly located in Germany, Italy, Austria, France and Sweden, with production capacity of about 21mn t/y and 11.5mn t/y demand, according to the EBB. 'There is plenty of spare capacity because the incentives are not as strong as they should be', says EBB Public Affairs Director André Paula Santos. 'We think it is essential to increase the blend wall. In most of Europe you can only blend up to 7% of biodiesel. Whereas B10 is widely used in France and moves are underway to allow B20 in the US subject to carmakers' approval.'

'Despite the electric vehicle fever around decarbonisation of passenger cars, we are still going to need biofuels for heavy duty transport, as well as the maritime and aviation sectors. The 14% renewables target in RED II is not ambitious given the multipliers and should be raised to 20% and higher by 2040. We are very happy the new European Commission and European Parliament have put climate change at the forefront of priorities in the new Green Deal, which will step up EU ambitions on renewables.'

The EBB is campaigning for a stronger traceability system for biofuels to address fraud risks across the supply chain and ensure companies are using feedstock from sustainable sources. Investigations are underway in the Netherlands regarding fake oils and a CEO has been sentenced to prison for illegal imports. 'A single EU traceability system would

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ensure that every feedstock is coming from sustainable sourcing,' says Paula Santos. RED II specifies that by 2021 the European Commission should put in place a traceability database.

There is also the thorny issue of subsidised imports of biodiesel. Duties were imposed by the EU on Argentina in 2019, with an agreement reached on a quota and a minimum import price. Provisional import duties were imposed on Indonesia over the summer, because of concerns about unfairly subsidised biodiesel imports, and the case is expected to be concluded in the next few months with imposition of definitive duties.

The European Parliament proposed an outright ban on all palm oil imports for biofuel, but this proved incompatible with the World Trade Organisation. A compromise was reached to phase-out by 2030 only biofuels with high ILUC-risk effects, which means that palm oil will have to pass new 'objective and non-discriminatory' criteria in line with RED II to be used for biodiesel production in Europe.

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Emmanuel Desplechin, Secretary General, ePURE

Bioethanol

The European ethanol market for fuel and beverages has installed capacity of 8.9bn l/y and demand of about 7bn litres. However, Bauen anticipates that European ethanol demand will grow over the next decade to meet the RED II target. Many countries are moving from E5 blend to E10. Belgium, Luxemburg, Finland, France, Germany, Bulgaria and Romania have established E10 markets and the Netherlands introduced E10 recently. Meanwhile, the UK government has been discussing E10 for three years and still maintains E5 at the pump.

'The bioethanol market is challenging and exciting,' says Emmanuel Desplechin, Secretary General of European ethanol association ePURE. 'We have already approved the regulatory framework for the decade post-2020, with a change of guard in the European Parliament and European Commission and climate change at the top of the agenda. Scientific communities tend to agree this will require massive uptake of bioenergy and biofuels, and member states realise they have to step up their efforts to meet 2020 targets.'

ePURE members account for 6.5bn litres installed ethanol capacity, of which 89% is being used. 'This is for two good reasons. Member states are really implementing the RED framework giving room for more biofuels. There was also exceptional protection of imports' says Desplechin.

Although EU member states have the same obligations in terms of decarbonisation, the situation differs from state to state. France has separate obligations for petrol and diesel. Other states have no overall biofuels obligation. 'Those member states smart enough to have separate obligations ensure that ethanol uptake is much stronger and have introduced E10,' says Desplechin. 'Despite the evidence and three years of consultation, the UK government has been reluctant to introduce E10.'

Some member states are looking at the introduction of higher blends. Brazil has E27 and the US E18. In France, there is high penetration of E10 and moves towards E85, which is half the price of petrol and works in flex fuel vehicles and cars equipped with a flex fuel conversion box.

Desplechin insists: 'Multiple counting of biofuels does nothing for the climate. It's fake accounting and virtually inflates the contribution of renewables in transport for member states to feel good.'

There is also renewed concern about imports, as anti-dumping duties levied on US ethanol imports were repealed this year. At one stage, anti-dumping duties were introduced when US ethanol accounted for about 25% of the European market. 'That was problematic. But in the last five years the US hasn't exported much to Europe,' explains Desplechin.

Advanced biofuels

'The bioethanol market has struggled and there hasn't been any additional value attached to advanced biofuels like lignocellulosic alcohol, which is at the demonstration stage and over which investors still have technology and supply chain risk concerns,' says Bauen. 'However, there is an opportunity given the advanced biofuels sub-target in RED II of 3.5% by 2030, which can be double counted. So, these fuels could command a premium.'

Clariant has started construction of a 50,000 t/y advanced cellulosic bioethanol plant in Romania and announced plans for a 25,000 t/y sunliquid technology-based plant in Poland in September 2019.

There is also strong interest in building plants for the conversion of municipal solid waste to diesel and kerosene. Altalto Immingham, a collaboration between Velocys, British Airways and Shell, submitted a planning application in August 2019, for a plant in the Humber Estuary that will convert household and solid waste into sustainable aviation fuel. Enerkem, Air Liquide, Akzo Nobel Specialty Chemicals and the Port of Rotterdam are developing a waste-to-chemistry plant in Rotterdam, which converts waste plastics and other mixed wastes into green methanol as a raw material for sustainable transport fuel and other products.

Lignocellulosic, second generation (2G) ethanol is on the verge of being commercial, with several industrial-scale plants planned. Meanwhile, algae technology and gasification processes are mostly at the demonstration phase.

Some first generation plants have been shut or mothballed. The 400mn l/y capacity Ensus bioethanol plant in Wilton, UK, which was bought by German company Crop Energies Group, was mothballed in October 2018 because of financial difficulties, but reopened in March 2019. Vivergo Fuels, which started as a joint venture of AB Sugar, BP and DuPont, ceased production last September. Managing Director, Mark Chesworth, blamed 'the UK government's lack of pace over the past decade to introduce E10'.

Despite the challenges, Desplechin is optimistic about the ethanol market. 'We probably have differing opinions on the pace of change. There is good potential for ethanol blends in hybrid cars using petrol. I believe the vast majority of cars will be running on liquid fuels for some time to come... though bioethanol is too light for aviation or shipping. And we look forward to the new European Commission and European Parliament keep walking the talk on decarbonisation over the next few years.' ●