

With biofuel producers looking at wastes and residues to mobilise advanced biofuels, they now rely on policymakers to aid their growth

# One step forward, two steps back

For those of us working on bioenergy policy, 2014 began with a jolt. Only three weeks into the New Year and the European Commission delivered its vision of how the energy system should look in 2030. It was a stunning change in direction and not entirely good news for those aiming to reduce the carbon impact of Europe's fuel supply.

The announcement, made on 22 January, stated: 'The Commission does not think it appropriate to establish new targets for renewable energy or the greenhouse gas (GHG) intensity of fuels used in the transport sector.'

Reacting to the well-publicised debate about indirect land use change (ILUC), it then went on to say: 'First generation biofuels have a limited role in decarbonising the transport sector,' raising an important question: If food-based biofuels are out of vogue, then what?

'The focus of policy development should be on improving the efficiency of the transport system, further development and deployment of electric vehicles, second and third generation biofuels and other alternative, sustainable fuels as part of a more holistic and integrated approach,' was the Commission's answer. Implicit within that one sentence lies a myriad of challenges, not least of which is the challenge of mobilising advanced biofuels.

## What happened next?

Just a few weeks after the Commission launched its 2030 vision, an initiative was established seeking to

shed light on some of these challenges. The report, entitled *Wasted: Europe's Untapped Resource*, focuses on the opportunity to produce advanced biofuels from wastes and residues. This project brought together a range of partners from across the debate, ranging from environmental groups such as Birdlife, WWF and T&E, to investors in advanced biofuels such as Biochemtex, Novozymes, UPM and Lanzatech.

The goal of the project, convened a year earlier by the European Climate Foundation, was to identify whether there is really a major opportunity in Europe for biofuel from wastes and residues, what environmental safeguards might be needed to make that opportunity sustainable and to assess the economic benefits the sector could deliver.

The discussions set the boundaries for a study by the International Council on Clean Transportation (ICCT) on the volumes of wastes and residues that might be sustainably available for energy use in 2030. This was accompanied by a close examination of the carbon savings that would be delivered by such fuels, taking account not only of the process emissions normally included in lifecycle analysis, but also assessing the potential for displacement effects and indirect impacts on land use.

Through 2013, the group shared evidence and perspectives on the questions thrown up by the analysis, supported by a thorough review of existing literature produced by the ICCT. And

beyond assessing the technical opportunity, UK consultancy firm NNFCC was contracted to examine the cost-effectiveness of a range of technologies at varying feedstock prices.

## Findings

Firstly, even accounting for a wide range of indirect impacts, the lifecycle assessment shows that advanced biofuels from wastes and residues could deliver significant carbon savings compared to fossil diesel or petrol. Forest residues were found to deliver potential CO<sub>2</sub> savings of around 60%, providing steps are taken to minimise soil carbon losses, while agricultural residues were found to deliver GHG savings of as high as 80%. Savings can even be over 100% where conversion of wastes to biofuels would prevent them from decomposing to the potent GHG methane, as would be the case with recovering rice straw or where municipal waste would otherwise be landfilled.

Despite these positive findings relating to GHGs, could this feedstock resource ever be more than just a niche? The research team allowed for two-thirds of agricultural residues to be either reserved for existing uses, such as livestock bedding, or left in the field to maintain soil quality. In the case of forestry residues, they assumed that on average half would need to be left in the forest to maintain soil carbon and fertility and to support forest ecosystems.

In both cases, it is worth noting that the recommended removal rates would actually vary greatly from case to case

– some forests and fields could be harvested for residues at high rates and some should not be harvested at all. When it comes to municipal waste, the project acknowledges established principles for sustainability, including the 'waste hierarchy'. Only those feedstocks that met all of the above criteria were included in the estimate of availability.

Even with these safeguards in place, it was concluded that around 220 million tonnes of biogenic cellulosic material should be available annually by 2030, which at current conversion rates would yield enough biofuel to displace 37 million tonnes of oil. To put this in context, the technical potential would meet 16% of the projected demand for road transport fuel in 2030 – so more than just a niche, although there would of course be competing demands from other users.

And as for the business-case: 'Our analysis indicates that once deployed at scale, advanced biofuels from agricultural and forest residue feedstocks would require little or only a modest additional incentive to stimulate production at prices comparable to that of current crop-fuelled technologies,' according to the NNFCC's David Turley. 'Advanced fuels derived from municipal waste streams are particularly interesting.'

## A cause for concern

So, with a viable business-case, compelling climate benefits, positive impacts on rural employment and the potential to displace substantial

amounts of imported oil, policymakers must be falling over themselves to provide investment certainty for this sector?

Not exactly. While the Commission names advanced biofuels as an important element in its vision for the energy system in 2030, in the same breath it condemns the most important policy lever for supporting such investments – the decarbonisation targets that are currently enshrined in the Fuel Quality Directive. This self-contradiction has worried those investing in the sector.

‘It is not sufficient for the EU to declare it wants advanced biofuels – it needs to take bold action that effectively supports market deployment by 2020 and beyond,’ says Thomas Nagy, executive VP of Novozymes. ‘The environmental and socioeconomic potential of advanced biofuels is too great to take the risk of letting investments go outside Europe where policy frameworks are more favourable.’

Novozymes is a partner in Europe’s first commercial-scale biorefinery, the Crescentino plant in northern Italy, which at full capacity can produce 60,000 tonnes a year of cellulosic ethanol. A majority partner in that same project, Biochemtex, is also concerned about the uncertainty created by EU energy policy.

‘The industry is ready and willing to invest and unlock the potential of advanced biofuels, but the recent political debate

has created extreme uncertainty,’ explains Piero Cavigliasso, director of institutional relations and public funding at Biochemtex. ‘Europe must refocus its attention on the need to decarbonise transport.’

Another partner in the research project, UPM of Finland is opening the world’s first biorefinery producing wood-based renewable diesel at commercial scale this summer and is closely watching EU policy developments.

Too late though, for Finnish innovator Vapo Oy, which announced in February it was freezing project planning for a 150,000 tonne per year plant to make biodiesel from logging waste. ‘The final, decisive blow to the project was the EU’s climate and energy strategy,’ the company said in a statement.

However, it is not just investors that decry the policy confusion caused by the Commission’s 2030 communication: ‘Policy certainty is what better biofuels need,’ says Pietro Caloprisco, clean fuels officer at environmental group T&E. ‘To unleash the full potential of this innovation, Europe requires ambitious decarbonisation targets for transport fuels by 2030 and a revision of its biofuels policy before 2020.’ ●

**For more information:**

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**Calling policymakers to take action**

**UPM also** emphasises the necessity of a stable policy framework with short-term incentives for transportation targets post 2020.

Marko Janhunen, VP of UPM, believes: ‘The report, which is one of the first joint assessments between industry, technology innovators and green NGOs on the possibilities of advanced biofuels made from wastes and residues, indicates that Europe has significant untapped potential for converting wastes and residues to advanced low carbon fuels.’

‘It is vital that we have this kind of common understanding on the huge potential – wastes and residues could supply 16% of Europe’s road transport fuel – especially now as the long-term policy framework is unclear.’

‘Scaling up the advanced biofuels industry will not happen overnight, but given a clear and consistent policy framework, even a few percents growth in the production of advanced biofuels would mean a major industrial growth, providing a lot of economic opportunity for Europe and significant carbon savings.’

‘A stable policy framework is extremely important to ensure further investments in advanced biofuels and the growth of the bioeconomy in Europe. We call for a strong investment signal from the EU member states and the European parliament. Europe simply needs to take bold action and set up a strong sustainability framework and ambitious targets for transportation fuels for 2020 and beyond.’

‘Road transport is one of the few industry sectors where CO<sub>2</sub> emissions have risen in recent years and the transport sector is predicted to be the EU’s biggest source of CO<sub>2</sub> by 2030. With advanced biofuels produced from wastes and residues, we could make a significant contribution to the EU’s climate targets.’

‘UPM will open the world’s first wood-based renewable biorefinery to produce diesel on a commercial scale this summer. With an annual production of 100,000 tonnes, it will use forest industry residue from pulp making, crude tall oil, as a raw material. It will reduce greenhouse gas emissions by as much as 80% compared to fossil fuels.’

‘The UPM Lappeenranta Biorefinery and other such investments make the EU’s bioeconomy real, reduce greenhouse gas emissions and offer jobs and growth. It also allows us to simultaneously reduce our energy dependency from outside-EU sources.’

‘According to the report, timber-processing residues such as sawdust were found to deliver CO<sub>2</sub> savings of around 75%. In fact, the next step in the company’s strategy is to start producing biofuels out of solid wood biomass e.g. sawdust and other forest residues.’

‘As concluded in the report, we are now looking to policymakers to deliver short-term incentives and policy certainty to take us a clear step forward in the development of advanced biofuels.’



Construction of UPM’s Lappeenranta biorefinery in Finland, which will produce around 100,000 tonnes a year of second generation biodiesel