

The turning point to scale-up bioenergy and renewable fuels solutions for decarbonizing the transport sector

The 10th Stakeholder Plenary Meeting of the ETIP Bioenergy was held virtually from 16 to 18 November 2021. It attracted over 500 registered bioenergy stakeholders, with around a hundred of participants to each session. This year's event focused on the role of bioenergy and renewable fuels in the green transition, and covered the latest trends in policy, technology, market readiness, research needs and financing instruments. Here are the main takeaways.

Fit-for-55 sets measures for the market uptake of renewable fuels and bioenergy in shipping and aviation sectors

The EU Climate and Energy Policy framework that is evolving under the overarching goals of the EU Green Deal will set the context for the deployment of renewable fuels and bioenergy until 2030 and beyond. The way forward is linked to the implementation of the Fit for 55 package, a set of interconnected legislative proposals that, in the intention of the European Commission, will introduce a balanced mix of pricing, targets, taxes, standards and support measures, to deliver on the ambitious target of the Green Deal. Among these, the revision of the RED II will likely have the highest direct effects for the sector. The current Commission's proposal aims to introduce a binding target of 40% renewables in the energy mix by 2030, together with sub-targets for advanced biofuels, biogas and renewable fuels of non-biological origin, as well as stronger sustainability criteria for bioenergy. Yet, the package also includes novel legislative proposals for the aviation and shipping sectors, namely the ReFuelEU Aviation, that introduces targets for Sustainable Aviation Fuels (SAF) by 2030 (5%) and 2050 (63%) and the FuelEU Maritime, that supports the reduction of GHG emissions - attributed to shipping by 6% in 2030 and 75% in 2050.

Sustainable Aviation Fuels have a crucial role in the airline's pathway to carbon neutrality

The Commission's intentions and expectations are that these measures will act as a driver for the market uptake of renewable fuels and bioenergy in these two sectors. As such, the event focused on the technological and market readiness to meet the future demand of both SAF and marine renewable fuels. SAF are critical for the carbon neutrality target of aviation in 2030 and 2050. Hydrogen and electric aircrafts will be developed in the future, but these developments will take time. Additionally, middle and long-range aircrafts, which are the biggest CO₂ emitters in aviation, may not be accessible to these technologies by 2050.

The challenge is to really reduce the demand of fuels that we have said Ruben Alblas, KLM, introducing the airline's pathway to reduce CO₂ emissions. Reduction is key and where we can't reduce, we should look for alternatives, such as SAF he continued. I am happy to acknowledge the European Commission made a step forward with the ReFuel EU initiative. We learnt that we need to approach SAF from a technology-agnostic perspective keeping the door open for many technologies and feedstock combinations as long as we can. He also explained that the company aims to push regional supply chains as much as possible, avoiding large-scale movements of raw materials, and strives to become less dependent on imports of products from outside the EU.

A recent Commission's study supporting the impact assessment of the ReFuelEU Aviation initiative, indicates that overall feedstock for SAF production will be available in sufficient quantities to meet the market demand relying on EU sources alone, although imports and trade will be part of the solution, as explained by Grégoire Le Comte (DG Move). Large volumes of Used Cooking Oil will be necessary to meet SAF demand, but agricultural residues and energy crops will also have to increase significantly. As the Annex IX of the RED II will be updated in the future, the pool of eligible feedstock for SAF is expected to become larger.

Renewable fuels and biofuels in shipping needed to decarbonize global supply chains

A similar trend is being observed in the shipping sector, where the FuelEU Maritime Regulation will set the regulatory context for the uptake of renewable fuels and biofuels, while the operators are already confronted with the need to decarbonize their activities. *Shipping accounts for 3% of global GHG emission, we need to decarbonize our operations and our customers supply chains as fast as possible, said Berit Hinnemann, Maersk, if we don't, we might become irrelevant.*

MAERSK will pursue its goal of achieving carbon neutrality by 2050, by both maximizing the energy efficiency of its 700+ vessels fleet and by introducing new carbon neutral fuels. With a consumption of more than 10 million tons of fuels per year, the company sees large potential in biomethanol and e-fuels and has already placed an order for methanol fueled vessels. *We have a demand of several thousand tonnes of biomethanol and we need to scale up its production, Berit Hinnemann said.*

Lignin-alcohol is also one of the solutions in the company's portfolio, although this pathway still requires more R&D on engine testing and production scale up. Green ammonia can be produced at scale from renewable electricity, but there are still safety and toxicity issues that need to be addressed. The current focus of the company is to find solutions to bunker and handle ammonia safely.

Boost the scale up of emerging technologies and learn from R&D applied to large scale plants

Day 2 of the event provided an overview and a panel discussion on technology trends and the challenges for advanced biofuels and green chemicals at different readiness levels, ranging from the sugar-ethanol-lignin platform to the co-processing of renewable and advanced feedstock, to the upgrading of HTL biocrude and Fischer-Tropsch fuels. Solutions are available but the common view of the panelists was that there is a real need to scale up now both, the mature technologies into commercial facilities, and the less mature ones into demonstration and first-of-a kind plants. There is still also a need to overcome many operational bottlenecks and to develop ways to further valorize important downstream co-products such as lignin, eventually reducing the costs of the fuels and increasing the resource efficiency of the processes. However, the experts panel agreed that the solutions will come more by research and development applied to large-scale projects rather than from additional research at lower scale.

Biomass from perennials for regenerative agriculture and integrated biomass-food crop rotations can be viable options to broaden the sustainable feedstock base

Even though sustainable productivity increases such as improved crop traits and agricultural practices may lead to as much as a 30% increase in soft wheat average yields by 2030 in the EU27, it is expected that the net conversion of agricultural land to abandoned land will amount to around 4.8 million ha over the period of 2015-2030, and approximately 62 million hectares of land in EU27 & the UK is already estimated as marginal. Perennial bioenergy crops can be a cost-effective solution for the regeneration of those lands, improving soil organic matter, with a positive energy balance and very low or even negative carbon footprint. Although there are no miracle crops, experiences from the field both in the EU and outside demonstrate that these are realistic options that can be deployed on thousands of hectares, with low risk to food competition, provided that growing crops on marginal land requires optimized logistics, soil amendment and the respect of sustainability criteria.

While perennials are an option for marginal land, research demonstrates that innovative cropping systems are viable solutions to integrate annual non-food crops into rotations with traditional cereal crops, increasing the biomass yields per unit of land without reducing the food yields, whilst making rotations more sustainable.

Integration and a flexible mix of different technology solutions is the key to overcome the implementation barriers for bioenergy and renewable fuels, and is the fast way forward

The SET Plan is based on the cooperation among EU Commission, EU Member States, associated countries, industries and research for accelerating energy technology solutions. The Implementation Working Group 8 is focused on bioenergy and renewable fuels for sustainable transportation. As pointed out by Timo Rittonummi, Chair of SET Plan IWG8, *bioenergy and renewable fuels are now ready for a fast way forward*, as technology infrastructure is well-established and open to improvement. There must be a reliable, stable framework for investors in renewable fuels, as increasing investments are needed in order to support the bioenergy and renewable fuels supply.

Bioenergy offers a unique option to reduce GHG emissions in the transport sector immediately, as renewable fuels are suitable for the whole vehicle fleet. A common point of discussion is the strong opportunity to integrate all the alternative solutions offered by bioenergy and renewable fuels to achieve a decarbonized, sustainable transportation sector. Even if electrification will grow significantly in road transport, renewable fuels as well have to be promoted: not only functional to thermal combustion engines, liquid fuels will also serve further in the future as hydrogen carriers. Moreover, renewable fuels represent a long-term solution for the aviation and shipping sector. Flexibility is another key element for the fast way forward, as it determines the success of a technology on the market. A systemic approach is needed to understand the complexity of a low-carbon energy transition, assuming an integration among different technologies and resources in a way to balance costs and benefits. Thinking about energy transition from a system perspective also means to raise ambition at a global scale, beyond the EU borders.

Bioenergy today represents over half of the share of renewables used in Europe, said Patrik Klintbom, ETIP Bioenergy Chair. *There is no climate deal without sustainable biomass use, technology innovation needs a market development in line with the ambitious climate targets at EU and national level and ETIP Bioenergy ready to contribute*, he concluded.