ADVANCEFUEL

The role of advanced biofuels in the energy transition

ADVANCEFUEL Coordinator Kristin Sternberg, Agency for Renewable Resources (FNR)

Birger Kerckow, Head of Department EU and International Cooperation, Agency for Renewable Resources (FNR)

ADVANCEFUEL project coordinator Kristin Sternberg Agency from FNR - Renewable Resources and Birkow Kerckow, FNR Head of EU and International Cooperation share insights in the development of the bioenergy and biofuel market and their impact on road transport, aviation and shipping.

How has the bioenergy sector – particularly in transport – developed over the past decade?

The share of energy from renewable sources in gross final energy consumption has almost doubled in the last years, from around 8.5% in 2004 up to 17.0% in 2016. This was mainly driven by the binding targets set in the Renewable Energy Directive.

In the transport sector, all EU countries must ensure that at least 10% of their transport fuels (including liquid biofuels, hydrogen, biomethane, “green” electricity) come from renewable sources by 2020. In this context, the average share of energy from renewable sources in transport increased from 1.4% in 2004 to 7.1% in 2016. Among EU Member States, the relative share of renewable energy in transport fuel consumption varies considerably, ranging from 30.3% (Sweden) to less than 2.0% (Croatia, Greece, Slovenia).

In 2015, an amendment to the Renewable Energy Directive (EU/2015/1513) was issued, which strongly influenced the further development of the bioenergy sector, in particular regarding biofuel production, as it caps the use of conventionally-produced biofuels (based on food/ feed plants) at 7%; the directive also obliges Member States to implement a target for biofuels from non-food feedstock (at least 0.5% in transport energy in 2020), which started a considerable

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement N.°764799

increase in corresponding R&D&D activities all over Europe.

How big is the market for integrating bioenergy?

There is an increasing market for renewable energy, mainly due to encouraging environmental regulations, supported R&D&D activities and subsequent investments. Bioenergy can be integrated in all areas of conventional energy markets, such as power, heat, transport fuels. This is strongly supported and legally defined by the European targets for the reduction of fossil carbon in the European energy supply and consumption of energy. However, there are significant country-specific differences with regard to the respective shares of bioenergy in the overall energy supply.

In the transport sector, high-quality drop-in products can supplement their fossil equivalents using the existing, mature and well-functioning (global) infrastructure and fuel standards. Liquid (bio)fuels have a high energy density and are well transportable and storable. Additionally, there are no other alternatives for certain end uses such as in aviation or in the shipping sector. Keeping the fossil-carbon-reduction targets in mind, this opens a huge market potential for renewable (bio)fuels.

Who are the main players in advancing bioenergy in Europe?

In collaboration, representatives from industry and research institutions as well as the European Union and its Member States shape, support and fund the framework of advancing the required technological development in Europe for the envisaged energy transition. Other networks like the established Technology and Innovation Platforms and Research Alliances play an important role.

There are, for instance, six European Industrial Initiatives (EIIs), which bring together industry, the research community, Member States and the European Commission in risk-sharing, public-private partnerships. These are aimed at the rapid development and deployment of key energy technologies. Additionally, the European Energy Research Alliance (EERA) aligns the R&D activities of major energy research organizations with the agreed priorities (SET-Plan).

With a view to a joint programming framework at EU level, the implementation of the SET-Plan is also supported by a series of industry-led European Technology Platforms (ETPs). Another pillar of support for implementing the SET-Plan is provided by several Joint Technology Initiatives. These are public-private partnerships, funded by the European Commission, along with Member States and industry.

Is Europe a global leader in bringing biofuel solutions to market?

North America accounted for the largest share in the actual production of biofuels, followed by South-Central America and then Europe.

In Europe, numerous R&D efforts on the topic of advancing bioenergy/ biofuel are taking place with many promising results and outcomes. However, there are considerable bottlenecks for a successful commercialization. According to representatives from industry, the technology (often) exists, but a supportive legislation with a clear mandate from 2021 onwards is missing. This is very much needed to leverage existing market opportunities.

The industrial implementation of R&D breakthroughs requires patience and investments to get from the pilot plant stage to operational first-of-a-kind industrial plants. Supportive and stable policies are very much needed to bridge this gap.

What is the future of mobility, aviation and shipping?

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N.°764799

The energy transition in transport revolves around decarbonization, the closing of carbon cycles, GHG reductions, and achieving higher energy efficiency levels. There are different options for future mobility, which very much depend on the eventual end use. Electrification will be one important route, but there is and will also be a strong need for liquid fuels particularly for aviation as well as in the shipping sector.

For road transport, electric vehicles (EVs) will become significant competitors for combustion engines. However, these two kinds of vehicles should not be competitors but allies. The respective technologies can be combined as hybrid electric vehicles (PHEVs) allowing for additional benefits. The trend worldwide, regarding traditional combustion-engine-equipped vehicles, is toward advanced fuels. According to the IEA Technology Roadmap "Delivering Sustainable Bioenergy" (2017), to comply with the reduction of GHG emissions required to limit global warming to 2 degrees as agreed in Paris in December 2015, biofuel consumption in the transport sector must triple by 2030, with 2/3 of that coming from advanced biofuels.

For aviation, advanced liquid biofuels are the only low-carbon option for substituting kerosene, as they have high energy content and are more easily transportable. Gaseous biofuels and electrification are definitely no option for air transportation. The aviation sector is very dependent on liquid fuels, and the only viable sustainable solution seems to be liquid biofuels.

Electrification is not possible in water transport either, therefore only gaseous and liquid renewable (bio)fuels would be alternative fuels – for example, BioLNG, methanol, hydrogen and biomass-derived products.

The shipping sector is still in a very early stage of orientation towards biofuels. The most promising option, from a technical point of view, seems to be small percentage of biodiesel blends (up to 20%) with marine diesel oil or marine gas oil (MDO/MGO), or the 100% replacement of heavy fuel oil (HFO) by straight vegetable oils.

In the long-term, advanced biofuels are the most sustainable solution for the decarbonization of transport sectors such as long-haul transports and aviation.

What is the added value of ADVANCEFUEL?

The ADVANCEFUEL project aims to facilitate the market roll-out of advanced biofuels and other liquid renewable fuels in the transportation sector. New knowledge will be generated considering the whole value chain involving

- Upgraded lignocellulosic feedstock supply chains
- Efficient roll-out of conversion technologies and system integration
- Harmonized sustainability standards and certification
- Improved understanding of market segments and on fuel blending properties
- Improved understanding of future scenarios

The project is being carried out in close cooperation with key market players. An online Stakeholder Platform as well as regular stakeholder workshops will ensure the exchange of information and the validation of results. Eventually, different tools will be developed to assess different promising supply chains, the involved technologies and for predicting the performance of different fuel options and fuel blend properties.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N.°764799