

Advanced biofuels are best for emissions targets in Finland

To 10% and beyond

The new EU framework requires a 40% reduction in greenhouse gas (GHG) emissions compared to 1990 levels, and an EU wide binding target for renewable energy of at least 27%.

Traffic is rapidly becoming the largest single source of CO₂ emissions in the EU, however no specific, official targets have been set for GHGs from the transportation sector. Transport emissions are not expected to change dramatically between 2020 and 2050; today approximately 95% of these emissions come from fossil fuels. Lowering emissions from within this sector is challenging as they have significantly higher marginal costs compared to the emission trading sectors.

CO₂ emissions from transport depend on the distance driven, energy consumption and the carbon intensity of the fuels used. In addition to changing the means and methods of transport and general improvements in the transport system, CO₂ emissions in transport can be reduced by improved energy efficiency and the increased uptake of electric vehicles or biofuels. In order to meet the targets outlined above, all of these changes must come into play.

Research supports investments in domestic advanced biofuels

VTT Technical Research Centre of Finland and VATT Governmental Institute for Economic Research have completed a study commissioned by the Ministry of Employment and the Economy, assessing not only the climate but also the cost impact of the EU's

2030 climate objectives on Finland's energy system and national economy. According to the study, increased use of second generation biofuels in road transport would be the most cost-effective way of achieving GHG emissions goals presented in the policy framework. Based on the economic impacts, the most cost-efficient way to reduce emissions is to invest in the production – and uptake – of domestic, advanced drop-in biofuels. The main benefit of these biofuels is that they are already compatible with the existing distribution system and vehicle base.

The study also found biogas to be a relatively cost-efficient option for reducing transport-related CO₂ emissions, but would require a significant increase in the number of gas-powered vehicles. However, the high price of electric cars at present means their large-scale uptake will not be cost-effective based on their impact on GDP until technology advancements bring down their price significantly. Also, resale value is an important factor in consumer purchase decisions of vehicles which is not currently helping the choice of electric cars.

An important note in the study was that, when assessing GHG emissions of different fuels, well-to-wheel analysis (used to assess total energy consumption including energy production) should always be used. Emission reductions achieved with biofuels should have the same ranking as those achieved with renewable electricity. Currently, electric vehicles are of more interest to vehicle manufacturers because electricity is always considered zero emission fuel, despite of the source



Finland and Sweden have forestry residues sustainably available for biofuels production to meet the proposed 0.5% advanced biofuel target

of electricity which might be anything from coal to wind.

Produced from European grown raw materials, advanced biofuels not only reduce our dependence on external energy sources but achieve a GHG saving of up to 95% compared to fossil fuels. Nevertheless, a vehicle running on biofuel is valued the same way as a vehicle running on fossil fuel as European vehicle legislation is based solely on studying emissions while driving.

Using total CO₂ figures including emissions generated in the manufacturing, processing, and transporting of the fuel, the well-to wheel analysis was also suggested by a recent study of The Joint Research Centre of the EU Commission (JRC), EUCAR and Concawe. Provided that the comparison also takes into account the CO₂ emissions generated during energy production, advanced biofuels such as renewable diesel fares well in an emission comparison with electric cars and hybrids. When driven, an electric car does not generate any emissions, but the CO₂

emissions from the production of electricity may be very high. In fact, advanced biofuels can easily achieve lower CO₂ emissions than electric cars whose batteries are being recharged with electricity produced by the average production method in the EU.

Finland sets bold targets for biofuels

Finland has been a frontrunner in setting ambitious targets for renewable energy in the transport sector. While the EU has a 10% target by 2020, Finland's target already stands at 10% in 2016 and this will increase to 20% by 2020. To reduce emissions further after 2020, it is necessary to increase the use of low carbon or carbon neutral energy in transport.

Finland's government has set out an ambitious target in order to further reduce Finland's dependence on foreign fossil fuels by halving oil imports and increasing the share of renewable fuels use to 40% by 2030.

The Finnish industry group,



Collaboration between private companies, research institutes and government have proven successful in biofuels development in Finland

the Petroleum and Biofuels Association, approves the programme and agrees that domestically produced biofuels that are suited to Finland's distribution system and current vehicle fleet are the most effective way to cut transport emissions.

Residues and waste are available

According to the VTT and VATT study, majority of the raw material requirements for new Finnish biorefineries needed to achieve the new 40% target could be met with the domestic supply of wood and waste materials.

The availability of waste and residues for biofuels is well in line with the study made by the International Council on Clean Transportation (ICCT), together with the European Climate Foundation, environmental NGOs and a coalition of advanced biofuel companies. This study estimates that second generation biofuels could cover 16% of European traffic fuels by 2030. This amount is equivalent to 37 million tonnes per year of oil.

In the original ICCT report 'Wasted', biofuel potential was calculated at the European level, showing that there are enough resources sustainably available to replace 16% of European road transport fuel by 2030, if it could all be collected and utilised.

The latest ICCT national

level study found that all 11 EU Member States examined have more than enough resources available to meet the proposed 0.5% advanced biofuel target several times over with domestic facilities. The resources however vary from country to country – France and Germany have more agricultural residues, for example, while Finland and Sweden have more forestry residues. The UK, on the other hand, has large quantities of waste sent to landfill. The basic conclusion, however, is the same.

Finland at the forefront of advanced biofuels production

Finland has seen the rise of a sizeable biofuel cluster, which was born partly from the need of the forest industry to renew and create new business in the sector. The results of R&D work in both privately held companies and in long-term collaboration projects with the government have proven successful.

Finland has not only plenty of wood-based raw materials, but also top level know-how for the production technologies of advanced biofuels. The nation has been a pioneer in sustainable advanced biofuels using residues, waste and lignocellulose as raw material.

The latest commercial-scale biofuels plant in Finland is the UPM Lappeenranta biorefinery.

Commercial production began in January 2015 with an annual production capacity of 120 million litres a year of wood-based renewable diesel for transport. The biorefinery uses crude tall oil, a residue of UPM's own pulp production, as its feedstock and is integrated into the existing UPM pulp and paper mill in Lappeenranta.

The biorefinery was awarded with the EU Sustainable Energy Europe Award in 2014 from the European Commission for the innovative use of an own residue for producing advanced biofuels having 80% GHG emission reduction.

Investment needed

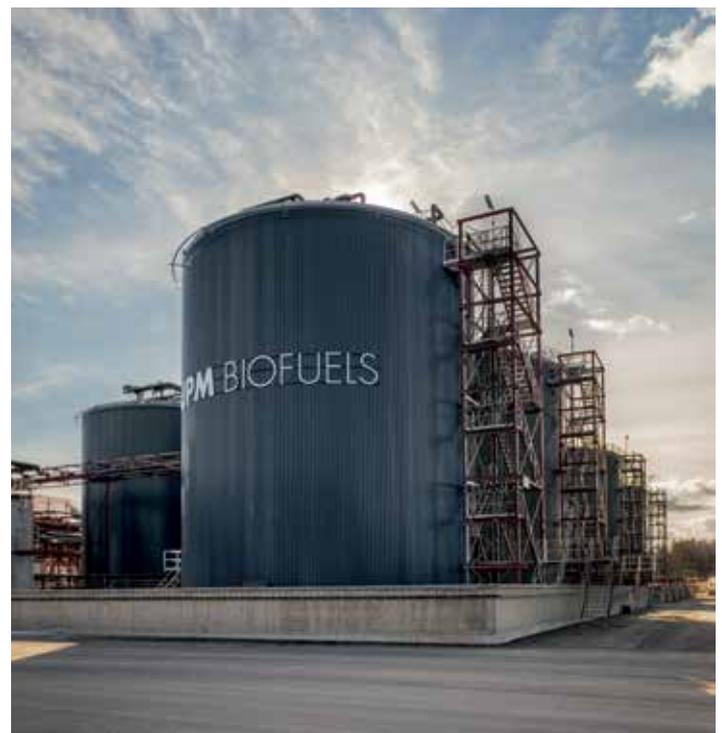
Advanced biofuels offer the fastest and the most cost efficient way to decarbonise the transport sector in the short and medium term, reflecting the slow renewal pace of the car fleet. However, the demand for biofuels is based on legislation connected to the EU's climate and energy policy. Do we want to stay dependent on polluting fossil fuels or do we want to harvest the potential of innovative biofuels technologies?

To drive European investments, it is time for the European institutions to create a credible and ambitious energy and climate package for 2030, enabling investments in advanced biofuels production in Europe.

Now that the ILUC file is finally concluded, Member States should introduce binding sub targets for advanced biofuels, as outlined in the ILUC Directive. European companies are technology leaders in advanced biofuels, paving the way for the EU to show leadership in heading towards global climate negotiations at the United Nations Conference on Climate Change in Paris 2015. Those Member States that are willing to commit to doing what it takes to get the advanced biofuels industry on its feet have an opportunity to take the lead in technology development for an industry with enormous potential to expand in the coming decades. ●

For more information:

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UPM's €175 million advanced wood-based biorefinery in located in Lappeenranta, Finland