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Providing clients with a strategic view of feedstock, technology, policy, and market opportunity across the bioeconomy

News Review





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Each month we review the latest news and select key announcements and commentary from across the biofuels sector.

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Foreword

Welcome to this month's issue of NNFCC's Biofuels News Review.

Back in January of this year, the European Parliament voted to approve amendments to the EU's Renewable Energy Directive, thus forming what has become colloquially known as RED II. While many in the biofuels sector have celebrated the reforms and their commitment to increased levels of biofuels, the reforms have also received criticism for the cap they have placed on crop-based biofuels. The intention behind this policy is to reduce the wider sustainability implications of biofuels: biofuel feedstocks include palm oil, the harvest of which is a highly controversial issue that the EU is seeking to distance itself from. Unsustainable palm oil harvest can actually result in greater net CO₂ emissions than fossil fuels. However, some NGOs based in Eastern Europe have spoken out against this cap, claiming that all crop-based biofuels should not be painted with the same brush as palm oil. They have called for a more nuanced approach, that recognises the individual sustainability impacts of each feedstock crop, as they all vary greatly in terms of both their yields and environmental impacts. The crop-based fuel cap remains controversial, and this is unlikely to change soon.

Ireland, on the other hand, has taken the matter of the crop-based biofuel cap into its own hands. Fearing a negative impact of the cap on Irish farmers, the Irish government have opted to increase the country's own cap, thus providing security for those who work in the sector.

Elsewhere, another kind of biofuel we rarely put in the spotlight is biomethane, but use of this fuel has been quietly rising over the past few years, as freight companies are recognising its quality as a fuel for heavy goods vehicles. This is reflected in the reports from biomethane supplier CNG fuels, who claim that demand for biomethane from its Leyland filling station has tripled over the past year, with actual gas dispensed also rising by an impressive 170% over the same period. This is no doubt in part thanks to major retailers such as Waitrose and John Lewis, and delivery service DHL, pledging their support for biomethane as a transport fuel, and hopefully the technology's continued success will attract more companies to use these biofuels.

Read on for the latest news.

Policy

Ireland commits to crop-based biofuels



Geograph

Ireland's environment ministry has decided to increase the crop-based biofuel share in transport to 10% from the existing 8% and draw a 2030 plan aiming to provide long-term business certainty in the field.

The scheme sets out an obligation for suppliers of road transport fuels to include a certain percentage of environmentally sustainable biofuels across their general fuel mix.

The "biofuel obligation rate" was initially set at 4% and has gradually increased to the current rate of 8% (by volume).

The scheme currently contributes an estimated 450,000 tonnes in carbon emission reductions each year towards Ireland's national targets.

The ministry's proposals were warmly welcomed as "rational" by Irish farmers, because crop-based biofuels have up to 70% less GHG (greenhouse gas) emissions than fossil fuels, reduce dependence on imports from outside the EU and provide a much-needed boost to EU arable farmers.

However, they warned that the government should now take action at EU level and prevent the European Commission from gradually phasing-out first-generation biofuels. Under the revised Renewable Energy Directive (RED II), the EU executive has proposed to reduce the contribution of conventional biofuels in transport from a maximum of 7% in 2021 to 3.8% in 2030. The first RED set a target of 10% of renewable energy sources in the transport sector, including first-generation biofuels made from food crops.

For its part, the European Parliament has proposed to cap crop-based biofuels at the member states' 2017 consumption levels and no more than 7% of all transport fuels until 2030.

However, biofuel producers accuse the Commission of groundless scientific evidence when it comes to conventional biofuels, warning about detrimental implications for EU farmers.

Click here for more information.

Ethanol groups sue US EPA over biofuel waivers

A coalition of ethanol and farm groups sued the U.S. Environmental Protection Agency on Tuesday, challenging its decision to free three refineries, including one owned by billionaire investor Carl Icahn, from annual biofuels requirements.

The groups, including the Renewable Fuels Association and the National Corn Growers Association, filed the challenge in a U.S. Court of Appeals for the 10th Circuit in Denver, according to a statement from the coalition. The lawsuit targets three waivers doled out to refineries owned by CVR Energy Inc, in which Icahn hold a majority stake, and HollyFrontier Corp.

Refiners are required by the U.S. Renewable Fuel Standard to blend increasing volumes of biofuels like ethanol each year, but the EPA can offer exemptions for facilities under 75,000 barrels per day, if they experience "disproportionate economic hardship."

The EPA has come under pressure for being stingy with the waivers in the past, and a successful

lawsuit last year by Sinclair Oil Corporation led a federal court to order EPA to expand its definition of "economic hardship" - opening the door for more facilities to qualify. U.S. refiner Andeavor and CVR are among the companies that sources have said have received waivers for their smallest units. Chevron Corp, Exxon Mobil Corp and Marathon Oil Corp have requested them, sources have told Reuters.

The number of waivers has soared, amplifying controversy over a program that has been a battleground for entrenched farm and oil interests in Washington for years. Oil refiners say the requirements cause undue financial strain, while corn and biofuels supporters say the waivers reduce demand for their products.

In addition to challenging the waivers themselves, the group criticized the EPA for its lack of transparency. The EPA has refused to share details of which companies have asked for and received the waivers, citing confidential business information.

Click here for more information.

Non-profit organisations argue against EU crop biofuel limit

Several Czech and Slovak non-profit organizations have officially commented on the forthcoming changes to vegetable fuel use legislation after 2020, outlined in the revision of the Renewable Energy Directive (RED). The European Commission's RED II proposal of November 2016 contains a plan to abandon the original transport target, a significant reduction of agrofuels (1st generation or conventional vegetable fuels) and their replacement by 2nd generation or advanced vegetable fuels.

Although the overwhelming majority of the scientific community and non-profit conservation organizations have pointed out for years the serious environmental and social impacts of some agrofuels production, especially in the case of

fuels containing tropical oils such as palm oil, whose combustion can produce up to 3 times higher amount of greenhouse gas emissions compared to conventional fossil, differences must be taken into account also in the case of conventional vegetable fuels.

Individual crops used for the production of agrofuels differ in their environmental and social impacts as well as their yield and efficiency. In the case of agrofuels, it is absolutely necessary to strive for the most economical and most responsible way of producing such crops. Ideally, in organic (BIO) mode, even at the expense of lower yields, to minimize negative impacts on biodiversity, soil and water, which are often degraded when intensive crops are grown. This condition includes also the local origin of the crops. In addition to the significant negative impacts on the environment, biodiversity and communities at the place of production of these crops, there is a problem of high greenhouse gas emissions associated with growing these crops as well as with long-distance transport of their products.



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Markets

New funding for Dutch shipping biofuels company



Pixabay

An Amsterdam company developing advanced biofuels for the shipping and transport sectors has secured major new funding.

GoodFuels makes the heavily polluting shipping industry cleaner by developing and supplying advanced and sustainable marine biofuels. These fossil-free fuels are one of the few options available today to drastically reduce the carbon footprint of shipping over the next decade. There is more need for this than ever, as indicated by the recently published International Maritime Organisation (IMO) targets for a 50% reduction in CO2 by 2050.

The money will enable Good Fuels Marine to ramp up global production.

Click <u>here</u> for more information.

Research & Development

Global Bioenergies begin project to establish isobutene value chain

Global Bioenergies has announced the start of a 3-year project to demonstrate a new value chain combining its Isobutene process with technologies developed by Sekab and Neste Engineering Solutions, two of Europe's leading technology developers. The aim is to convert currently poorly valorised softwood residues into second generation renewable isobutene for subsequent conversion into gasoline and jet fuel. A €13.9m grant agreement was signed with INEA on behalf of the European commission.

Biomass is frequently considered as an alternative feedstock to fossil oil in order to address the issues of climate change and resources depletion, and also to strengthen energy independence of European nations. However, such substitution is far from trivial and innovative processes are needed to efficiently convert residual biomass into drop-in fuels and chemicals.

The present project, gathering renowned industrialists from various fields, sets the foundations of a first-of-a-kind biorefinery converting residual wood to high performances drop-in renewable gasoline and jet fuel. With an estimated forestry residues potential of about 145 million tons per year, the European Union has the potential to support the deployment of hundreds of such biorefineries.

Swedish plant to produce biofuels from lignin

Rottneros plans to build a lignin production plant at the Vallvik pulp mill in cooperation with Swedish fuel manufacturer Preem and Swedish bioenergy company Renfuel. The three companies announced that the planned plant, which is to be completed in 2021, will produce 25,000-30,000tpy of lignin from pulp production, which will then be refined into biofuels. Through the joint subsidiary of Preem and RenFuel, Lignolproduktion AB, lignin production capacities of 300,000 to 500,000tpy are to be built up in the longer term by establishing further plants such as the planned one in Vallvik.

Rottneros is committed to becoming an important player in Sweden's bio-economy and already sees a key role for the pulp industry in this segment. In addition to contributing to Sweden's declared goal of reducing fossil emissions by 70% between 2010 and 2030, the extraction of lignin also offers the possibility of increasing its own pulp production, explains Rottneros.

Click here for more information.

Finnish progress into algal biofuels

The search for a viable plant-based biofuel that could power the next generation of vehicles could have gathered some speed after a group of researchers from a Finland university announced it had developed an efficient method of producing biofuel derived from algae. The University of Turku in the country's south east discovered, via the study of photosynthesis of the organism, a sustainable technique of harnessing solar power into the chemical energy of bio-hydrogen – allowing the transformed algae to work as a microbial cell factory.

According to the university that unearthed the new procedure, during photosynthesis the green algae uses harvested solar energy to split water, release oxygen into the atmosphere and produce biomass which in turn creates a feed-stock. With the potential to improve it further, the university's researchers said that by exposing the anaerobic algal cultures to strong yet short light pulses they could extend the production of hydrogen significantly.

Meanwhile, petrochemical giant ExxonMobil has teamed up with Synthetic Genomics to also use the power of algae to produce biofuels, altering the organism's structure to produce a renewable, low-emission energy source that the companies said would give it the ability to produce 10,000 barrels of algae-derived fuel a day by 2025.

In other biofuel news, Fulcrum BioEnergy said this week that it had entered the next stage of development in construction of its facility that will eventually produce transport-specific biofuel derived from lowly landfill rubbish. When it enters production, the Sierra BioFuels Plant will reportedly become the US's first commercial-scale plant that generates biofuel purely from waste that would otherwise end up at municipal waste dumps. Bio-Based World News covered Fulcrum's announcement last year of its intention to build the plant with a 10-million-gallon biofuel output, a production facility that according to the company would produce 80% less greenhouse gas emissions when compared to fossil-based alternatives.



Wikimedia Commons

Global Bioenergies joins projects to diversify isobutene feedstocks



Global Bioenergies

Global Bioenergies has announced it has been selected in three additional Horizon 2020 projects funded by the European Union, and will receive for this purpose about €2m in grants over 4 years. These projects reinforce Global Bioenergies' strategy of feedstock diversification in order to continue improving the economics and the environmental impact of its Isobutene process.

Global Bioenergies' bio-process for the production of isobutene relies on the use of renewable resources. The process is presently operated at demo-plant scale using first generation feedstocks, such as sugar beet sucrose or wheat glucose. For several years now, Global Bioenergies has been actively investigating the adaptation of its process to second and third generation feedstocks, aiming at reducing the risk of future competition with food or feed resources, and also to continue improving the economics and the CO2-reduction level of its process.

Second generation resources consist in agricultural wastes such as wheat straw or corn stover, as well as wood chips and other forestry leftovers. Each of these feedstocks contains sugars which, once made accessible to microorganisms by physical and enzymatic treatments, have proven being excellent substrates for fermentation. Global Bioenergies has already announced being the coordinator in two major EU-funded projects named OPTISOCHEM and REWOFUEL, respectively targeting the use of wheat straw and softwood to produce isobutene derivatives, and will receive a total of €10m as grants from these two programs. Third generation feedstocks consist in inorganic carbon resources, such as carbon dioxide or monoxide from industrial waste, and represent the ultimate alternative in terms of environmental impact. In 2017, Global Bioenergies has acquired Syngip, a small Dutch company involved in third generation processes.

One of these new programs, named "SWEETWOODS" and led by the Estonian forestry industrialist Granuul Invest, targets the utilization of hardwood in fermentative processes at demo scale, with the aim of utilizing all fractions of the biomass feedstock and thus minimizing the carbon-containing streams associated to lowvalue uses. Global Bioenergies will validate that hardwood hydrolysates can indeed be used as a feedstock in its Isobutene process. By specifically addressing hardwood biomass, this program completes the portfolio of second generation feedstocks to be used by Global Bioenergies in its Isobutene production process.

The two other new programs are related to third generation resources. One is led by VITO, a Dutch institution among the world leaders in industrial biology, and targets the use of industrial CO2 to produce chemical compounds, and in particular isobutene. Global Bioenergies' Dutch subsidiary will dedicate a large part of its activities to this program. The other project, led by the Max Planck Institute, takes place in a new, emerging scientific field: electrobiology. The driving idea of this program is to use renewable electricity as an energy source to produce liquid fuels and materials from CO2.

Sweetwater to build biorefinery plant



Sweetwater

Sweetwater Energy, a Rochester, NY-based biotechnology company, and Estonia-based AS Graanul Invest, Europe's largest wood pellet producer, will build a commercial-scale integrated biorefinery that will produce clean cellulosic sugars and highly pure lignin from 50,000 tons of local hardwood each year. In addition, the plant will allow the two companies to work with corporate partners to create and optimize innovative new products from sugar and lignin.

The success of this project will have a tremendous impact on the biomaterials marketplace. The plant will be the first to incorporate Sweetwater's Sunburst pre-treatment technology, which splits biomass into its constituent parts faster and more effectively than any commercial process available today. The result is lower greenhouse gas emissions, lower usage of water and chemicals while for the first time deriving significant value from all components of wood.

The agreement grants Graanul, which owns 11 large-scale wood-pellet production plants in the Baltics, an exclusive territorial license to incorporate the Sunburst technology into its existing plants, as well as into future plants throughout the Baltic States.

The fully funded plant is made possible through significant investment and collaboration between the two companies by utilizing Sweetwater's patented technology and Graanul's existing infrastructure as one of the largest producers of wood pellets in the world.

The patented technology is based on modified, highly reliable twin-screw extrusion systems that operate today around the world in many industries, ranging from plastics to aluminium to food processing. All fuels, plastics, and chemicals have traditionally been made from fossil-derived, prehistoric carbon pulled from the ground, eventually ending up in our atmosphere and oceans. The new Sweetwater-Graanul partnership will compete economically with all of those same products, but will do so by using green, sustainable carbon that trees and crops have taken from the atmosphere. Further, the ingredients produced by this technology are now being tested in new renewable products for food, amino acids, paper products, and even activated carbon for pollution control.

Click here for more information.

Bioethanol

Mushroom bacterium could produce butanol biofuel

A bacterium in mushroom crop residue can contribute to greener and cheaper biofuel production, according to new research.

A team of engineers recently discovered that a naturally occurring bacterium, Thermoanaerobacterium thermosaccharolyticum TG57, can directly convert cellulose, a plant-based material, to biobutanol.

Traditional biofuels are produced from food crops. This approach is costly and competes with food production in the use of land, water, energy, and other environmental resources.

Many scientists believe biofuels produced from unprocessed cellulosic materials such as plant biomass, as well as agriculture, horticultural, and organic waste could meet growing energy demands without increasing greenhouse gas emissions resulting from the burning of fossil fuels. These cellulosic materials are in great abundance, environmentally friendly, and economically sustainable. Among various types of biofuels, biobutanol offers great promise as a gasoline substitute because of its high energy density and superior properties. It can directly replace gasoline in car engines without any modification. However, commercial production of biobutanol has been hampered by the lack of potent microbes capable of converting cellulosic biomass into biofuels. The current technique is costly and requires complicated chemical pre-treatment.

The new technique could potentially be a gamechanging technology for cost effective and sustainable biofuel production.

Spent mushroom compost—typically composed of wheat straw and saw dust—is the residual compost waste mushroom farming generates. To obtain the unique TG57 strain, researchers left the microorganisms in the waste to evolve naturally for more than two years.

The fermentation process is simple and doesn't require complicated pre-treatment or genetic modification of the microorganisms. When the researchers add cellulose, the bacterium simply digests it to produce butanol as the main product.

Moving forward, the research team will continue to optimize the performance of the TG57 strain, and further engineer it to enhance biobutanol ratio and yield using molecular genetic tools.

Click here for more information.

Biodiesel

Cross-Solent ferry to run on biodiesel



Geograph

RED Funnel will be trialling new fossil-free fuel on its RoPax fleet of ships.

The cross-Solent ferry company has teamed up with Green Biofuels, to trial Green D+ biofuel with varying amounts of low-sulphur marine gas oil, to power the main engines and on-board generators.

The aim is to significantly reduce greenhouse gas emissions.

Green D+ fuel is formulated by Green Biofuels using a patented performance additive to hydrotreated vegetable oil (HVO) renewable diesel.

The HVO is produced by Neste in Europe from a variety of waste and residue materials, such as used cooking oil and waste fats from the food processing industry, as well as plant oils, such as palm oil and rapeseed oil.

The waste oil is recycled back into fuel, eliminating the dangers of inefficient and often dangerous disposal or its re-use in the food chain.

Velocys licenses Red Rock biofuels plant

Velocys plc, the renewable fuels company, has received a "notice to proceed" action to commence manufacturing of the Fischer-Tropsch reactors and catalyst for the Red Rock Biofuels LLC biorefinery that will be located in Lakeview, Oregon, USA. RRB has commenced construction of the biorefinery, which will incorporate Velocys' technology, and produce low-carbon, renewable diesel and jet fuel. Velocys' role will be as a licensor for its technology to the project.

RRB is a subsidiary of IR1 Group LLC, which has 325 million gallons of installed biofuels capacity. The biorefinery in Lakeview will convert forestry residue into 15 million gallons per year of renewable transportation fuels including diesel and jet fuel. Enough jet fuel will be produced by the plant to fuel 1,800 round trips per year from Portland, Oregon to San Francisco. RRB has in place contracts from several airlines to purchase 100 percent of the jet fuel produced each year.

RRB's Lakeview project is expected to deliver around \$15 million revenues to Velocys during the construction and early operation stages of the plant, and an additional \$30 million or more over the life of the biorefinery. Over \$6 million has already been invoiced and received from RRB.

With broad international agreement in the aviation industry for carbon-free growth beyond 2020, airlines are actively seeking low-carbon jet fuel to reduce their greenhouse gas emissions. The civil aviation industry alone will require around 1.5 billion gallons per year of new renewable jet fuel production capacity to meet this commitment.

Velocys' technology, be it via licensed third-party projects like RRB's biorefinery, or through Velocys' own projects such as the Natchez, Mississippi project, will supply the aviation and road haulage industries with a scalable, sustainable supply of fuel. By using forest and sawmill residues, RRB's biorefinery will not only avoid competition for agricultural resources, but also reduce the risk of catastrophic wildfires by removing waste biomass from overgrown forests. It will also help to regenerate the local forestry industry.

Click here for more information.

Aviation Biofuel

Study begins into feasibility of jet fuel from forest biomasss



Wikimedia Commons

Södra (the largest forest-owner association in Sweden and an international forest industry group) has signed a letter of intent with KLM Royal Dutch Airlines to conduct a joint feasibility study to examine the prerequisites for producing biojet fuel from forest biomass. While Södra and KLM are the main partners in the collaboration, many other players are also participating. Södra will become the first company in Sweden to join KLM's Corporate Biofuel Programme, which is aimed at supporting growth in demand for fossilfuel-free alternatives in the aviation sector. The programme enables companies to ensure that sustainable biojet fuel is used for their air travel by paying a surcharge that covers the difference in price between biofuel and regular jet fuel.

Other Fuel

Tripling in CNG's biomethane fuel demand

CNG Fuels is reporting that demand for '100% renewable biomethane' from its refuelling station in Leyland, UK has more than tripled in the last year.

The facility was first unveiled in March 2016, with CNG Fuels stating at the time it was the facility of its kind in the UK.

Capable of refuelling more than 500 heavy-duty vehicles per days, the facility also supplies 100% renewable biomethane (bio-CNG) made from waste at anaerobic digestion plants and delivered to the station through the national grid pipeline system. The facility is backed by gas network Cadent.

With an increasing number of retail and logistics firms, such as Waitrose and DHL, using the site, the latest data have revealed that the volume of gas dispensed at the site in March 2018 was 170% higher than in March 2017.

Click here for more information.

Novel process for algal hydrogen production

Sustained H2 photoproduction is demonstrated in green algae under a train of strong white light pulses interrupted by longer dark phases. The devised protocol relies on the presence of the [FeFe]-hydrogenase in algal chloroplasts, which is activated within a few seconds after the establishment of anaerobiosis. H2 photoproduction proceeds for up to 3 days with the maximum rate occurring in the first 6 hours.

Click here for more information.

Södra and ANDRITZ to produce biomethanol

International technology Group ANDRITZ has received an order from Södra, Sweden, to supply a bio-methanol cleaning and purification plant for Södra's pulp mill in Mönsterås.

The bio-methanol treatment plant supplied by ANDRITZ is designed to produce 5,000 tons of bio-methanol per year. The plant is a key part of a new process producing sustainable bio-methanol from renewable raw material. Bio-methanol can be used in shipping, for example, as a stand-alone fuel, as well as for the production of biodiesel (RME), as an additive in petrol, or as a raw material in the chemical industry. The methanol produced is compliant with the IMPCA Reference Specifications for merchantable methanol. Startup of the plant is scheduled for the third quarter of 2019.

The global methanol production is in the order of 80 million tons per year and is generated mostly from fossil raw materials. In the chemical wood pulping process, methanol is formed as a byproduct that contains many impurities. This raw methanol is purified to a merchantable biomethanol, which is chemically identical to fossilbased methanol. The bio-methanol generated contributes towards reducing the amount of fossil greenhouse gas emissions.

The current target of the European Union is to have 10% of the transport fuel of every EU country coming from renewable sources, such as biofuels, by 2020. The new EU Renewable Energy Directive 2 currently in preparation will significantly increase the share of advanced biofuels by 2030.

Events

BioBase4SME Innovation Biocamp Easingwold, 3rd-8th June 2018

Apply now for €7000 worth of fully funded, specialist training for your business.

New, high-growth, bio-based businesses can benefit from an intensive, week-long course giving them the tools they need to commercialise their idea and their company. Includes follow-on coaching for a year after the workshop. This event is part of the EU-funded project BioBase4SME and builds on last year's successful Biocamp.

Click here for more information.

UK AD & World Biogas Expo 2018 Birmingham, 11th July 2018

UK AD and World Biogas Expo, the largest international trade show dedicated solely to the anaerobic digestion and biogas industry, returns in 2018 to provide the latest market and technology news, sector by sector, as well as a platform for industry professionals from the UK and overseas to network, share experiences and do business. Anaerobic digestion (AD) is a rapidly-expanding sector, with the potential to become a £1 trillion global industry making a significant contribution to the development of a green, circular economy. AD plays a critical part in meeting nine of the UN Sustainable Development Goals, providing solutions applicable to agriculture, urbanisation, waste and water management, transport and energy generation. This creates exceptional opportunities for the AD market to grow, both in the UK and abroad.

UK AD and World Biogas Expo 2018 is unique in bringing together an international gathering of new and existing players in this game-changing sector. Over two full days, it will provide a dynamic platform for them to engage with each other.

Click here for more information.

EFIB

Toulouse, 16th-18th October 2018

Join over 650 bio-based leaders in 2018 for the 11th edition of EFIB in Toulouse, France, on the 16th, 17thand 18th of October.

Price Information

Historical spot prices of liquid fossil fuels and liquid biofuels. Five years prices and up to April 2018 are given in \$ per barrel.



Prices of Crude oil, diesel, gasoline, and jet fuel are recorded from <u>www.indexmundi.com</u>; Price of ethanol from <u>www.neo.ne.gov</u>; Biodiesel spot prices from <u>http://www.kingsman.com</u>

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