

# NNFCC News Review

## Feedstocks & Biorefining



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

# Contents

Markets.....	4
Research & Development .....	6
Wood & Crop.....	8
Other Feedstocks.....	10
Events .....	13
Feedstock Prices.....	14
Credits and Disclaimer.....	15

# Foreword

Welcome subscribers, to this month's Feedstocks News Review.

Europe has been the largest consumer of wood pellets in the world for years, occupying as much as 58% of the global market in 2018, followed by the US and China, both taking up 22.9% of the market in the same year. The Covid-19 pandemic has led to a decrease in demand which has resulted in the European market being oversupplied. There are however signs that demand has begun to rise again, with exports from the US starting to pick up once again.

In January 2021, the U.S. exported 599,624 metric tons of wood pellets, compared to 564,826 metric tons in December and 500,904 metric tons in January 2020, showing that although the pandemic has led to setbacks, the wood pellets market is still steadily growing. The UK remained the main importer of US wood pellets, followed by Denmark and the Netherlands. In addition, the value of U.S. wood pellet exports reached \$84 million in January, up from \$76 million the previous month and up from \$69 million in January 2020.

Wood pellets have been identified by industrial stakeholders as one of the main means to achieving net zero. The feedstock is therefore becoming a more attractive investment to leading industrial businesses with growing sustainability commitments. Drax wood pellet production increased by 7% in 2020 while improving quality and reducing costs by 5%. Similarly, Envival has announced it is expanding its wood pellets production in several of its production plants by the end of this year.

Read on for the latest news.

# Markets

## US pellet export to UK-January 2021



*Pixabay*

The U.S. exported 599,624.2 metric tons of wood pellets in January, up from both 564,826.2 metric tons in December and 500,904 metric tons in January 2020, according to data released by the USDA Foreign Agricultural Service on the 5<sup>th</sup> March.

The U.K. remained the top destination for U.S. wood pellet exports in January at 475,264 metric tons, followed by Denmark at 84,663.7 metric tons and the Netherland at 35,088.9 metric tons.

The value of U.S. wood pellet exports reached \$84.46 million in January, up from \$75.68 million the previous month and up from \$69.31 million in January 2020.

Click [here](#) for more information.

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## Drax ups wood pellet production and lowers costs

Drax Group plc increased wood pellet production by 7% last year while improving quality and reducing costs by 5%, according to information published in the company's 2020 financial report, which was released on the 25<sup>th</sup> February.

The company produced 1.5 million metric tons of pellets in 2020, up from 1.4 million metric tons in 2019. Drax CEO Will Gardiner said increased production was a result of strong operational performance and good fiber availability when compared to 2019 when heavy rainfall restricted commercial forestry activity.

Cost of wood pellet production fell to \$153 per ton in 2020, down from \$161 per ton the previous year. Gardiner said Drax remains focused on opportunities to deliver savings across the supply chain as part of its effort to reduce the cost of biomass to £50 per megawatt hour (MWh) on 5 million metric tons by 2027.

Click [here](#) for more information.

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## Envival pellet capacity continues to expand and targets Zero carbon

Enviva confirmed it has received the necessary permits to expand production at its pellet plant in Greenwood, South Carolina, to 600,000 metric tons per year. Construction is ongoing with the expansion on track for completion by the end of 2021.

The company also reported it is continuing to commission certain assets and ramp production from the existing expansion projects at its facilities

in Northampton, North Carolina, and Southampton, Virginia. Each facility is expected to reach nameplate production capacity of approximately 750,000 metric tons per year by the end of 2021.

Expansion projects are also planned at Enviva's wood pellet plants located in Sampson, North Carolina; Hamlet, North Carolina; and Cottdonale, Florida. Those projects are subject to the company receiving necessary permits.

Development is also continuing on proposed wood pellet plants located in Lucedale, Mississippi, and Epes, Alabama, along with a deep-water marine terminal in Pascagoula, Mississippi. Enviva said its sponsor is also evaluating additional sites for wood pellet production plants across the Southeastern U.S.

Click [here](#) for more information.

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### **Södra to raise price of NBSK to \$1,220/tonne**

Södra Cell is increasing the price of its northern bleached softwood kraft (NBSK) pulp in Europe to \$1,220, effective on 1<sup>st</sup> April 2021.

"The global NBSK market is very tight, and in Europe a robust demand is outpacing supply. This announcement reflects the overall market sentiment", commented Henrik Wettergren, VP Marketing and Sales, Södra Cell.

Click [here](#) for more information.

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### **Neste acquire Bunge Refinery in Rotterdam**



*Pixabay*

On the 3<sup>rd</sup> November 2020, Neste announced that it would acquire Bunge Loders Croklaan's refinery plant in Rotterdam, the Netherlands. The refinery plant is located next to Neste's existing biorefinery and it consists of a pretreatment facility, tank farm, jetties and has a pipeline connection to Neste's site. The transition of operations and employees will be implemented in phases with the refinery plant's full and modified pretreatment capacity available for processing Neste's feedstock by the end of 2024.

The company will expand its renewables annual nameplate production capacity from the current 3.2 to 4.5 million tons in the first quarter of 2023, of which the Singapore facility expansion will provide 1.3 million tons.

The now acquired refinery offers further pretreatment capacity and terminal infrastructure to handle the increasingly complex waste and residue feedstocks, and supports further growth in production capacity beyond 2023.

Click [here](#) for more information.

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# Research & Development

## **Review of characterization, pretreatment and its applications on different lignocellulosic biomass**

With the draining of petroleum derivatives, expanding natural contamination issues, there has been rising enthusiasm for the examination of lignocellulosic biomass for an alternative source of energy. Characterization of various biomass, its intermediate, and products is a need for conversion of any biomass to biofuels. Chemical composition of lignocellulosic biomass is an essential point for developing potent pretreatment technologies to break its rigid structure, conversion of sugar by different enzymes mainly cellulose to glucose and even various microorganisms which can ferment sugars into bioethanol and other value-added green chemicals.

In this present review work, the main focus is on the proximate and ultimate analysis of different feedstocks, and altered pretreatment techniques such as physical, chemical, physicochemical, and biological methods for bioethanol production have been addressed, which ultimately will help in overcoming the recalcitrance of lignocellulosic biomass by degrading the lignin fraction, breaking down of lignocellulose components, hydrolysis, and fermentation process.

Click [here](#) for more information.

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## **Year-Round Storage Operation of Three Major Agricultural Crop Residue Biomasses**



*Pixabay*

Commercial cellulosic biofuel operation requires a reliable, low-cost, and stable feedstock logistic system. One great challenge is its long-term storage at least for one harvest cycle (1 year for agricultural crop residues) with a minimum loss of bulky, geographically dispersed, inflammable, and easily degradable lignocellulosic biomass.

This study conducted an investigation of year-round storage of the agricultural crop residue feedstock under the scenario of performing dry acid pretreatment at the distributed regional collection depots, instead of the central biorefinery plant. The dry acid pretreatment method provides a practical basis for the storage operation by its ability for high preservation of polysaccharide solids, highly compacted accumulation density, being free from wastewater generation, low capital investment, and low energy consumption.

Click [here](#) for more information.

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## Crop Residues as Potential Sustainable Source of Silica in the Era of Climate Change: A Review

Prospecting for sustainable resources will be suitable to generate silica materials extensively used for different commercial applications. Accumulated amorphous silica which is found in the crop residues removed during the harvesting is called as phytolith. From various crop residues discussed in this study, sugarcane leaves are most important and capable source of silica.

Synthesis methods are in order to generate silica particle with high processing efficiency. The applications for silica particles extracted from crop residues differ depending on their unique characteristics related to textural and morphological properties. Developing silica materials from crop residues involve several challenges involving silica depletion in croplands, separation of valuable components from crop residues, and the high use of energy and chemical reagents.

Use of industrial wastes containing silica can be utilized as silicon fertilizer in crop lands facing silica depletion. An integrated approach can be applied using low energy with fewer chemical methods to retrieve energy, lignocellulosic, siliceous, carbon containing material from crop residues.

Click [here](#) for more information.

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## Development of a forest-based bioeconomy in Finland



*Pixabay*

It is uncertain how the traditional forest sector can respond to the changing political environment, evolving markets, and global environmental problems. This study focuses on the development of forest-based bioeconomy (BE) in Finland from the perspective of three forest-based value networks (wooden multistory construction, fiber-based packaging, and biorefining) and thus breaks the tendency of siloed discussions.

The study of expert opinions applies a collaborative interdisciplinary research method that combines group discussions and follow-up survey data. The results indicate that transformational regulation, proper incentives, and ways of increasing interaction at the business-consumer interface are required to support the creation of new practices and the destruction of old practices in the industry renewal.

Click [here](#) for more information.

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# Wood & Crop

## Canola/Rapeseed Pan-Genome Consortium Results Reveal Broad Genetic Diversity of the Crop



*Pixabay*

A consortium of leading academic and commercial companies from the USA, Canada, Europe and Israel, together with NRGene (TASE:NRGN), has announced the successful completion and results of the canola/rapeseed pan-genome.

The International Canola Pan-genome Consortium was established in 2019 to advance the rapeseed agricultural industry by capturing this crop's broad genetic diversity. The global consortium was led jointly by Dr. Isobel Parkin from the Government of Canada's Agriculture & Agri-food Canada (AAFC), Dr. Andrew Sharpe from the Global Institute for Food Security (GIFS) at the University of Saskatchewan, Canada, and NRGene, a leading genomic Artificial Intelligence (AI) company based in Israel.

Click [here](#) for more information.

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## Locating Hotspots for the Social Life Cycle Assessment of Bio-Based Products from Short Rotation Coppice

The establishment of new value chains raises expectations in economic and social benefits. To determine whether these expectations can be fulfilled or whether there are also negative consequences, social aspects should be assessed as early as the R&D phase.

Potential social impacts can be assessed with the help of a social life cycle assessment (SLCA). A common problem in SLCA studies is the large number of social aspects. Thus, it is important to prioritize the most relevant aspects. Scholars agree that socioeconomic indicators should not be selected on a purely intuitive and common sense basis and that a standardized approach is missing.

The outcome of this study aims to support future research by identifying an appropriate approach for the selection of indicators in SLCA. For studies with a similar focus, the proposed set of indicators can be used as a framework in itself or serve as a basis for the choice of relevant social indicators.

Click [here](#) for more information.

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## Economic perspective of ethanol and biodiesel coproduction from industrial hemp

In this study, the economics of producing biofuels from an industrial hemp (*Cannabis sativa*) genotype – 19m96136 was investigated.

The simulation results indicated that Hemp containing 2% lipids can yield up to 3.95 million gallons of biodiesel annually. On improving biomass lipid content to 5 and 10%, biodiesel

production increased to 9.88 and 19.91 million gallons, respectively. The breakeven unit production cost of hemp biodiesel with 2, 5, and 10% lipid containing hemp was \$18.49, \$7.87, and \$4.13/gallon respectively. The biodiesel unit production cost when utilizing 10% lipid-containing hemp was comparable to soybean biodiesel at \$4.13/gallon.

Furthermore, sensitivity analysis revealed the possibility of a 7.80% reduction in unit production cost upon a 10% reduction in hemp feedstock cost. Furthermore, industrial hemp was capable of producing between 307.80 and 325.82 gallons of total biofuels per hectare of agricultural land than soybean.

Click [here](#) for more information.

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## Cultivation Of Hemp In Spain Increases Eightfold Since 2016



*Pixabay*

Data from the Spanish Agrarian Guarantee Fund (FEGA), has shown that during 2020, the area under dedicated cultivation of hemp in Spain has gone up from 61 hectares to 510 hectares, meaning it has increased eightfold since 2016, on 'hemp for fibre' area, declared in the single CAP application.

The Ministry of Agriculture has pointed out that although this figure is still relatively low within Spanish industrial crop growing, it does mean that interest in the production of this crop is increasing, and as such, has produced an informative document which lays out to prospective farmers and growers the main conditions relating to the cultivation of this specific crop, explaining the permitted purposes, the applicable regulations, and the existing obligations for growers.

Click [here](#) for more information.

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## Goodyear strengthens commitment to sustainable procurement of soybeans

The Goodyear Tire & Rubber Company has announced a new sustainable soybean oil procurement policy that reflects its strong commitment to the responsible sourcing of raw materials. The company believes that, through this policy, it can help guide processors, farmers, and all other members of the supply chain to establish practices and make sound environmental and social decisions related to the growing, harvesting, and processing of soybeans.

Building upon the company's Business Conduct Manual and Supplier Code of Conduct, the policy, which can be reviewed [here](#), features these important components: human rights; responsible land acquisition and use; soybean oil processing; soybean growing and harvesting; supplier alignment; and policy implementation and compliance.

Goodyear commercialized this innovation in its Assurance WeatherReady™ consumer tire line in 2017, the Eagle Enforcer All Weather™ in 2018, the Eagle Exhilarate™ in 2019 and the Goodyear Assurance ComfortDrive in 2020.

Goodyear's 2020 use of soybean oil increased 73% over 2018 usage, making progress toward its long-term goal of full petroleum oil replacement in its products by 2040.

Click [here](#) for more information.

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## Other Feedstocks

### Industrial Symbiosis: Beer Brewery Wastewater-Based Biorefinery

The scope of this theoretical study is to investigate the concept of biorefinery applied to the use of brewery wastewater as feedstock for bioconversions for lactic acid production using lactic acid bacteria (LAB), while examining the theoretical design, development, and costing of brewery wastewater treatment plant within the scope of wastewater recovery and reuse as formulated waste-derived nutrient media-assimilated effluents.

Beer is the fifth of the most consumed alcoholic beverage in the world, nowadays, with well-established large production sites across the world, while its wastewater generation for breweries for example in China, reaching 300 million m<sup>3</sup>/year. The system design is based on sedimentation and membrane technology, within the scope of removal of pollutants that would be resulting in the generation of relatively abundant inexpensive liquid feedstock able to be recycled to produce high-value chemicals such as lactic acid while reducing the carbon footprint of the fermentation and reducing waste disposal.

Click [here](#) for more information.

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### A Biorefinery Approach to the Biomass of the Seaweed *Undaria pinnatifida*



*Pixabay*

Brown seaweeds are recognized sources of compounds with a wide range of properties and applications. Within these compounds, phlorotannins are known to possess several bioactivities (e.g., antioxidant, anti-inflammatory, and antimicrobial) with potential to improve wound healing.

To obtain phlorotannins enriched extracts from *Undaria pinnatifida*, a biorefinery was set using low-cost industry-friendly methodologies, such as sequential solid-liquid extraction and liquid-liquid extraction. The obtained extracts were screened for their antioxidant and antimicrobial activity against five common wound pathogens and for their anti-inflammatory potential. The ethanolic wash fraction (wE100) had the highest antioxidant activity ( $114.61 \pm 10.04$  mmol·mg<sup>-1</sup> extract by Diphenyl-1-picrylhydrazyl (DPPH) and  $6.56 \pm 1.13$  mM eq. Fe II·mg<sup>-1</sup> extract by and Ferric Reducing Antioxidant Power (FRAP)), acting efficiently against Gram-negative (*Pseudomonas aeruginosa*) and Gram-positive (*Staphylococcus aureus*) bacteria, and showing a nitric oxide production inhibition over 47% when used at 0.01 µg·mL<sup>-1</sup>.

NMR and FTIR chemical characterization suggested that phlorotannins are present.

Obtained fraction wE100 proved to be a promising candidate for further inclusion as wound healing agents, while the remaining fractions analyzed are potential sources for other biotechnological applications, giving emphasis to a biorefinery and circular economy framework to add value to this seaweed and the industry.

Click [here](#) for more information.

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### **Multi-objective optimization of a 1G-2G biorefinery: A tool towards economic and environmental viability**



*Pixabay*

First-generation sugarcane ethanol production is a well-established technology. However, second-generation ethanol is not yet consolidated in industries. Under these circumstances, this work presents a multi-objective optimization of this process focusing on economic and environmental objectives.

The impact of the Brazilian decarbonization program on an integrated biorefinery is analysed, considering a first-generation ethanol conventional autonomous distillery and a second-generation process with hydrothermal pre-

treatment, enzymatic hydrolysis and fermentation of the xylose liquor.

As the main conclusions, there is a trade-off between economic and environmental targets, indicating that carbon credits may be essential for second-generation ethanol economic feasibility. The optimized integrated biorefinery is able to increase ethanol production by approximately 24% compared to first-generation biorefineries, but an increase in ethanol production higher than 13% would make the process economically unfeasible, while the decarbonization credits are not being commercialized. A price of \$ 15.77 for decarbonization credits would make it possible to produce 20% more ethanol, keeping the integrated biorefinery economically feasible.

Click [here](#) for more information.

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### **Cell wall hemicellulose for sustainable industrial utilization**

Despite a steady decline in fossil resources in past few decades, demand for petroleum-based chemicals and polymers has increased sharply. As the dead end of the petroleum industry has begun to emerge, mankind must immediately seek for alternative energy and other biopolymer resources.

Hemicellulose being an abundant component of lignocellulosic biomass, may serve as a promising alternative for replacing dwindling fossil resources with many important fuels and biopolymers such as furfural, HMF, etc. Utilization of hemicellulose in the present review is divided into two sections; in the first section, products manufactured in the industry by direct modification of hemicellulose either by attaching different functional groups or other polymers are discussed, while in the second section, products or polymers produced by

hemicellulose degradation are discussed along with their use.

The present review paper presents the current research about hemicellulose utilization and thus encourages in-depth studies in this area.

Click [here](#) for more information.

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# Events

## **EUBCE 2021**

**Marseille / Online, 26<sup>th</sup>-29<sup>th</sup> April 2021**

Each year, EUBCE brings together the greatest minds and latest advancements in biomass, with the aim of accelerating research and market uptake across the globe. During the conference, over 2,000 experts from both academia and industry share and discuss ground-breaking ideas, technologies, applications, and solutions for the sourcing, production, and utility of biomass.

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## **RRB 2021**

**Aveiro, 6<sup>th</sup>-8<sup>th</sup> September 2021**

The 17th edition of the International Conference on Renewable Resources & Biorefineries will take place in Aveiro, Portugal from Monday 6 Sept until Wednesday 8 Sept, 2021.

Click [here](#) for more information.

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## **RWM 2020**

**Birmingham, 22<sup>nd</sup>-23<sup>rd</sup> September 2021**

The UK's largest Recycling, Resource & Waste Management Event, features over 180 expert speakers across the waste management and circular economy industries, over 500 exhibitors and numerous experiential features and live demonstrations.

Click [here](#) for more information.

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# Feedstock Prices

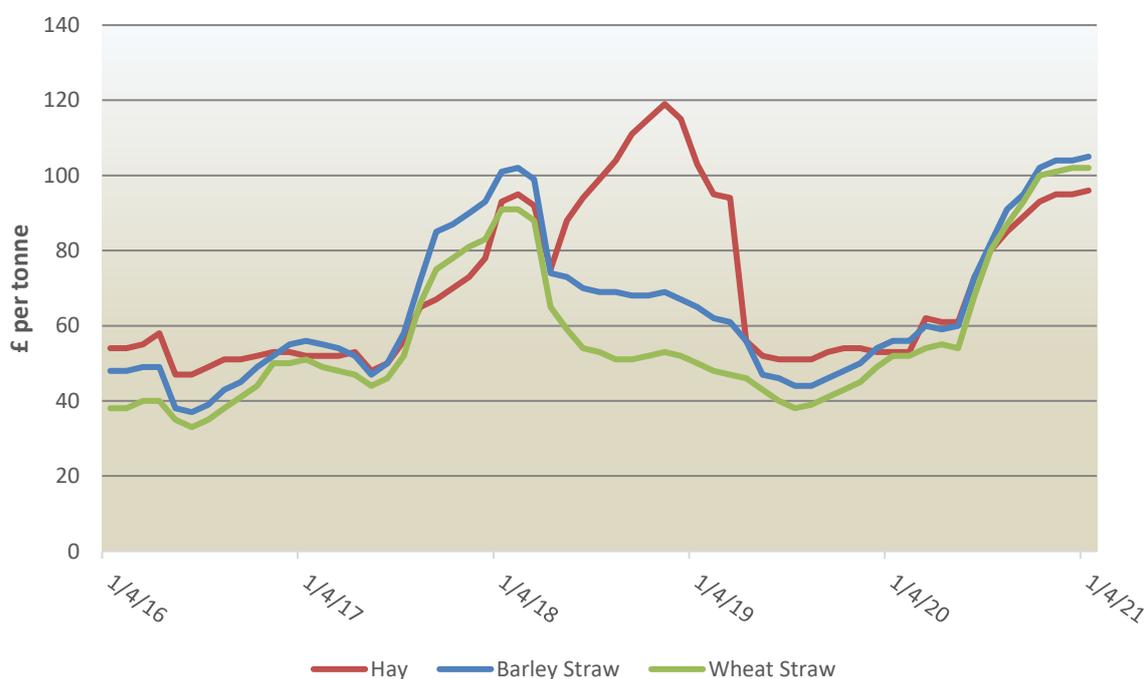
**UK spot prices of bagged wood pellets, delivered. Grain and oilseed prices are across all main regions of the UK.**

	Wood Pellets £/tonne, 5% VAT	Milling wheat £/tonne, ex- farm	Feed wheat £/tonne, ex- farm	Feed barley £/tonne, ex- farm	Oilseed rape £/tonne, ex- farm
High	328.13	202.00	190.00	160.00	423.00
Low	246.15	202.00	173.00	150.00	406.00
Average	279.61	202.00	185.15	152.62	417.25

For wood pellets prices we consider UK pellet traders advertised selling prices.

For details on grains and oilseed prices, see [Farmers Weekly](#).

**Monthly prices of ex-farm Hay and Straw in England and Wales. Prices shown are for 5 years up to April 2021.**



Source: British Hay and Straw Merchants' Association, Defra

**Other biomass feedstock prices are available upon request, simply contact [enquiries@nnfcc.co.uk](mailto:enquiries@nnfcc.co.uk)**

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The Bioeconomy Consultants



**NNFCC**  
**Biocentre, York Science Park**  
**Innovation Way**  
**Heslington, York**  
**YO10 5DG**

**Phone: +44 (0)1904 435182**  
**Fax: +44 (0)1904 435345**  
**Email: [enquiries@nnfcc.co.uk](mailto:enquiries@nnfcc.co.uk)**  
**Web: [www.nnfcc.co.uk](http://www.nnfcc.co.uk)**  
**Twitter: @NNFCC**