Bioenergy Insight

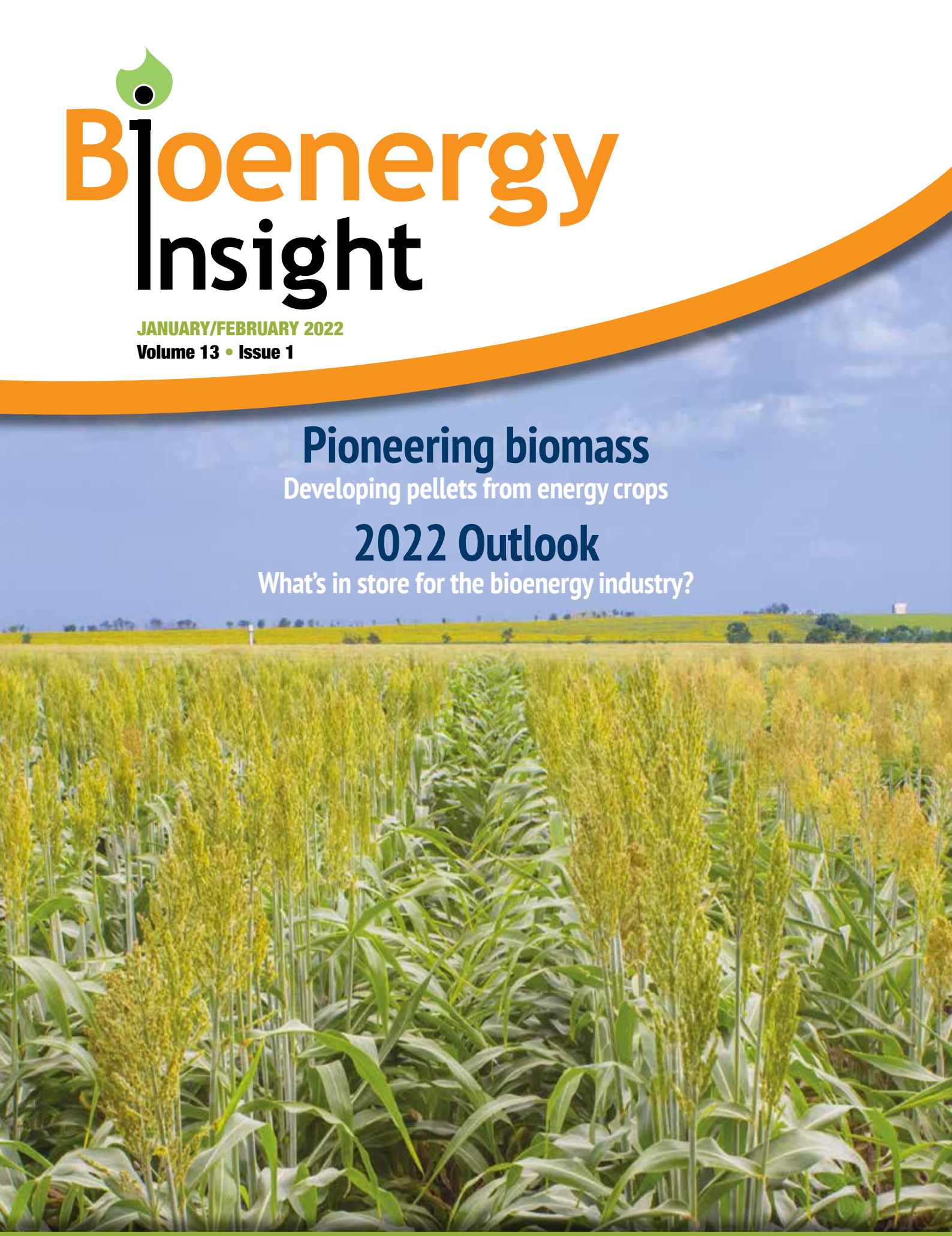
JANUARY/FEBRUARY 2022
Volume 13 • Issue 1

Pioneering biomass

Developing pellets from energy crops

2022 Outlook

What's in store for the bioenergy industry?



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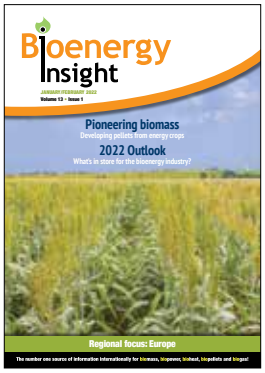

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Bioenergy Insight
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December summary

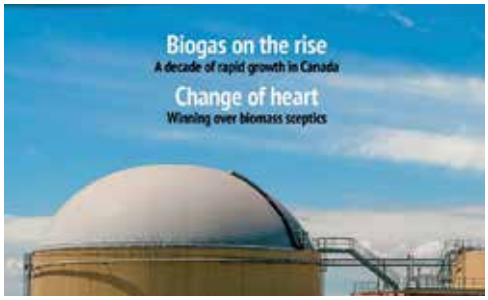
23,400	21	51
impressions	mentions	new followers

TOP TWEETS

Top Mention earned 69 engagements

EQTEC plc (LSE:EQT) **@eqtec**

"Our #syngas, specifically, has an extremely high level of purity, making it very versatile for many high-value applications". Our technology is patented, proven and proprietary and we share more in this recent interview with @bioenergyinfo
https://bit.ly/2XMdhnO #cleantech



7 22

Top Tweet earned 3,468 impressions

TotalEnergies to supply The Restaurant Group with green gas: https://bioenergy-news.com/news/totalenergies-to-supply-the-restaurant-group-with-green-gas/... @TotalEnergies
#greengas #biomethane #renewablegas

4 4

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Bioenergy for a secure future

Firstly, the *Bioenergy Insight* team would like to wish you all a Happy New Year! We hope you had a safe, relaxing break and that you are feeling refreshed and ready to tackle 2022.

It has been a tumultuous time in the UK, with the rapid spread of the Omicron variant, instability in government, and yet more challenges as a result of Brexit. We are also experiencing, like much of Europe, a huge increase in energy prices. Volatility in the gas and electricity markets shows no sign of stopping, unfortunately, with UK energy bills expected to rise by 50% from April.

Recently, I read a blog by Fatih Birol, executive director at the International Energy Agency, criticising the worrying assumption that the clean energy transition is to blame for this volatility in the energy market. Birol described these claims as "misleading, to say the least".

"This is not a renewables or a clean energy crisis; this is a natural gas market crisis," he said. "It is important to work from a sound evidence base on the causes of the current market turbulence.

"As we showed in our recent World Energy Outlook 2021, well managed clean energy transitions can help reduce energy market volatility and its impacts on businesses and consumers. The underlying causes of today's crisis lie elsewhere."

Birol highlighted the rapid global economic rebound in 2021, outages and maintenance of key gas infrastructure, and a lack of sufficient supply from Russia as the main reasons behind the crisis. Energy security has an important role to play in the solution; there is an urgent need for increased baseload supply and flexibility. Biomass and biogas both have enormous potential to help in these areas.

In our November/December issue, we covered a story from bio-CO_2 supplier, BioCarbonics, which outlined the benefits of creating a new CO_2 supply chain model in the UK based on biogas production, instead of relying on one or two large sources of supply. This piece was particularly poignant following the sudden increase in wholesale gas prices seen in September last year, which resulted in two major fertiliser plants in the north of England — responsible for 60% of the UK's food-grade CO_2 supply — temporarily shutting down.

On 20 January, the European Biogas Association and Gas Infrastructure Europe revealed 2021 was a record-breaking year for biomethane production in Europe. The combined amount of biomethane and biogas available today can cover the entire gas consumption of Belgium. It is estimated that by 2050, sustainable biomethane will be able to cover up to 30-40% of Europe's gas consumption. We are heading in the right direction.

A new year brings new challenges, but also opportunities. We know that the bioenergy industry has great potential in the global race to reach net zero. So, let's see what 2022 has in store!

Dawn Stephens-Borg
Editor

MHIENG to deliver compact CO_2 capture system to biomass power plant

Mitsubishi Heavy Industries Engineering (MHIENG), a group company of Mitsubishi Heavy Industries, has received an order for a compact CO_2 capture system for a biomass power plant in Japan.

The order comes from Taihei Dengyo Kaisha, a provider of plant construction, maintenance, and auxiliary services. The CO_2 capture system offers a capacity of 0.3 tonnes per day.

Taihei Dengyo is targeting the establishment of carbon-negative solutions from carbon-neutral systems, to help achieve a circular society. The firm aims to achieve this shift through the separation, capture, and initial storage of the CO_2 emitted by biomass power plants, followed by the use of the stored carbon to grow plants, for example.

The introduction of a newly ordered compact CO_2 capture system forms part of this initiative. Plans call for its integration into a 7 MW class biomass power plant operated by Taihei Dengyo at an urban complex in Hiroshima City.

The system is based on a test plant manufactured to verify the impact of applying the new CO_2 capture system to a biomass flue gas source, which made early commercialisation possible. The base system is a pilot facility used in the BECCS project conducted at a biomass power plant owned by Drax.

The CO_2 capture technology adopted in the new system is the KM CDR Process™, jointly developed by MHIENG and Kansai Electric Power Co, which employs the high performance KS-1™ amine solvent. It significantly reduces energy consumption.

As of November, MHIENG had delivered a total of 13 commercial plants using the KM CDR Process at locations globally, and two more are currently under construction.

Baltpool launches biomass traceability tool

International biomass exchange BALTPOOL is introducing a new solution for its clients to determine the precise origin of biomass and the raw materials used.

The launch of the biomass traceability tool means that from now on, before selling biomass, the seller will have to provide detailed information about its products. The tool will indicate the exact location from where the biomass will be transported and under which contract; the quantity of the supplied biomass, and the raw materials that were used to produce it.

Additionally, sellers will be required to indicate any relevant certificates. An option to attach images of the raw materials will also be available.

"Our vision is to make our biomass trading platform the number one choice for sustainable biomass trade in Europe," said Andrius Smaliukas, CEO of Baltpool, "so we decided to develop a tool enabling participants to easily find all the information they need about the origin of the raw materials of biomass.

"This is the first step in making it easier for market participants to comply with the requirements of RED II."

After viewing all the information provided by the seller, the buyer will be able to accept the fuel via an online application. This is done by entering the necessary data during the biomass acceptance process: specifying the weight in tonnes, entering the data of the taken samples, and attaching images of the raw materials. All of this information will be visible in the trading platform's quality reports.

Gustav Melin, CEO of the Swedish Bioenergy Association, commented: "When phasing out fossil energy, biomass fuels are an easy and efficient solution that works.

"With the new Baltpool biomass traceability tool, buyers will be able to demonstrate their compliance with the ambitious European sustainability criteria. In fact, bioenergy is currently the most controlled and sustainable energy source that we have."

Buyers and sellers will be able to use the tool to calculate preliminary CO_2 emissions, view statistics on the amount and type of raw materials, and the location from which they were transported under certain contracts.

Baltpool currently operates in the Baltic and Nordic countries and has over 470 participants. The exchange sells wood chips, wood pellets, fuel peat, and lignin. In 2020, 5.5 TWh of biomass was sold on the exchange and 5,629 transactions were concluded, amounting to €54.9 million.

Drax subsidiary to acquire Pacific BioEnergy pellet contracts

Drax's subsidiary Pinnacle Renewable Energy will acquire Pacific BioEnergy Corporation's pellet sales contract book.

In doing so, 2.8 million tonnes (Mt) of orders will be added for sustainable biomass supply to counterparties in Japan and Europe.

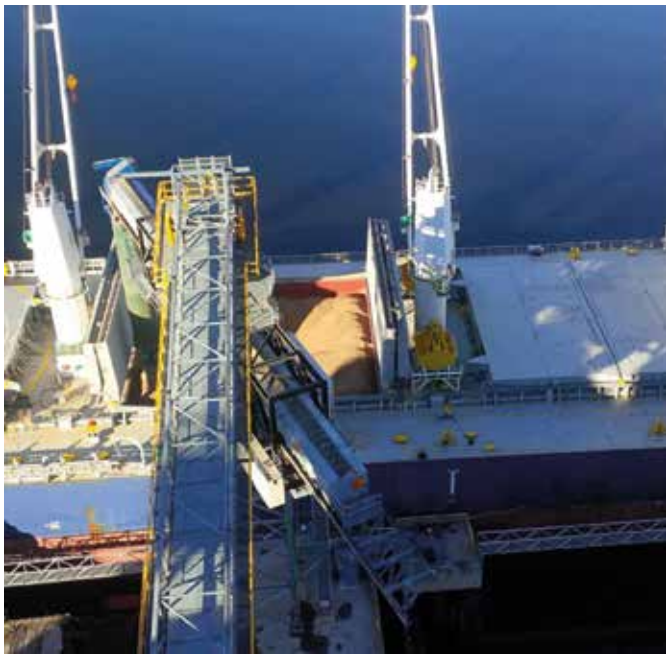
These contracts are for delivery between 2022 and the mid-2030s, of which 0.3 Mt is for delivery this year. The total incremental revenues over the contract period are around CAD$675 million (€465 million).

The deal complements Drax's existing supply contracts to Asian counterparties and European generators, increasing its long-term third-party sales book by 15% to around 23 Mt, with total revenues over US$4.5 billion (€3.9 billion).

"This deal supports Drax's ambition to double our sales of sustainable biomass by 2030 to markets in Asia and Europe where demand for biomass is increasing as countries transition away from coal," said Drax's CEO, Will Gardiner. "It also demonstrates Drax's commitment to the growth of sustainable biomass in Japan specifically, where we expect to establish a new office in 2022."

Drax recently announced its plans to double biomass sales to third parties to at least 4 Mt per annum by 2030, developing its market presence in Asia and Europe, facilitated by new business development teams in Tokyo and London next year.

"We look forward to working with our partners in Japan and other markets across Asia and Europe as part of our aim to be a global leader in sustainable biomass, making an even greater contribution to the world's efforts to reach net zero," commented Gardiner. ●



EQTEC partnership to convert forest residues into electricity

EQTEC has joined forces with Phoenix Energy, the North Fork Community Development Council and Carbonfuture to convert forest residues into renewable electricity in California.

The partnership will help Sierra Nevada forests and their communities remove carbon from the atmosphere and reduce wildfire risk, as well we generating renewable energy and creating new jobs.

North Fork Community Power will soon commission and utilise EQTEC's Advanced Gasification Technology to convert forest stewardship residues into renewable electricity, heat and biochar — a solid carbon by-product that can be used in agriculture and water filtration.

The project, located on the site of an abandoned sawmill from the 1990s, is aligned with state and international net-zero targets and supports circular economy principles. The initiative has been rewarded with carbon removal credits by Carbonfuture through its platform and marketplace. This is the first forest biomass plant in California to join the scheme.

"I'm very pleased that our partnership in North Fork is now even more compelling by working with Carbonfuture," said David Palumbo, CEO of EQTEC.

"Once operational, the plant at North Fork will service the local community by demonstrating a better way to use forestry waste that would otherwise pose a fire risk and to both produce biochar for watershed protection, carbon sequestration and soil enrichment, as well as use the syngas produced from the wood as a fuel to produce electricity."

With the help of EQTEC's Advanced Gasification Technology, the process does not involve burning or combusting the wood. The waste wood is transformed through EQTEC's patented process, reduced, and left in solid form as pure carbon as it is converted into a hydrogen-rich syngas.

The project will generate 2 MWe of renewable electricity and biochar. Once produced, biochar is sold mostly to farms in California's Central Valley to improve water efficiency, nutrient conservation, beneficial microbial composition, and overall quality of stable organic matter. The produced biochar will help to sequester 20,000 tons of Co_2e over the next five years.

Gregory Stangl, Phoenix Energy's CEO, commented: "This project is so impactful because it provides California with carbon negative, 24/7 renewable power, created from a unique sustainable waste-to-energy process and, at the same time, it reduces catastrophic wildfire risk and returns lost jobs to a struggling Sierra Nevada community." ●

Albioma acquires wood pellet production facility in Quebec

Albioma has acquired the La Granaudière wood pellet production plant in Quebec.

The plant has been out of service since July last year but is due to be recommissioned early this year, with its nominal annual production capacity of 200,000 tonnes being achieved following additional investments.

The transaction will diversify Albioma's sources of sustainable biomass supplies, supplementing the existing portfolio of contracts with 'top-tier' international suppliers.

Ideally positioned to supply Albioma's Caribbean power plants, the La Granaudière plant produces SBP-certified pellets from wood waste or low-grade wood from certified, sustainability managed forests.

The acquisition also includes a long-term agreement granting access to a 45,000-tonne pellet storage facility in the Port of Quebec, as well as raw material supply guarantees issued by Quebec's Ministry of Forests, Wildlife and Parks.

"We extend a warm welcome to the staff at La Granaudière, as they bring their expertise to Albioma," said the company's chairman and CEO, Frédéric Moyne.

"Through this transaction, which will enable us to produce pellets to very strict sustainability requirements, Albioma is renewing and stepping up its commitment to the energy transition in Overseas France.

"Supplementing locally-sourced biomass, to which priority will naturally be given in order to stimulate the circular economy, this diversified supply is essential, ensuring that we are able to continuously generate renewable energy in non-interconnected areas."

Valmet to supply biomass boiler to Japanese power plant

Valmet will supply a biomass boiler and flue gas cleaning system to Tahara Biomass Power in Japan, valued at approximately €70 million.

The new circulating fluidised bed (CFB) boiler will enable Tahara Biomass Power Plant to achieve a stable power supply at high thermal efficiency while significantly reducing CO_2 emissions.

Valmet's delivery includes a biomass-fired 112 MWe CFB boiler and flue gas cleaning system. The annual output of Tahara's power facility, which will

mainly use wood pellets, will be 770 million kWh. All electricity generated will be supplied to grid companies based on Japan's feed-in-tariff scheme.

The project will be delivered in partnership with Japanese firm JFE Engineering Corporation. JFE will be the engineering, procurement and construction contractor for the plant.

"We are proud to supply one of the largest biomass-fired boiler plants in Japan with a maximum biomass combustion capacity," said Jari Niemelä, director of boilers and gasifiers in Valmet's energy business unit.

"This is also our sixth boiler plant order in a row with JFE Engineering Corporation, which is proof of our long and trustful cooperation."

UK Government's £116m fund offers BECCS boost

Over £116 million (€136 million) in new UK Government funding will boost green innovation across the nation, including bioenergy with carbon capture and storage (BECCS) technology.

The funding will see projects across the UK develop new technologies that increase energy efficiency in homes and buildings, reduce carbon emissions, boost the UK's energy security, and provide cleaner ways to generate power and heat.

From 7 December, businesses developing technologies new to the UK can bid for a share of £64 million (€75 million) in government funding, supporting projects that will capture carbon emissions and remove greenhouse gases from the atmosphere, through the Direct Air Capture and Greenhouse Gas Removal programme.

A range of green technologies will be supported under the first phase of the programme, including BECCS. Under the second phase of the initiative, these projects will be developed from the design stage into demonstration projects, which could scale up to be commercial projects by 2025.

Energy and Climate Change Minister, Greg Hands, said the funding will support businesses "to turn their green ideas into reality", and develop 'ground-breaking projects' that save energy, cut bills, and tackle pollution.

"British businesses and entrepreneurs are already leading the world with innovative solutions to tackling climate change," he said. "This is not only good for the planet, but will bring new jobs and investment to the UK."

Additionally, the government is supporting energy entrepreneurs across the UK with £30 million (€35 million) to develop a range of decarbonisation and energy-saving technologies. Under the latest round of funding from the Energy Entrepreneurs Fund, 58 small and medium-sized enterprises (SMEs) will receive grants to develop and demonstrate new technologies in the energy efficiency, power generation, heat generation and energy storage spaces.

A further £22.8 million (€26.7 million) in funding will provide SMEs with support services to accelerate their green innovations. A consortium of organisations, led by the Carbon Trust, will ensure the SMEs funded through the government's Net Zero Innovation Portfolio receive business development advice for their technology.

Waga Energy confirms first US landfill gas-to-RNG project

Steuben County in New York has awarded a landfill gas-to-RNG contract to Waga Energy.

The project at the county's landfill in the town of Bath will produce RNG and inject it into the local grid to help decarbonise mobility. Steuben County is home to approximately 99,000 residents and its landfill in Bath is authorised to dispose of 150,000 tons of waste annually.

The Steuben County landfill will be the first in the US to adopt Waga Energy's WAGABOX® technology, already in use at 10 landfills, with an additional 11 facilities in the pipeline in Europe and North America.

Under the contract signed on 30 December, Waga Energy will build a landfill gas upgrading unit using its patented WAGABOX technology. Once completed, the unit will produce grid-compliant RNG (biomethane) from the methane generated by the decomposition of waste at the landfill.

The unit will purify 1,000 standard cubic feet per minute of raw landfill gas to deliver 60 GWh of RNG. The facility will produce RNG that can be used for residential consumption or as a transportation fuel, equivalent to supplying around 4,000 homes with renewable energy, and saving an estimated 13,500 tons of CO_2 per year.

Shell, CMA-CGM perform first bio-LNG bunkering in Rotterdam

The CMA CGM Group and Shell have performed a bio-LNG bunkering trial in Rotterdam.

Containerships Aurora, a 1,400 twenty-foot equivalent units LNG-powered vessel was bunkered by Shell with a nearly 10% blend of low-carbon bio-LNG while calling at Rotterdam. The vessel received around 483 m^3 of LNG, 44 m^3 of which were bio-LNG.

The operation was performed by the barge LNG London at the Rotterdam Short Sea Terminals. It was successfully conducted through a ship-to-ship transfer while Containerships Aurora carried out cargo operations simultaneously.

Shell's bio-LNG offering, combined with the dual-fuel gas engine technology developed by CMA-CGM, has the potential to further reduce greenhouse gas emissions by at least 67% well-to-wake (the whole value chain) compared to very low sulphur fuel oil.

30-40% of Europe's gas consumption could be biomethane by 2050

By 2050, 30-40% of Europe's total gas consumption could be made up of sustainable biomethane, according to the European Biogas Association (EBA).

In its 11th Statistical Report, the EBA provides an in-depth analysis on biogas and its upgraded form, biomethane, and the best pathways to ensure full deployment in the coming years.

The report analyses the current availability of renewable gases in Europe, notably biogas and biomethane. Combined biogas and biomethane production in 2020 amounted to 191 TWh of energy, and this figure is expected to double in the next nine years. By 2050, production can be at least five-fold, reaching over 1,000 TWh, with some estimates even reaching 1,700 TWh.

Agriculture-based biogas plants make up the majority of the total production, which is now already more than the entire natural gas consumption of Belgium and represents 4.6% of gas consumption in the EU.

In terms of job creation, the report shows that biogas and biomethane industries are already responsible for over 210,000 green jobs today. Both sectors combined can be expected to create around 420,000 jobs by 2030 and over one million jobs by 2050.

Over the last decade, the delivery of dispatchable power and heat from biogas has been very important, the EBA said, and its role will continue to some extent. However, the current trend places the emphasis squarely on sustainable biomethane production, and it is expected that this tendency will be amplified in the coming decade.

Biomethane is a versatile energy carrier, suitable for a range of sectors including transport, industry, power and heating. 2020 saw the biggest year-on-year increase in biomethane production so far, despite the pandemic, with an additional 6.4 TWh of biomethane produced in Europe.

The EBA expects an even bigger increase in 2021, as a record number of new biomethane facilities started production 2020 and are due to become fully operational within the year.

Synergy between biogas, biomethane and other low-carbon solutions, such as green hydrogen, will be important going forward. In line with this, the EBA's report highlights the need to develop a vision of how biomethane and hydrogen will integrate with each other in the future.

The report also points out a clear tendency towards the increasing use of sustainable feedstocks for biogas and biomethane production. These include mostly industrial waste, municipal waste or agricultural residues.

It is also expected that the remaining energy crops to produce biogas will be replaced by sustainable cropping, for example, with the introduction of sequential cropping systems which simultaneously allows for carbon farming and revitalisation of the soil.

In terms of use by sectors, the need to decarbonise all modes of transport will be especially relevant in the coming years and, therefore, the need for further renewable gas uptake in that sector. According to the EBA report, the sustainable European bio-LNG (liquefied biomethane) production capacity by 2024, considering only confirmed plants, amounts to 10.6 TWh annually. This projected 2024 production capacity could fuel almost 25,000 LNG trucks for the whole year.

"Today, the EU is 90% dependent on imported fossil gas," said Harmen Dekker, EBA director. "The EBA Statistical Report 2021 highlights best possible pathways to accelerate sustainable renewable gas deployment and ensure we are on track to meet climate neutrality by 2050, making use of all possible solutions within our reach."

Sewage from cargo ships turned into biogas in Finland

A new project producing biogas from sewage discharged by cargo ships is underway in Finland.

The Baltic Sea Action Group (BSAG) is collaborating with multiple companies, including Gasum, on the new Ship/t Waste Action project. The initiative turns sewage into biogas that will be used as fuel by the heavy-duty transport sector.

The Ship/t Waste Action cooperation develops waste value chains between different parties. The Port of HaminaKotka, the largest general port in Finland visited by around 2,500 cargo ships annually, has been chosen as the first location.

"We want to encourage ships to discharge their wastewater at the port," said Suvi-Tuuli Lappalainen, development manager at the Port of HaminaKotka. "Our sewage reception and treatment facilities meet the requirements of the circular economy."

Regional wastewater and sewage treatment company KymenVesi treats the sewage discharged by cargo ships at the port of HaminaKotka. The wastewater sludge created in the process is then refined into renewable energy at Gasum's biogas plant.

"We can achieve our objective of a cleaner Baltic Sea, one ship, one port, and one country at a time," said Elisa Mikkolainen, project director at BSAG. "The nutrient load on the sea decreases every time wastewater is discharged at the port. We need extensive cooperation to succeed in our mission."

Wastewater and food waste contain, among other things, nutrients, bacteria, fats, chemicals and microplastics. If these are discharged into the sea, they accelerate two of the worst issues currently facing the Baltic Sea: eutrophication and oxygen depletion.

Approximately 2,000 ships are operating in the Baltic Sea, and 95% are cargo ships. It is currently legal to discharge grey water, sewage and ground food waste into the sea.

Passenger ships, such as the ferries between Finland, Sweden, and Estonia, have been voluntarily discharging their wastewaters at the port for years. Since 2021, the International Maritime Organisation regulations prohibit discharges of untreated sewage from passenger ships in the Baltic Sea; there is no similar regulation for cargo ships.

AstraZeneca, Future Biogas to build biomethane facility

Pharmaceutical company AstraZeneca is partnering with Future Biogas to build a biogas plant in the UK.

The plant in East Anglia will generate biomethane as a substitute for natural gas to provide a renewable source of heat and power for AstraZeneca's UK sites in Macclesfield, Cambridge, Speke, and Luton. The initiative will provide additional renewable gas to the UK gas grid.

Transitioning to 100% renewable energy for heat and power is core to AstraZeneca's Ambition Zero Carbon commitment, to achieve zero carbon emissions from its operations by the end of 2025 and carbon negativity by 2030.

"We're proud to be working in partnership with innovative organisations like Future Biogas to enable the sustainable discovery, development and manufacture of medicines and vaccines," said Juliette White, vice-president of global SHE and operations sustainability at AstraZeneca.

The plant will have the capacity to provide up to 125 GWh of biomethane, equivalent to the heating demand of 9,000 homes.

The facility will utilise crops grown locally to the site, supporting the rural economy. Feedstock crops are integrated into farm rotations and grown on farmland that already forms part of agricultural systems. Adding feedstocks grown for anaerobic digestion into the rotation offers farmers diverse cropping opportunities, boosting the sector's sustainability and supporting the wider UK circular economy.

Crops will be grown with regenerative agriculture practices, promoting nutrient cycling through wider cropping rotations, minimising soil disturbance to limit carbon release from soils, and helping to build soil organic matter and soil health.

Philipp Lukas, CEO of Future Biogas, commented: "Future Biogas is delighted to be working with AstraZeneca on this ground-breaking green energy solution.

"AstraZeneca set itself a very ambitious and challenging net-zero target, which sets a benchmark for their sector as well as global corporates more widely. We're proud to be able to help on this journey."

Through the partnership with Future Biogas, AstraZeneca will access high-quality bioenergy with carbon capture and storage through the Northern Lights partnership in Norway, a joint venture supported by the Norwegian Government.

CO_2 generated through the Future Biogas plant will be captured and transported to the Northern Lights storage facility, where it will be permanently sequestered 2.6 kilometres under the seabed. As a result, biomethane production could be not just net zero but net-negative.

Construction of the biomethane facility will begin in 2023.

StormFisher adds third anaerobic digester to Ontario facility

StormFisher has increased its organic waste processing capacity through the construction of a third anaerobic digester at its facility in London, Ontario.

Accompanied by an RNG upgrading system, the plant is now the largest food waste AD facility in Canada. The plant repurposes food waste to provide heat to 2,500 homes in Ontario and also support transport with sustainable fuel.

Construction of the third digester began in 2020. The additional digester, which increases food waste intake capacity by 30%, was constructed by engineered storage systems firm, Greatario.

The expansion was made possible by StormFisher's partnership with Generate, a North American sustainable infrastructure company, which owns and operates the London plant in partnership with StormFisher.

"Our in-house team of expert engineers, maintenance technicians and operators allows StormFisher to provide the best service to both our feedstock providers and energy customers," said Pearce Fallis, vice president of operations at StormFisher.

"This new digester is part of our commitment to bringing innovative solutions for organic waste to market, and an exciting part of our growth in capabilities across waste collection, AD, biogas production, and RNG upgrading."

StormFisher's new RNG upgrading system provides energy for heat as well as transport to customers in Canada, all from renewable sources. The company can produce 225,000 GJ of RNG — enough to displace over 6.2 million litres of diesel fuel. In the summer of 2021, the firm provided FortisBC with over 60,000 GJ of energy through a long-term partnership.

IES Biogas, CVE to develop biomethane plant in Toulouse

IES Biogas has signed a new contract with French company CVE to build a new biomethane plant near Toulouse, France.

The 320 Nm^3 per hour (1.2 MWe) facility will be located in an area of approximately 28,000 square metres in the municipalities of Labessiere-Candeil and Montdragon.

Due to come on stream next year, the new plant will treat approximately 25,000 tonnes per year of organic, industrial, and agro-industrial waste. The waste will be made up of 29 different types of biomass, including from slaughterhouses and bakeries. The biomethane produced by this facility will be fed into the Teréga gas network.

IES Biogas, a subsidiary of Snam, a major energy infrastructure player, entered the French market a few years ago and in the coming months will conclude the construction of another plant in the north of the country in Amiens, which will treat waste from large-scale retail trade and catering, obtaining 2.2 million m^3 of biogas.

The CVE Group is an independent French producer of renewable energy across multiple countries and sources of power. The firm develops, finances and builds solar and hydropower plants and biomethane units. In December 2021, CVE raised €30 million from SWEN Capital Partners to finance the development of its biogas business, and aims to become the leading independent player in renewable gas in France, based on a local model.

According to the European Biogas Association's Statistical Report 2021, with biomethane production at 2,207 GWh, France is the fastest-growing European country in this sector. Ninety-one plants went into operation in 2020 and another 81 were installed in the first seven months of 2021. Currently, 950 new projects are underway with a total production capacity of 22.6 TWh per year.

Plant update: Europe

IES Biogas

Alternative fuel: Biogas
Location: France
Date: January 2022
Feedstock: Organic, industrial & agro-industrial waste
Development: New plant

IES Biogas has signed a contract with French renewable energy producer CVE to build a biomethane plant near Toulouse, France. The 320 Nm^3 per hour (1.2 MWe) facility will be located in an area of approximately 28,000 square metres in the municipalities of Labessière-Candeil and Montdragon. Due to come on stream in 2023, the new plant will treat approximately 25,000 tonnes per year of organic, industrial, and agro-industrial waste. The waste will be made up of 29 different types of biomass, including from slaughterhouses and bakeries. The biomethane produced by this facility will be fed into the Teréga gas network.

Bright Biomethane

Alternative fuel: Biogas
Location: Hungary
Date: November 2021
Feedstock: N/A
Development: New plant

Bright Biomethane will build its first biogas upgrading system in Hungary. The upgrader will be installed at a farm 100 km east of Budapest. A PurePac Compact system will be used to upgrade the biogas, produced from waste, to biomethane, which will then be added to the gas grid. For this project, Bright has joined forces with local partner Omnis Epito Kft, construction partner of Biogas Unio Zrt and the largest player in the biogas industry in Hungary. With an upgrading capacity of 400 Nm^3 inlet biogas per hour, the project will provide enough RNG to power 1,500 households.

Anaergia

Alternative fuel: Biogas
Location: Denmark
Date: October 2021
Feedstock: Agricultural waste
Development: New plant

Anaergia has acquired two Danish subsidiaries that will build, own, and operate a major new anaerobic digestion (AD) facility in Denmark. The plant in Tønder will convert agricultural waste into RNG. Anaergia expects the facility to produce 1.4 MMBtu of RNG per year, which would make it one of the largest plants of its kind in the world. It will produce approximately 40% more RNG than that of the company's facility in Rialto, California. Construction is underway and expected to be complete within two years. Anaergia is aiming for RNG production to start before 31 December.

Bunnahabhain distillery, AMP Clean Energy

Alternative fuel: Biomass
Location: Scotland
Date: October 2021
Feedstock: Forest biomass
Development: Plant installation

Scottish whisky distillery Bunnahabhain is set to become Islay's first distillery with a net-zero distillation process with the help of biomass. The distillery is installing a £6.5 million (€7.7 million) biomass energy centre — powered entirely by spent malt and forest biomass (wood chips) sourced from low-value timber felled 15 miles away. The facility will save around 3,500 tonnes of carbon per year — a CO_2 saving equivalent to the emissions of 1,800 diesel cars, which is more than the total number of vehicles based on Islay. The project, due to be operational by the spring, has been funded by AMP Clean Energy which will own, manage and operate the biomass system.

Nordsol, Shell, Renewi

Alternative fuel: Biogas
Location: The Netherlands
Date: October 2021
Development: Plant opening

Willem-Alexander, King of the Netherlands, officially opened the country's first bio-LNG plant on 14 October. The plant was developed by Nordsol, Shell and Renewi and will produce an estimated 3.4 kilotons of bio-LNG annually — enough for 13 million kilometres of driving — preventing approximately 14.3 kilotons of fossil CO_2 from entering the atmosphere.

EQTEC

Alternative fuel: Biomass
Location: Greece
Date: October 2021
Feedstock: Forestry waste
Development: Plant proposal

EQTEC has signed an agreement for the proposed acquisition of a 5 MWe project in Greece. The agreement concerns a project in Drama, north-eastern Greece. The biomass-to-energy plant will generate 5 MW of green electricity and up to 8 MW of thermal output from around 35,000 tonnes locally, sustainably sourced forestry waste. Due diligence, including financial and technical feasibility, has been completed.

"All of our projects in our Greek pipeline, now totalling five and with strong potential for more, will help local farmers and forestry managers to use the waste they produce in a way that supports a circular economy and is beneficial for the environment and local communities," said David Palumbo, EQTEC's CEO.

BioConstruct

Alternative fuel: Biogas
Location: UK
Date: September 2021
Feedstock: Food waste
Development: New plant

A new AD plant built by BioConstruct will convert approximately 95,000 tons of food waste annually into biomethane in Somerset. The AD facility at Evercreech Junction will generate enough RNG to power around 5,500 homes as part of Adapt Biogas' (formerly Biocow) ambitions to increase renewable energy production across the UK. The project had been in development for a 'significant' period following redesigns and securing of construction finances. Construction has commenced and the site will produce biomethane, meeting Renewable Heat Incentives deadlines, by the end of March.

MAKEEN Energy, Nature Energy

Alternative fuel: Biogas
Location: Denmark
Date: September 2021
Feedstock: Food waste
Development: New plant

MAKEEN Energy and biogas supplier Nature Energy will build and operate the first Danish biogas liquefaction plant in Frederikshavn, Denmark. The two companies have formed a joint company, NORDLIQ (Nordic Liquefaction), to build and operate the plant, which will initially be able to produce 20,000 tonnes of LBG annually. The plant will enable shipping and transportation companies to supply vessels with CO_2-neutral fuel — a 'decisive' milestone in the sustainable transformation of the transport and shipping sector in Denmark and northern Europe.

Valmet

Alternative fuel: Biomass
Location: Austria
Date: July 2021
Feedstock: N/A
Development: New plant

Valmet will deliver a complete turnkey biopower plant to produce green electricity and heat in the city of Salzburg. The order was placed by Salzburg AG, an Austrian energy and technology company. It is hoped the Siezenheim II plant will increase the share of Salzburg's CO_2-neutral district heat production to 40%. The plant will have a maximum electrical output of around 4 MW and a maximum output of 17 MW. It will provide 8,300 additional homes with bio district heat and 7,000 homes with ecologically-produced power in the future. The facility will be commissioned and started up in August 2023.

*This list is based on information made available to *Bioenergy Insight* at the time of printing. If you would like to update the list with additional plants for future issues, email dawn@woodcotemedia.com

Bioenergy producers, experts and associations share their 2022 predictions exclusively for *Bioenergy Insight*

What will 2022 bring for the bioenergy industry?

'Woody biomass — The decarbonising agent of the future'

Thomas Meth
chief commercial officer, Enviva

Looking at recommendations from the United Nations' Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA), every pathway to meeting decarbonisation goals that limit the impact of global warming includes woody biomass. To achieve climate targets and reach climate neutrality, industrial countries need to decarbonise their heaviest-emitting sectors. Biomass allows industry to do this quickly, efficiently, and economically.

To realise the true potential of renewable energy, such as sustainably sourced biomass, additional applications to various industrial sectors will need consideration. Furthermore, combining biomass with carbon capture and storage (BECCS) will enable the industrial sector to generate carbon-neutral and carbon-negative energy for its production processes.

In a report titled *Net Zero by 2050: A Roadmap for the Global Energy Sector*, the IEA stated that BECCS will continue to play a critical role in all scenarios to achieve net-zero emissions. BECCS offers opportunities to decarbonise not only the energy sector, but also heavy industries such as steel, lime, biochemicals, and cement, making it an overarching tool to achieve international climate goals.

> ...industrial countries need to decarbonise their heaviest-emitting sectors — biomass allows industry to do this quickly"

Today, energy-intensive companies and those also requiring high heat content in their industrial processes cannot utilise wind or solar power, since both are limited by intermittency, and neither can offer the necessary heat intensity. Given that wood pellets are the only renewable energy fuel that can generate both power and high-temperature heat, they serve as the ideal solution.

Over the last year, domestic and international steel companies have been exploring incorporating bioenergy solutions into their business models. Currently, coal is used both as an energy source and as a reducing agent to de-oxidise ferrous ore in steelmaking. In this instance, biomass can be a substitute for metallurgical coal in the process. Additionally, biomass as an energy source can provide energy security — and a stable cost base for manufacturers — in an era when wholesale gas prices are high and extremely volatile. Looking ahead, industries like steel and cement could double the market for industrialised wood pellets, notwithstanding other verticals such as lime, sugar, and chemicals that are also looking to biomass as a solution to decarbonise their energy footprint.

As for sugar production and cement-making, biomass can be used for drying and clinker production. In the chemicals industry, both energy substitution and material substitution can occur. Due to its bio-carbon structure, woody biomass offers a substitute for fossil-based chemicals, and for syngas, biomethane, ammonia, ethanol, and process steam applications. Presently, biomass is the only route to decarbonise heavy industry. Hydrogen shows promise, but it is not yet commercially available at scale. As it relates to the development of the hydrogen economy, biomass is expected to remain essential and continue to evolve into other critical roles. For example, hydrogen development at scale, certainly in the UK, will be driven by carbon clusters. Grouping major power users together in clusters de-risks hydrogen development. Multiple potential methods for making hydrogen from woody biomass are available, therefore, BECCS is also paving the way for hydrogen.

In conclusion, if we expect to meet net-zero commitments by 2050, governments must provide a regulatory framework to allow heavy industries to decarbonise; investors must have regulatory certainty to deploy significant capital; and heavy industries need to be able to plan and implement decarbonisation solutions available today with the support of a regulatory framework and investment capital.

‘2022 is the time to start building plants, increase production, and ring in the era of biomethane’

Zoltan Elek
CEO, Landwaerme

2021 was a turbulent year for the gas industry. In the second half of the year, we saw increasing carbon prices and skyrocketing natural gas prices, paving the way for a shift towards renewable gases, starting with biomethane.

Demand for sustainable biomethane in Germany is rapidly increasing. The industry can benefit from developments in carbon pricing — from which biomethane is exempt — and developments in natural gas prices, as well as from favourable legislations. In 2022, production must follow and should include technologies for carbon capture and usage or storage (CCU/CCS).

In the heating and power industries, the amendment of legislation in Germany has presented new opportunities in buildings, as well as biomethane-based CHP plants, until well into the 2040s. Both new and existing CHP plants benefit from the new legislative framework, increasing the demand for this green gas in power generation for years to come.

In the transport sector, Germany has successfully implemented the renewables mandates set by the EU in the Renewable Energy Directive (RED II), driving the demand for biomethane as a fuel to reduce transport emissions by 2030 and beyond. The emissions reduction quota for the fuel industry has been raised from 6% in 2021 to 25% in 2030. In addition, the EU-prescribed, mandatory minimum share of advanced fuels will gradually rise from 0.05% today to 2.6% in 2030.

Waste-based biomethane will see rising interest as it is one of the few available fuels that meet the criteria. Germany has gone further to acknowledge its climate contribution in line with EU guidelines. When surpassing the minimum share, the exceeding amount can count double towards fulfilling the emission reduction requirement, making biomethane even more attractive as a fuel.

At the same time, the calls for negative emissions have been growing ever louder, most prominently by the Intergovernmental Panel on Climate Change (IPPC) and more recently by the newly elected German Government. Biomethane production can deliver and benefit greatly.

Negative emissions mean actively removing carbon from the atmosphere, and, in the long run, permanently storing it in designated areas, for instance in depleted natural gas fields. Before sending it underground, however, to meet the requirements of a circular economy, the captured carbon can be used in the food and drink industry or in chemical industries, for example.

What does that mean for biomethane production? Carbon capture is already part of the biogas upgrading process, which means we are already halfway there. To profit from it, all we need to do is add carbon upgrading and liquefaction and build a customer structure for usage or, in the long run, storage. As if that is not enough, CCS and CCU improve biomethane’s greenhouse gas emission value as a fuel, making it more valuable.

Market and legislative conditions for biomethane in Germany and the EU have given the industry a noticeable boost for the years to come. The current demand can just now be met. If we want to continue to meet the significant rise in demand, 2022 is the time to start building plants and increase production and ring in the era of biomethane.

> “Carbon capture is already part of the biogas upgrading process, which means we are already halfway there”

‘The new focus on methane is a game changer for our industry’

Charlotte Morton
chief executive, Anaerobic Digestion and Bioresources Association (ADBA)

Throughout 2021, all eyes were on the road to COP26. Six years and four conferences since the Paris Agreement, COP26 was seen as the world’s last chance to ‘keep 1.5˚C alive’. The extent to which it was a success is dividing opinion. The last-minute watering down of commitments to phase out coal overshadowed the raft of piecemeal pledges and agreements that came out from Glasgow, which, if honoured, would reduce global warming from the forecast 2.7˚C to 1.8˚C. The most significant one being the Global Methane Pledge, with over 100 countries committing to reduce methane emissions by 30% against 2020 levels by 2030.

Tackling methane alongside carbon effectively buys us time. Methane is a far more potent greenhouse gas (GHG) than CO_2 by a factor of 86 in the first 20 years in the atmosphere and is responsible for 50% of current warming.

The new focus on methane is a game changer for our industry. At its full potential, anaerobic digestion (AD) alone could deliver over 20% of the UK’s contribution to the Global Methane Pledge. In the UK, there are over 140 million tonnes of readily available

organic wastes still being left to decompose every year, releasing methane into the atmosphere. When recycled through AD, these emissions are captured and the wastes turned into valuable bioresources: a storable, flexible green gas, bio-CO_2, digestate, and other valuable bio-products.

In addition, the energy and CO_2 crises have made the case for AD and biomethane. The UK AD industry could supply 25% of the country's domestic gas needs and its entire current requirement for CO_2. The Department for Business, Energy and Industrial Strategy has shown a keen interest in bio-CO_2 from AD and intends to issue a policy document on bio-CO_2 soon.

Both the launch of the Green Gas Support Scheme (GGSS) on 30 November and the release of the biomass policy statement show the government's commitment in supporting the sector. The statement sets out the framework for the Biomass Strategy, a key policy development for our industry as AD is set to play a significant role. The strategy — expected to be published this year — is aimed at identifying the optimum sources of biomass and its best uses in the short-, medium-, and long-term to meet net zero.

In the lead up to COP26, the UK Government also published the long-awaited Net Zero Strategy. In it, we have seen some promising statements on biomethane and AD, showing that our work is bearing fruit. Indeed, the strategy highlights biomethane's role in decarbonising the gas grid. Yet, it conveys the uncertainty regarding the future of the grid — namely to what level hydrogen can (and should) be blended with biomethane and natural gas. The paper also commits to exploring the development of a long-term biomethane support scheme that would replace the GGSS following its closure in 2025.

For years, ADBA has been advocating for a long-term support scheme for the industry to give investors the confidence they need. In September, ADBA met with Lord Callanan, Minister for Climate Change and Corporate Responsibility, to highlight the need for a new Strategy and Action Plan that would build on the one carried out by the 2010 Coalition Agreement and allow the AD industry to rapidly but sustainably scale up. On the last day of COP26, the Minister visited Grant & Sons' distilleries and AD site in Girvan on the west coast of Scotland. The site is one of the largest in Europe and demonstrates at scale what the industry is already delivering across the UK. Discussions on the strategy are ongoing as a new meeting is planned to unpack its key elements and policy asks.

COP26 succeeded in raising climate ambitions both at home and globally. In 2022, ADBA will work with the government to ensure that the pledges and targets made in Glasgow are mirrored by supportive policies and investment in AD as one of the key technologies that will deliver the GHG emissions reduction we need.

In 2022, after over a decade leading ADBA, I will focus on growing the World Biogas Association to facilitate the deployment of biogas globally and Grant Budge will join ADBA as chief executive-elect. Thanks to his extensive engineering background, experience and keenness to make a difference, I have no doubt that Grant will be able to support the industry to meet its full potential this decade.

> "At its full potential, AD alone could deliver over 20% of the UK's contribution to the Global Methane Pledge"

'We must retain a razor-sharp focus on ensuring our biomass delivers positive outcomes for the climate, nature and the communities where we operate'

Dr Alan Knight
director of sustainability, Drax Group

Bioenergy has a vital role to play in keeping the 1.5˚C goal alive. Its unique ability to deliver reliable, renewable power that displaces fossil fuels, combined with carbon capture and storage (CCS) to permanently remove CO_2 from the atmosphere, makes it an essential component in global efforts to address the climate crisis.

It is no coincidence that world leaders and policymakers are showing greater appreciation of the critical role that sustainable biomass and carbon removal must play, at the same time as more than 40 countries committed to phase out coal at COP26. Rising gas prices across Europe have highlighted the importance of energy security as over 90% of countries have committed to net zero. Biomass can help to achieve both these goals.

As we see increased global political momentum behind biomass, it is increasingly important that the industry, producers and users as well as non-governmental organisations (NGOs) work together to discuss guiding principles and reach consensus on what 'good biomass' looks like. If we can all sign up to those principles and commit to only using biomass which meets them, then real momentum can be created to deliver progress against the climate crisis.

At COP26, Drax and 12 other companies operating across the world, representing around 80% of the industry, signed up to the Glasgow Declaration on Sustainable Bioenergy. The 16 principles in the Declaration outline a sustainable approach to bioenergy across four main areas — responsible management of natural resources; transparency and science-based carbon accounting; protecting biodiversity, and supporting and protecting communities.

The Declaration builds on existing Intergovernmental Panel on Climate Change accounting practices, as well as national reporting and sustainability requirements set by legislation and certification, and incorporates key learnings on sustainable sourcing practices from across our sector and how we want to make further progress.

This year, I invite all participants and stakeholders in the wider bioenergy sector, including civil society, academics, and governments, to join us in developing the Declaration into a universal set of global principles for sustainable biomass so we can deliver its full potential and support net zero.

Drax already engages with NGOs, academics and other external forestry experts to better understand their concerns and find agreement on common principles, and we will continue to do that this year. As the world's largest user of sustainable biomass for energy, Drax already abides by a robust regulatory framework in the UK and the EU, but we are always striving to go beyond existing legislation and requirements to ensure we are selecting the right feedstocks. As an industry, we must continually use the latest science to ensure our operations keep making a positive contribution to the communities in which we

operate and the growing forests we source from.

This past year, we continued to make progress on initiatives we have developed to ensure greater transparency on biomass sourcing and sustainability, such as the Healthy Forest Landscapes (HFL) programme and the Biomass Carbon Calculator. HFL measures and evaluates forest health across different types of forests in different regions and countries. It assesses four key areas — forest cover, carbon stock, biodiversity, and community wellbeing — the same priorities in Drax's own policy on sustainable biomass sourcing.

Based on the advice from our Independent Advisory Board (IAB) — a panel of scientists and forestry experts — we are further refining the HFL methodology with a particular focus on biodiversity and socio-economic wellbeing to make it as effective as possible. The HFL tool will be shared with other companies that rely on forestry, such as the pulp and paper industry. The IAB's continued scrutiny of our operations and their advice will be invaluable in ensuring our biomass meets the highest standards.

Our Biomass Carbon Calculator has already provided us with a clear understanding of our supply chain emissions. This will help us to tackle our remaining CO_2 emissions on the path to net zero and our ambition to be carbon negative by 2030. Other end-users and biomass producers are also using the calculator and we expect it to become the most widely used tool across the industry.

This year is set to be a busy one for Drax and the industry, but as we grow in size and scope, we must retain a razor-sharp focus on ensuring that our biomass delivers positive outcomes for the climate, for nature and for the communities where we operate.

> "Today, we produce around a third of the biogas in Denmark, which is known for having the world's greenest gas grid"

'With large investments in the future, Nature Energy is looking to enhance the green transition'

Ole Hvelplund
CEO at Nature Energy

In many ways, we at Nature Energy have an exciting year ahead of us. In 2021, we announced a new, ambitious growth strategy which means Nature Energy will invest heavily in the construction of new large-scale biogas plants internationally. This will be our key focus in the year to come.

A few years ago, the large-scale production of biogas was unknown territory, and, therefore, it was relatively expensive to develop the technologies. In previous years, we have strengthened our production methods and at the same time we have gained extensive experience in producing biogas at a large-scale effectively and with fewer production costs.

Massive potential to scale up the production

Our large-scale concept is unique and 'homegrown' in Denmark, where we already own and operate 11 large biogas plants (with more on the way). Today, we produce around a third of the biogas in Denmark, which is known for having the world's greenest gas grid, and we see huge potential to expand our technology to new markets where biogas and green CO_2 can make a difference for the climate.

In 2022, I look forward to breaking ground on new biogas projects in both France and the US; this will be a huge milestone for our company. In the coming years, we will establish new biogas plants in several European countries and abroad, we have upcoming projects in Canada and US — two big countries that hold massive potential for large-scale biogas production.

We clean up in society while producing green energy

Climate change is a global fact and the need for well-known green technologies that can be easily adapted across borders is growing. Together with wind and solar power, biogas is the most obvious technology to deliver green energy to society. Biogas production also helps to clean up in society, when we take in waste products, produce green energy, and send back green fertiliser to local farms.

In countries with a lot of farmland like in Denmark, biogas is a key, green technology to enable sustainable food production. The global population is growing and this sets a high demand for the food sector to produce enough food, sustainably.

Focus on the green impact of biogas is increasing

There is no doubt that the biogas sector's contribution to the green transition is increasing and the its circular benefit is receiving positive feedback internationally. In December 2021 I took part in a conference with a focus on the potentials of scaling up biogas production in Europe, where the European Commissioner for Energy was among the participants. There was a clear consensus about the substantial role that biogas plays on the path to a greener society. In particular, the need for access to biogas in the energy-intensive industry was highlighted, as well as the need for biogas as a green fuel in the road transport. In my view, these sectors must have access to biogas since these parts of society cannot be electrified.

To comply with the Paris Agreement and the EU's ambitious climate targets, the need for green solutions that make an impact here and now are rising. Investments in scaling up biogas production are a fruitful solution for the climate as well as the economy, because when we establish new plants, we also create green, local jobs in the rural areas where our plants often are located.

We look forward to the year ahead and the many challenges and opportunities that lay ahead of us. I wish you all a good 2022!

'Increasingly, operators are discovering biomethane is the only viable alternative for their fleets'

James Westcott
chief commercial officer, Gasrec

To say that 2021 was a busy year for Gasrec would be something of an understatement. The last 12 months seem to have flashed by in the blink of an eye and yet so much has happened for the company, and the industry as a whole, as demand for bio-LNG and bio-CNG as a transport fuel continues to go from strength to strength.

Stronger government direction for the continued drive to reduce harmful tailpipe emissions has led an growing number of operators to search for alternatives to diesel. Increasingly, they are discovering that biomethane is the only viable alternative for their fleets.

The challenge for us now is to ensure the infrastructure is there to keep up with demand, as the sector continues to grow throughout 2022 and beyond. We are committed to our strategy of operating both large open-access refuelling sites and private facilities for customers, working closely with end-user operators as well as developers of new logistics parks to ensure infrastructure is rolled out as quickly as possible.

During the past year, we opened new customer facilities for Reed Boardall in Boroughbridge, at Gregory Distribution's headquarters in Devon, with a further station installed for another customer at Avonmouth only a few weeks ago — a precursor facility to a larger open-access site that is planned for this year. That takes the total number of customer refuelling stations currently operated by Gasrec up to 11, with a further seven expected to follow in the first half of next year alone — including a facility at Ocado's Dordon Customer Fulfilment Centre. This will be the online supermarket's second biomethane refuelling station, reinforcing its clear commitment to transition its delivery fleet to this cleaner fuel source.

Our flagship site at Daventry International Rail Freight Terminal (DIRFT) continues to get busier by the day, and in May another significant landmark was chalked up when we collected our 10,000th tanker load of LNG from the National Grid facility on the Isle of Grain.

In total, the amount of gas we sold in 2021 doubled compared to the year before and we anticipate this scaling up again over the course of the next 12 months. To prepare for this, we have made significant investment in both our people and our facilities. The size of our projects team doubled over the course of 2021, with a staffing structure now in place to ensure we fully utilise the expertise in place across the company.

> "The amount of gas we sold in 2021 doubled compared to the year before"

Our new Remote Monitoring Centre in Daventry is fully operational and will be a huge asset for the business moving forward. It is manned by a dedicated team of control operators who monitor real-time data from every one of our stations across the UK, plus our tanker fleet, 24 hours a day, seven days a week, 365 days a year. The centre operators can access and control live CCTV footage of every Gasrec facility, allowing them to identify problems quickly while also offering advice or assistance to drivers fuelling their vehicles, whatever time of day or night.

There has also been investment and maintenance work carried out at the DIRFT site to prepare the station for increased traffic while we tripled the size of our cryogenic trailer fleet and invested in a stock of bio-LNG refuelling equipment.

Perhaps the most significant development over the past year was bp acquiring 28.57% of the company, in a deal announced at the start of December. Moving forward, bp will supply Gasrec with renewable biomethane produced mainly from organic wastes, such as food and dairy manure, giving our customers renewed reassurance about the resilience of their supply line.

With this new investment secured, our ambition is to have three new open-access facilities operational during 2022 in total. It also opens opportunities to potentially diversify into other renewable energy sources in the future. All in all, it promises to be another hugely exciting year ahead. ●

The 12th edition of ecoprog's Biomass to Power report reveals Asia remains the strongest growth market

An overview of the global biomass-to-power market

Asia remains the strongest growth market in the global solid biomass-to-power industry, according to a new report.

ecoprog, a German consultancy specialising in environmental and energy technology, shared the findings in the 12th edition of its annual Biomass to Power report.

In 2021, the global biomass power plant asset increased by around 120 plants with a combined capacity of almost 2.9 GWel. Following the trend of recent years, Asia is the strongest region with a capacity growth of 1.6 GWel in 2021, followed by South and Central America and Europe.

While Europe will no longer reach the growth rates seen in recent years, according to ecoprog, new opportunities will evolve from a changing heat market. For the forecast period of 2021-2030, ecoprog expects more than 1,500 plants with a combined capacity of approximately 23.2 GWel to become operational worldwide.

Around 1.1 GWel of additional capacity was installed in China and India alone. In both countries, ecoprog expects the growth rates to remain high due to existing support schemes and the agricultural biomass potential.

In India, biomass-to-power also plays a role in fighting against harmful straw paddy burning. In this context, the co-incineration of biomass in coal-fired plants will be supported. China plans to increase the competitiveness in its support scheme, which is why a less dynamic development is expected in the coming years.

Japan is a 'booming' market, triggered by the attractive incentive scheme implemented in 2021. For the next five years, a record capacity growth is expected in Japan. In the future, however, the market will undergo similar developments as the European market with a shift to smaller projects, the report highlighted.

Japan depends on biomass imports. In addition to the supply of agricultural biomass through South East Asian countries, US pellet producers enter the market in Japan to meet demand. New sustainability criteria for biomass fuel will also be implemented in the country.

Brazil remains the only dynamic market in South and Central America, as the country with the biggest biomass power plant asset globally at around 15.4 GWel. The country has a strong sugar and ethanol industry where most of the asset is located.

While renewable energy auctions were suspended in 2020 due to Covid, this was balanced by auctions in 2021, where approximately 480 MWe of additional biomass capacity was awarded - the highest since 2014. Additionally, large-scale projects in Brazil and Chile's pulp industry are being developed.

In Europe, the strong growth rates seen in recent years, mostly due to large-scale projects in the Scandinavian countries and the UK, will no longer be reached, said ecoprog. In general the trend towards more competitive support schemes for renewable energy and 'cascade use' of biomass is ongoing in Europe. In line with this, the European Commission aims to make sustainability criteria for biomass fuels stricter in the EU.

However, new opportunities are evolving in Europe through the changing heating market, both in the industrial and district heating segments.

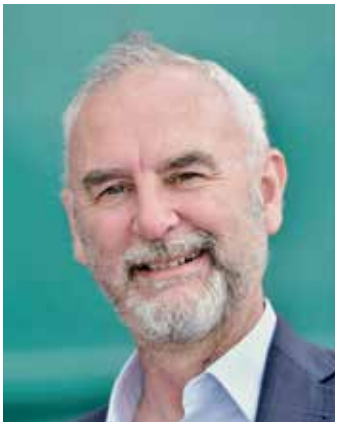
In Germany, several projects based on wood waste are underway. In Poland, similar projects are expected to evolve in the future; the country has the second-biggest coal-fired plant asset in Europe, after Germany. Additionally, new conversion or replacement projects are appearing in Portugal, Spain and France.

In the future, ecoprog believes bioenergy could gain importance in the global decarbonisation pathways with the roll-out of new technologies such as hydrogen production or carbon capture and storage. BECCS could become a positive market factor in regions like North America, for example, where biomass potential is high, but subsidies are "not sufficient". ●

For more information:
The full report is available via: ecoprog.com/publications/energy-management/biomass-to-power.htm

Bioenergy Insight speaks to David Hurren, UK CEO of Biogas Solutions at Air Liquide, about the company's biomethane activities

A closer look with Air Liquide



David Hurren

Air Liquide is a household name in the global biogas industry. Present in 78 countries with 64,500 employees, the company has been at the forefront of developing technologies for biogas purification and liquefaction.

With strong roots in the industry, Air Liquide was well positioned to invest in biomethane and is now supporting logistics firms across Europe on their journey to reach net zero. Air Liquide operates 21 biomethane production units worldwide with an installed capacity of 1.3 TWh per year, as well as 90 distribution stations across Europe.

To find out more about Air Liquide's biomethane journey, *Bioenergy Insight* caught up with David Hurren, the company's UK CEO of Biogas Solutions.

Hurren has a background in chemical engineering, but for the past 30 years he has been working on the business side, in the water and industrial gas sectors. The majority of that time has been spent with Air Liquide.

"I see myself as something of an enabler, helping support the team and the business to grow from a seedling to something much bigger and diverse," said Hurren. "Looking to see where the conditions might be right in the future is also a part of the role."

Biogas, specifically biomethane, is a big part of the future, and Air Liquide is already delivering impressive results in this area. Over the past five years, the group has invested in the entire biomethane value chain, including the ownership and operation of production units covering everything from anaerobic digestion, through to biogas upgrading, and its use in vehicles and industrial heat.

In recent years, Air Liquide has been supporting businesses in the UK in decarbonising their heavy-goods vehicle (HGV) fleets with biomethane. The firm has 35 installations in the UK today, split between production and biogas upgrading units, refuelling stations for trucks and buses, and industrial heat.

In December 2020, Air Liquide announced it had been contracted by supermarket giant ASDA to install and operate six biomethane (bio-NGV) distribution stations to refuel trucks on its sites. The six new stations will refuel ASDA's trucks — the company commissioned more than 300 new bio-NGV trucks in 2021 — and those of some partners.

The firm also worked with the John Lewis Partnership to build a dedicated biomethane gas filling station in Bracknell, UK, with biomethane derived from food waste and food processing materials. The parent company of high-end department store John Lewis and Waitrose supermarket uses biomethane to fuel its ever-growing fleet of HGVs.

"Biomethane for trucks has experienced a fast evolution in recent years thanks to its environmental benefits compared to diesel, and the fact that it is the best available technology proven at commercial scale in the UK," commented Hurren.

"Both John Lewis and ASDA had been operators involved in the Low Emission Freight Trial run by the UK Government and had been able to form their own assessments of the technology for HGVs, particularly those with high mileage.

"We have worked with those customers to understand their short and long-term challenges. As part of that process, we have invested in and deployed a depot-based refuelling infrastructure. It was encouraging to see that in the UK in 2020, 93% of the fuel to gas trucks came from bio-resources."

For Air Liquide, 100% of the fuel supplied to trucks and buses since the start of 2019 has been from bio-resources.

"We see continued growth in this sector. It is established now as a proven and reliable technology and we see it increasingly core for operators running high mileage such as for delivery of products to our supermarkets and stores."

Last year, Air Liquide announced the construction of two biomethane production units in Italy. The two units in Milan and Bergamo will recycle organic material from agricultural and livestock activities and convert it to biomethane. The plants will have a total production capacity of 3,200 tonnes per year, equivalent to approximately 50 GWh annually.

Air Liquide has made enormous progress in the field of biomethane. *Bioenergy Insight* asked Hurren what other projects are in the pipeline.

"We will continue to look for opportunities with a circular economy approach, taking organic waste to use it for transport and heat. We have a number of projects in build or at contract finalisation stage, which we will communicate on throughout the year as they move to operation.

"We will also be present at more industry events so there

will be plenty of opportunities to start a conversation."

So, there you have it! Air Liquide is progressing full speed ahead with plans to deliver biomethane solutions to companies across Europe. But we felt it was important to ask, amid ever-urgent discussions surrounding the clean energy transition, what are the biggest barriers facing the scaling-up of the biogas sector?

"There is generally a challenge to find land and progress planning approvals for new facilities," said Hurren. "All operators share the experience that the process can be quite drawn out and time consuming."

Is this perhaps the result of a lack of public awareness of biogas and the industry's amazing potential? There have been cases, even in recent months, of communities rising up against the development of anaerobic digestion facilities in their towns. Maybe this is something that, with the right policy support, will change in the months and years ahead.

Biogas production site (Future Biogas, Springlinton, UK) Credit: James Bastable

The industry has faced enormous challenges in the past two years during the pandemic and it is surely a testament to the determination of the industry that the biomethane market has continued to thrive.

Hurren added: "I would like to pay tribute to our team who have had a challenging 18 months in a remote working scenario and have continued to continuously strive to support a growing and developing business."

We can't wait to see how Air Liquide continues to build on its success in the biogas space and look forward to continuing to celebrate its progress.

For more information:
Visit: airliquide.com

Biowave Technologies's microwave-based pre-treatment system is a game changer for enhancing AD. So, how does it work?

A wave of change

The containerised Biowave unit on site at Biowave Technologies in Waterford, Ireland

The wastewater treatment industry, by necessity, produces waste sludge by-products, which through the principles of the circular economy must be turned from waste materials for disposal to valuable resources, whether for renewable energy generation or reuse.

Depending on the characteristics of the sludge, it can be difficult to convert the material to an alternative use. For example, certain sludges are poorly degradable to biomethane in anaerobic digestion (AD) and require pre-treatments to release their energy potential and reduce the sludge volume.

The use of land banks for the disposal of sludge has been commonplace, but is under increasing pressure as there is finite availability of suitable land. It is anticipated that restrictions on the application of sludge to land will be introduced in response to growing concerns surrounding pathogens, anti-microbial resistance, bioaccumulation of micro-plastics and pharmaceuticals, which will reduce the availability of this method of disposal even further.

AD of sludges is an important part of the solution to reintegrating these wastes into the circular economy, generating renewable biogas and creating a high-quality fertiliser. However, for many difficult-to-treat wastes, AD is either not possible or the full energy potential of the material cannot be realised. Biowave Technologies offers a state-of-the-art microwave-based pre-treatment system at an industrial scale, which is energy efficient and unlocks the full potential of energy-dense, but difficult-to-digest waste streams.

How does it work?

An example of an organic waste stream that is poorly suited to AD in its current form is fat, oil and grease (FOG) effluent. Dairy processing wastewater contains high concentrations of FOG compounds, in particular long-chain fatty acids (LCFAs). These compounds are inhibitive to AD, and so the FOG content of the wastewater is removed via dissolved air flotation (DAF) in the primary treatment stage of the process. This FOG sludge is typically sent for disposal and results in collection fees, transport costs, and greenhouse gas emissions. It is anticipated that a carbon cost will be implemented in the near future for sludge disposal where the sludge offers little or no value to the land bank.

The volume of FOG removed from dairy processing wastewater typically represents about 10% of the flow through the wastewater treatment plant (WWTP). However, contained within that 10% volume is upwards of 50%, even as much as 80%, of the chemical oxygen demand (COD) of the total influent. FOG is, therefore, a highly energy-dense material and in disposing of it, the energy potential of the COD is left untapped. Oleic acid and palmitic acid are LCFAs in high abundance in the FOG sludge and these are the compounds, in particular, that cause inhibition in AD, coating the AD sludge bed, preventing mass transfer, and causing biomass washout and diminished performance.

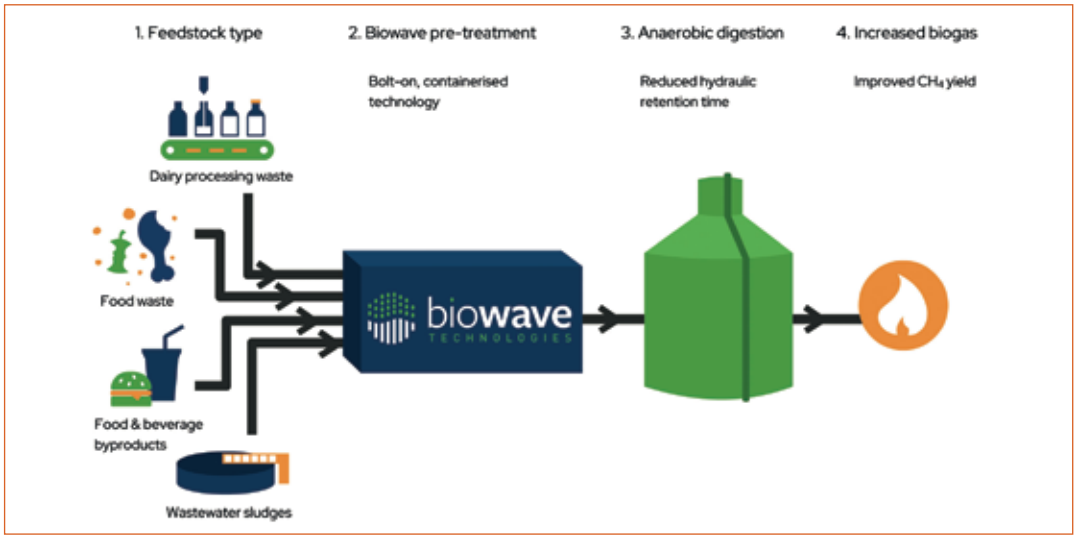
Biowave Technologies has partnered with large dairy producers in Ireland to demonstrate this technology at an industrial scale. A containerised unit treats the FOG sludge from the dairy processors' WWTP, generating a feedstock suitable for higher rate AD (typically employed at dairy processing sites) with high gas production potential, and without a residual build-up of FOGs. The addition of Biowave treated FOG sludge and associated COD to a digester will significantly increase the gas output with energy and cost benefits for the plant, as well as the elimination of FOG sludge disposal costs.

The Biowave Technologies senior team. L-R: Karly Feehily, bioenergy R&D manager; Catherine McIntyre, senior environmental chemist; Ken McGrath, CEO

As mentioned above, Biowave pre-treatment is used to break down the LCFAs in FOG sludge, including oleic and palmitic acid, removing their inhibitive effect. The breakdown of LCFAs is achieved by applying microwave energy to the FOG sludge. Polar compounds in the feedstock absorb the microwave energy on a molecular level, causing them to vibrate and rotate, releasing heat energy to the material in situ. The uniform manner of heating is much more energy efficient than conventional heating, where heat energy is applied from the outside and relies on convection and conduction to move the heat through the material. The Biowave treatment rapidly increases the temperature of the FOG sludge and, therefore, the rate of chemical reactions, such as the breakdown of LCFAs, is improved.

A reduction in average LCFA concentrations of up to 66% post-Biowave treatment of FOG sludge has been demonstrated. In batch degradation tests, the treated FOG sludge feedstock was shown to be biodegradable by the AD biomass, and biomethane yield was 1.8 times higher than the untreated FOG sludge. COD removal of more than 80% was also achieved in the batch degradations.

Additional benefits for the physico-chemical properties of the sludge have also been established. Biowave™ pre-treatment greatly improves the viscosity of the sludge, reducing it from 4,500 centipoises (cP) to under 500 cP post-treatment. Gel permeation chromatography analysis of the high molecular weight compounds show reductions in the average molecular weight from > 160,000 Da to < 80,000 Da, indicating breakdown of the floc polymers which are added during the solids separation processes.



A schematic diagram of where Biowave technology fits into various industries

Biowave's widespread potential

FOG sludge from dairy processing wastewater is just one example of a target feedstock for Biowave Technologies. The pre-treatment can also be applied to waste materials from other sectors such as municipal and industrial wastewater sludges, and food and beverage waste streams. The treatment solubilises recalcitrant solids, making the energy-rich substances more accessible for digestion. Benefits are reduced hydraulic retention time and improved gas quality. For example, treatment of vegetable waste (peels, skins at 17% DS) through Biowave yielded a 40% increase in biomethane potential and an 11% increase in the biomethane content of the gas.

Recently, Biowave Technologies partnered with Gaz Reseau Distribution France (GRDF), France's largest gas distribution network, to deliver Biowave to pretreat waste activated sludge from the municipal wastewater sector. A 16% increase in biogas output has already been demonstrated, but the process will be optimised further.

Biowave technology will increase the renewable gas contribution to GRDF's network, helping it to reach its 2030 carbon goals. For municipal WWTPs, Biowave represents an opportunity to reduce sludge management costs, as well as significantly boost renewable energy outputs from the plant. The technology is modular and scalable, so is suitable for smaller WWTPs, as well as large ones. For the circular economy, Biowave represents an opportunity to turn formerly difficult to convert organic wastes into renewable energy resources. ●

For more information:
Visit: biowave-tech.com

Could energy crop pellets help solve the UK's energy security issue? Domestic biomass energy supplier White Horse Energy outlines its latest project

Innovations in the energy crop space

As the world's attention turns to the threat to our planet posed by climate change post-COP26, the energy sector is under intense scrutiny. Coal has long been the answer to the energy conundrum, but in the 21st century, it is no longer the right one.

Renewables, in all forms, have risen to the challenge. However, the energy crisis gripping Europe, and indeed the world, at present isa testament to the fact that intermittent renewable generation cannot replace dispatchable generation without unintended consequences. One of the potential answers to this problem is the use of dispatchable renewable power, such as biomass.

White Horse Energy, a UK biomass business, was recently awarded funding for a project through the Department for Business, Energy and Industrial Strategy as part of its Biomass Feedstocks Innovation Programme along with 24 other projects looking to develop innovative solutions to these challenges.

Wood pellets, when well regulated, are an extremely low-carbon dispatchable energy source

Historically, energy generators could easily increase their output to match anticipated increases in electricity demand. With intermittent generation now a large part of our energy mix, this is no longer possible — especially when that intermittent generation underperforms for long periods of time. Now, when faced with a generation deficit, Europe turns to whatever can be switched on as quickly as possible; in the past, a large proportion of this would be coal. Now, it is more likely to be gas. With a significant proportion of gas supplies imported from outside Europe, this passes control of our energy mix to foreign powers whose agendas do not always match our own. Our energy security and our wallets are at risk from potential price gouging.

A Metitron560 pelletising in the field

There are, however, renewable forms of dispatchable power. Biomass, most commonly consumed in the form of wood pellets, does an admirable job of replicating the benefits of coal generation, without the negatives. Wood pellets (when well regulated) are an extremely low carbon dispatchable energy source. The energy density and the ease of storing pellets facilitate the use of biomass as a long-term strategic energy reserve.

However, wood pellets aren't a panacea. In Europe, and especially the UK, a large proportion of pellets are imported. While pellet exporters tend to be more

> "...wood pellets aren't a panacea"

aligned with Europe than the exporters of gas, this nevertheless represents an energy security concern, albeit minor. The long-distance transport of pellets has a carbon impact, too. Locally produced pellets from crop residues (such as straw) and non-food energy crops deal with these issues but have previously been too cost-prohibitive to be viable alternatives. White Horse Energy's innovation sets out to change that.

White Horse Energy is focusing on the production and supply chain aspects of energy crop pellet production to ensure that as little cost and as little carbon is incurred from the point of harvest to the point of generation. Dramatically reducing cost and carbon during this phase allows the positioning of these pellets as viable alternatives to imported wood pellets. A key part of this innovation is onsite mobile pelletisation, before the crops have left the farm.

In a post-Brexit world, the nature of farming in the UK has changed dramatically. Subsidy loss and increased import competition is a reality, and so new revenue streams from crops that can grow on marginal land and processing that will generate a higher return on existing residues represent opportunities that should, in part, compensate for this new reality.

The UK is a challenging market from an energy crop pellet perspective. High existing crop residue values and high labour and transport costs make the deployment of energy crop pellets into the existing wood pellet market tough when evaluating purely on a cost basis. Fortunately, the additional energy security and lower carbon footprint represented by energy crop pellets are a compelling benefit.

Internationally, crop residues are abundant and often have no inherent value at all. The ability to convert these into dispatchable power using a methodology perfected in one of the world's tougher energy markets represents a significant opportunity to tackle the challenges presented by modern renewable energy generation.

For more information:
Visit: whitehorseenergy.co.uk/innovation

Yoshinobu Kusano, executive advisor & director of Renova's biomass fuel department, shares his thoughts on plans to phase down coal

"We cannot wait another five or 10 years"

Yoshinobu Kusano

"Coal is being phased down." This was the message from COP26 in Glasgow. The Japanese Government, together with other participants at the conference, pledged this official commitment to the world. To hold this commitment, biomass will need to play a much more important role than before, as the fuel can directly substitute coal.

With biomass, we can change a coal facility into a renewable facility overnight. Biomass can provide baseload electricity while other renewables such as solar and wind cannot. This is why biomass is essential.

Japan, unlike the EU and the UK, still relies heavily on coal for energy. The power industry, which once relied on nuclear power for 40% of energy, suddenly lost its dependence as a result of the Fukushima disaster in 2011. Since then, fossil fuels such as coal and gas have been supporting the Japanese power industry.

In its Energy Mix 2030 plans, the government said it will still rely on nuclear for 20-22% of total electricity in the country, anticipating that some nuclear units will restart soon. The reality is, however, that although 11 years have passed since the disaster, only some nuclear units could come back online.

Solar power, as an industrial-sized installation, is very difficult to find suitable land for. Onshore wind also poses challenges in terms of location. Japan has a dense population, yet only 3% of the land is flat; the rest is mountainous and hilly. Onshore wind turbines need a strong and continuous wind to blow. The top of the mountain is one of the ideal installation places for this type of renewable energy. In the case of offshore wind, there is a huge engineering challenge, as the turbines cannot be embedded. Japan is surrounded by deep seawater while shallow water is only found at the edge of the coastline.

In the future, hydrogen and ammonia will be able to replace coal. The Japanese Government has mentioned these two options since starting the discussion on renewables. Manufacturing hydrogen from fossil fuels such as coal and natural gas is possible, but CO_2 emitted from the process must be captured and stored. This technology is not yet fully developed. Green hydrogen, through an expensive electrolysis process, can be produced only by renewable electricity; therefore, it is expensive. To make hydrogen and ammonia happen, we need more technical innovation and development.

So, what should we do now? How should we cope with the phase-down from coal dependency? We need it tomorrow. We cannot wait another five or 10 years to make it happen. I strongly believe that biomass can serve this purpose perfectly.

I must emphasise that biomass can be a direct substitute for coal. It is available abundantly from any part of the world. In addition to woody biomass and its residues, agricultural waste should also be used, but only if it does not interfere with food production.

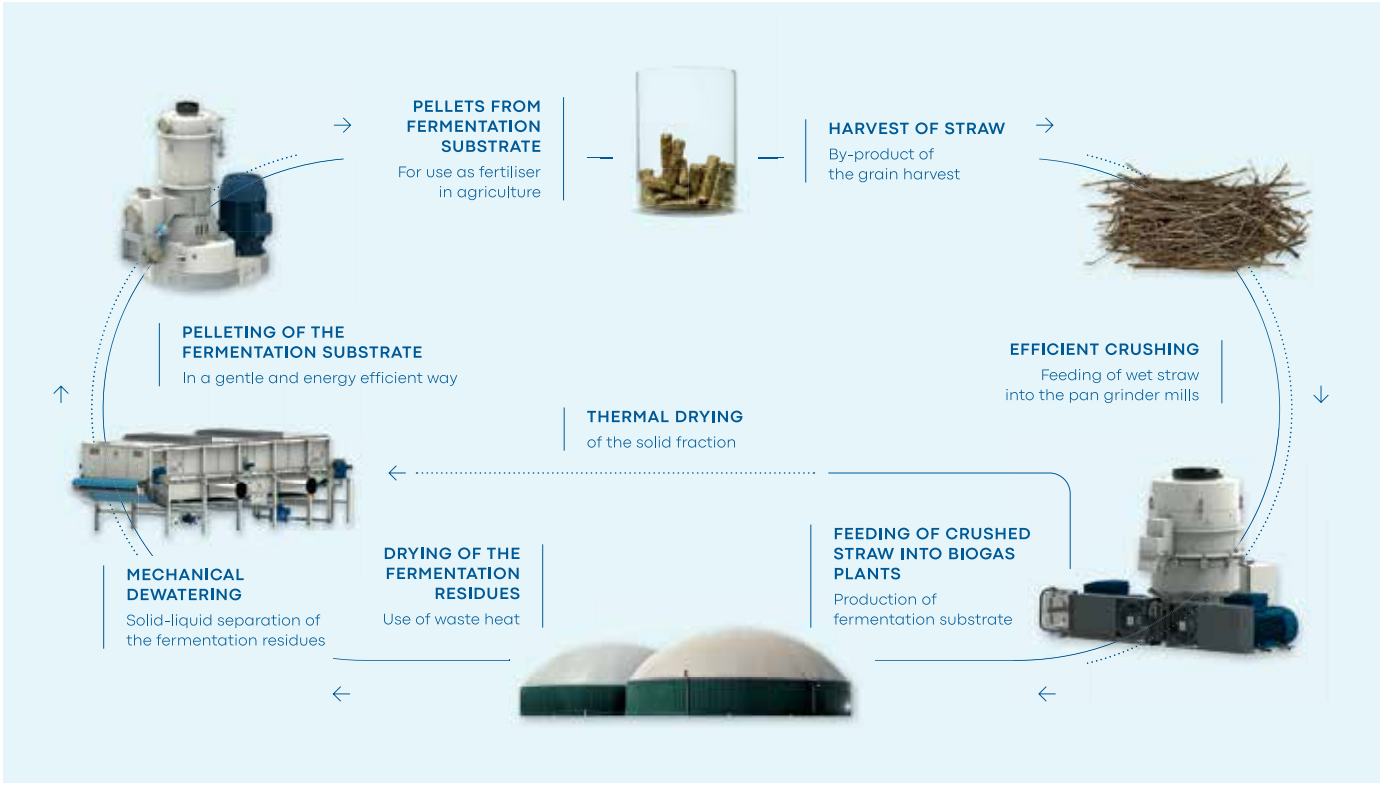
In terms of woody biomass, what should be the preferred choice? Wood pellets or wood chips? Non-torrefied or torrefied? It all depends on what the end-user wants. The end-users own and operate different types of boilers with a wide range of capacities. Some do not want to make a big investment or modify their existing facilities. For these people, simply changing fuel from coal to wood pellets or wood chips is difficult — torrefied pellet or torrefied chips will likely be their preferred choice. These might be well suited to PC boiler operators who are looking to ratchet-up co-firing ratio or complete fuel conversion.

Headwind blows toward biomass. Some environmental bodies are raising concerns, arguing that biomass is produced by cutting whole trees from environmentally unacceptable areas. Another concern has been raised about the CO_2 emissions from the entire process: collecting raw material, processing, transporting and storage before being delivered to the biomass power plant. I think existing major biomass suppliers can cope with this concern.

As far as biomass sourcing is concerned, the 'cascade' usage of wood will be key. This means any part of the tree should be utilised and the value of trees must be maximised and optimised. The traditional way of using wood sees the best part of the tree being used for sawn timber, however, the branches and cuttings are not fully utilised. Forest residuals are a good part source of biomass. ●

For more information:
Yoshinobu Kusano will be speaking at the International Biomass Congress & Expo in Brussels on 5-6 July. Visit: bioenergy-news.com/conference/biomass/biomass_index_2022.php

FROM STRAW TO BIOGAS WITH KAHL



Based on the principles of the flat die pellet mill, AMANDUS KAHL has developed the pan grinder mill for defibration of wet wood chips for the production of fuel pellets. The grinding properties of the pan grinder mill are ideally suited for the preparation of substrates such as fibrous waste for use in biogas plants. Agricultural waste and residues such as solid manure, straw and other harvest residues, but also biomass from landscape management and green waste from public areas as well as forestry waste offer enormous potential for the production of biogas.

The first pilot plant for the defibration of straw, grass and solid manure with an AMANDUS KAHL pan grinder mill is in operation in Denmark. In this pilot plant, mainly wet straw which is not suitable as litter for animals, is processed. Aarhus University conducted a comparison of the gas yield of straw defibrated on the pan grinder mill with that of straw that had merely been cut. The gas production of straw that has been passed through the pan grinder mill exceeds the production of conventionally cut straw by more than 30 %. With the defibrated product, the same gas yield that is obtained in 30 days with cut straw can be achieved in just 17 days.

The defibrated biomass can be dosed more easily and, in combination with liquid manure, can be pumped easily into the digesters without forming foam and floating matter. Thus, various residues and waste materials can be used in biogas plants, while the gas production of existing biogas plants can be increased without the need to increase the volume of the digesters.

In addition, the use of the described biomasses in existing plants is more cost-effective than the use of silage maize or by-products of food production, while the total gas yield is not reduced. Last but not least, these fermentation residues can easily be pelleted and used as high-quality fertiliser for the fields. AMANDUS KAHL is your reliable partner for defibration by means of a roller mill and subsequent pelleting of the fermentation residues.

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KAHL

"In the wake of COP26, it would be deeply disappointing if the debate in 28 years' time is more about why we failed than how we succeeded," writes Colin Ley

European bioenergy in need of coherent policy framework

The emergence of the Omicron variant in late November last year, followed by a rapid surge in infections, has raised serious doubts over the speed of Europe's economic recovery over the next 12-18 months.

Having enjoyed a 5.8% rebound in domestic demand in 2021, the growth forecast for Central Europe this year is a more modest 4.7%, falling to 3.7% in 2023. These are World Bank figures, taken from the organisation's latest Global Economic Prospects report published in early January.

Growth forecasts for Eastern Europe in the near-term are even more severe, projected to fall from 3.1% in 2021 to 1.4% this year before rallying to reach 3.2% in 2023.

Set against this downbeat reading of Europe's economic potential in general, a more optimistic case could almost certainly be made concerning current growth prospects in relation to European bioenergy, but only if the right policy framework is put in place by politicians and EU officials.

Broken fossil system

Soaring energy prices, including forecasts of some European consumers having to pay 50% more to heat their homes from mid-2022 onwards, suggests the present fossil fuel-based supply chain is pretty much broken. Upping European investment in renewable alternatives, particularly domestically sourced alternatives, would seem to have much going for it. Managing the transition from fossils to renewables won't be easy, however, particularly in terms of the timescale involved.

Global electricity demand rose by 6% in 2021, the highest growth rate in more than a decade. This created 'strains in major markets, pushing prices to unprecedented levels and driving the power sector's emissions to a record high', according to a mid-January report from the International Energy Agency (IEA).

"Electricity is central to modern life and clean electricity is pivotal to energy transitions, but in the absence of faster structural change in the sector, rising demand over the next three years could result in additional market volatility and continued high emissions," added the IEA.

Warning that policymakers should be taking action now to soften energy cost impacts on the most vulnerable, IEA executive director, Fatih Birol, highlighted the need for increased investment in low-carbon energy technologies, including renewables, as a way to 'help us get out of today's difficulties'.

Looking at the next three years, the report's authors anticipate electricity demand growing by 2.7% a year on average, subject to further Covid surprises, which continue to inject uncertainty into this outlook. They also say renewables are set to grow by 8% per year on average, serving more than 90% of net demand growth during their 2022-24 forecast period. Fossil fuel-based generation, meanwhile, is expected to stagnate in the coming years.

The legacy of COP26 is another potential bioenergy positive, of course. This should be true even for those who think last year's climate summit was essentially a disappointment. There must still be a few short-term policy and funding gains to be made during the next few months.

French promises

The French Government's six-month Presidency of the Council of the European Union, which began on 1 January, also promises to include a range of climate change and energy positives.

"The goal of carbon neutrality by 2050 cannot be achieved unless the European energy sector undertakes a major transition, implementing energy

conservation and efficiency measures, increasing the use of renewable and decarbonised energy sources and developing technological innovation," stated the French Government in its official Presidency Programme. "These objectives will be pursued whilst ensuring affordable energy for European citizens and businesses."

The French Presidency will 'thus seek to push forward discussions on renewable energy and energy efficiency directives' while also continuing to 'enforce the European Green Deal (EGD)'.

The EGD, of course, presented in December 2019, aims to make the EU the first carbon-neutral continent by 2050 with the intermediate 'Fit for 55' target of reducing net greenhouse gas (GHG) emissions by at least 55% by 2030, compared to

1990 levels. The French Government's presidency also pledges 'further negotiations' on the Fit for 55 package.

Ironically, given such fine words and intentions, the French Government's EU Presidency began just one month after an IEA policy review concluded that France itself needs to invest more in energy efficiency, renewables and nuclear to put the country on track for net zero by 2050.

"France is approaching a crossroads, as key decisions on its future energy system need to be taken soon to ensure it can reach net zero emissions by 2050," said Birol, adding that half of France's renewables output still comes from hydropower plants that were built decades ago.

It will be interesting to see how this all plays out over the next few months and how many development and funding gains bioenergy businesses may be able to secure during France's time in the EU hot seat.

Push and pull

There is an opportunity, certainly, for industry leaders to match the French Government's determination to 'push' the EGD forward with their own insider 'pull' on policies and strategic thinking.

"Our advocacy team is currently meeting with decision-makers in the European Parliament and Council," Giulia Cancian, policy director at Bioenergy Europe, told *Bioenergy Insight*. "We are explaining the reality of the sector on the ground and trying to suggest operational changes that can guarantee sustainability of sourcing while also ensuring smooth operational structures.

"We need to make sure the policy framework regulating biomass sustainability can be achieved and that there is a certain degree of predictability if we want to scale up bioenergy with carbon capture and storage (BECCS) and biochar."

The policy director's comment enlarged on the core message given in the organisation's latest Bioenergy Landscape, published in mid-January.

"Achieving a carbon neutral economy will be challenging and requires a portfolio of clean solutions," stated Bioenergy Europe, adding that sustainable bioenergy plays an essential role in all climate mitigation scenarios from both European and international organisations.

"Today, bioenergy provides 57.4% of renewable energy consumption in the EU and 11% of the total EU energy mix. To continue playing this important role, bioenergy must, with the support of a coherent policy framework, be generated sustainably, allowing significant GHG emission reductions to be achieved, compared to fossil fuels; thus contributing to the achievement of sustainable economic development."

Coherency

The advocacy work outlined by Cancian is all about helping the EU's politicians and officials deliver the sort of 'coherent' policies which bioenergy businesses need in order to realise their potential. A similar point was made by French farmers' union leader, Christiane Lambert, president of Fédération Nationale des Syndicats depletants' Agricoles.

Commenting on a wide range of EU issues, from free trade deals to how the EGD and Fit for 55 will affect Europe's farmers, Lambert said producers needed 'coherency' at local, European and national levels. She then turned to the French Presidency's promised emphasis on the development of 'carbon farming'.

"This initiative will be positive if it enables agriculture to be more sustainable, delivers on climate benefits and ensures an additional income for farmers," she said.

"The two key dimensions of the popular success of this new business model for farmers are carbon pricing and market-based instruments. The European Fit for 55 legislative package is paving the way. However, the EU's new soil protection strategy, the biodiversity 2030 strategy, and the Nature Restoration's objectives will also have to be consistent with the key role of agriculture in carbon storage.

"We must also ensure that farmers are rewarded not only for their participation in increasing carbon sequestration, but also in reducing GHG emissions."

It's a good reminder that bioenergy management in Europe embraces many different interests and many different players, all with their own needs and agendas.

Momentum shift

With so much being said and written about reaching carbon neutrality by 2050, in the wake of COP26, it would be deeply disappointing if the debate in 28 years' time is more about why we failed than how we succeeded. Getting there, however, will require a definite momentum shift.

"Despite significant growth of renewable energy consumption during the last decade, our energy system is still largely dependent on imported fossil fuels," stated Bioenergy Europe, adding that the penetration of clean alternatives, like sustainable bioenergy, needs to be accelerated to reach climate neutrality by the mid-point of the century.

BECCS potential is also key, especially with the European Commission being committed to advancing work this year on proposals for a Carbon Dioxide Removal Regulation.

"This should set standards for accounting negative emissions while also setting targets for technological solutions," said Cancian. "This step will be key to make sure negative emissions are deployed at speed."

Success in 2050, therefore, will be based largely on plans, policies and strategies laid in 2022, or at least on actions taken during the 2020s to establish the right foundation for the following two decades. All of which should result in a positive future for bioenergy developers in general and European bioenergy businesses in particular.

"The European bioenergy industry is globally competitive and holds an undisputed leadership in terms of technology development, manufacturing, and fuel production processes," concluded Bioenergy Europe in its mid-January publication.

"The EU exports advanced equipment and is largely resilient to the disruptions of global value chains. Bioenergy is also an enabler of other sectors' decarbonisation such as commercial and industrial energy consumption.

"For these reasons, it is essential to establish a European industrial strategy recognising the decarbonisation potential of bioenergy as well as its potential for economic growth and job creation."

That equates to the delivery of coherency by European politicians and officials throughout 2022 and, in truth, for the 28 years that follow. ●

For more information:
This article was written by Colin Ley, a freelance contributor

Reliable and simple: additional revenue through Europe-wide biomethane trading with bmp greengas

The trading game

Funding or no funding? Certification or no certification? Short- or long-term contracts? Biomethane trading is less time-consuming if, as a plant operator, you are working with experts.

bmp greengas is a major European biomethane marketer helping with engineering, certification and commercial knowledge as well as optimal contracts for better planning security — regardless of the country of origin or the received subsidies.

The company's contracts with production partners typically have a term of around 10 years. Guaranteed purchase quantities with the required flexibility and a fixed purchase price per kilowatt-hour secure the plant's revenues every month and at the same time leave enough room for potential ups and downs in production during the plant's lifecycle.

bmp greengas is one of the few providers on the European market using this approach. The company's offtaking contracts are bankable and offer plant operators investment security. Additionally, due to their seriousness and resilience, the contracts convince banks, private or institutional investors, and even investment funds to sign loans or provide an investment for the construction of a biomethane plant. In terms of bankability, the fact that bmp greengas is part of the EnBW group, one of the four historic German energy majors, helps a lot.

15 years of biomethane experience

Within the EnBW group, which is active both in gas and electricity, bmp greengas plays the role of the expert when it comes to finding the right markets for biomethane. The German company, which was originally founded as a start-up in Munich in 2007, has been trading biomethane since the very beginning of the market as a whole.

The first German biomethane plant in the Bavarian community of Pliening was developed by bmp's founding team and is still part of its portfolio today. This is also the case for many other long-term partnerships. After an initial period of typically 10 years, which is necessary to secure the return on investment for a new plant, many partnerships have been extended for another 10 years. This is proof of fruitful cooperation and trust built together over a long time.

Today, bmp greengas is not only a leader in its home country, but has also gained a lot of experience in other European countries, including Denmark, the Netherlands, the UK, Spain, Czech Republic, Austria and Switzerland. The company's experts are familiar with the legal and national frameworks from many projects over the years.

Today, the company's portfolio has reached over 3 TWh per year. A large part of this volume comes from its production partners, but as a part of the EnBW group with 20 of its own biomethane facilities, bmp greengas is more than a pure trader. It combines trading know-how with in-depth experience of all the processes necessary to successfully run a biomethane plant.

All-round package for the greatest possible added value

Diverse knowledge and extensive experience in international biomethane trading means bmp greengas is well placed to help in other areas of the market. The company sees itself as a partner that also provides support in matters such as balancing group management, transport from one European market area to another, portfolio management and certification. For example, the company helps with logging into the national/European register; selecting the right auditor for plants in various certification systems (REDcert, International Sustainability and Carbon Certification, DENA), and transferring national registers to the German DENA register. Sustainability requirements are becoming increasingly important, and bmp greengas can help secure a plant's future competitiveness and compliance with upcoming regulations.

Apart from long-term production partnerships, bmp greengas is also available as a partner for short-term business in the spot market. In countries with a public feed-in-tariff, the offtaking of biomethane certificates is typically more short-term orientated. Producers who run biomethane plants without subsidies can also count on bmp greengas as a reliable counterparty for short-term deals, including either certificates or the physical gas and certificates delivery. ●

For more information:
Visit: bmp-greengas.com

A state-of-the-art care home in York, UK, has taken a fresh approach to sustainable food waste management with ReFood

Caring for people and the planet

The Oaks is a state-of-the-art care home in New Earswick, York, run by the Joseph Rowntree Housing Trust (JRHT). It is an integral part of the Hartrigg Oaks retirement village, a community of around 400 people, and now, working with ReFood, the care home also recycles its food waste into biogas.

Approximately 40 residents live in the care home and around 250 more live in the 152 bungalows that surround the Oaks Centre. The bungalows were specifically designed to enable their lessees to remain in them for as long as they wish, with up to 21 hours of support a week provided.

The Oaks Centre is, in normal times, the lively heart of the community. As well as the care home, it contains a large restaurant, a busy coffee shop and a large kitchen area. This serves not only the two eateries, but also the many care home residents who take their meals in the care home. Each day it also delivers meals to bungalow residents in their homes.

In addition, the Oaks Centre provides the base for the 40 trained carers who support bungalow residents where necessary, as well as the 60 care home staff, the JRHT management team, and around 20 kitchen staff. All of these activities in the Oaks Centre mean that the kitchen and the coffee shop are busy serving food and drinks almost all day. The result, of course, is that the volume of potential food waste is considerable.

Up to 2014, there was no recycling of food waste at Hartrigg Oaks. Instead, there was a great deal of food waste — partly because it is hard to predict the appropriate quantities to supply to a population the size of Hartrigg Oaks, and especially when many are elderly, with varying appetites. So, all of the considerable quantity of food waste from the very busy and highly productive Hartrigg Oak kitchen was, until 2014, simply disposed of by a macerator — a machine that chews up disposable food and flushes it away as waste matter. The JRHT authorities were ready to order a replacement when news of these plans reached the Hartrigg Oaks Sustainability Group. This group was a joint committee of both residents and senior JRHT staff that had already successfully overseen several ecologically desirable innovations in Hartrigg Oaks. These included the installation of photovoltaic panels on the Oaks Building, encouraging a good number of bungalow residents to do the same, and ensuring that JRHT and bungalow residents installed LED lighting wherever possible.

The group pointed out to JRHT that the replacement of the macerator provided an excellent opportunity to demonstrate their commitment to sustainability. JRHT agreed, and the decision was taken that the Hartrigg Oaks kitchen should switch from treating food waste as 'rubbish' to recycling it. Of course, it also avoided spending a considerable sum on a new macerator.

After carefully considering the alternative possibilities, the decision was made to appoint ReFood to provide a food waste recycling service for Hartrigg Oaks. The service sees bins of discarded food collected by ReFood and taken to its anaerobic digestion site in Doncaster. ReFood's Doncaster facility became operational in the summer of 2011. It generates 5 MWh of renewable energy and is capable of processing 160,000 tonnes of waste.

A further advantage of recycling through ReFood is its innovative 'bin swap' service, in which each bin that is taken away for recycling is replaced by a freshly sanitised bin. However, the successful recycling of food waste from the Hartrigg Oaks kitchen is only half of the story.

Once this service had been established, the Sustainability Group turned its attention to the question of how best to meet the recycling wishes of sustainability-minded residents of the 152 bungalows. This was a more complex matter because it involved distinguishing between food waste that is suitable for composting and food waste that is not. Every bungalow has a small garden, and many households additionally take over nearby areas of the grounds to extend their gardening territory. In addition, two areas of the grounds are given over to allotments, so there is plenty of demand for compost.

The solution was clear. There had to be scope for bungalow residents to use some of their food waste as compost and sustainably dispose of the rest. In other words, any such household needs to have two small bins available for recycling food waste: one for composting and one for ReFood.

The development of recycling food waste at Hartrigg Oaks in the last few years is a beacon that, with ReFood's help, many other social groups of all kinds can follow with confidence. Each community will be different, depending on factors such as the physical fitness of the recyclers and the willingness of the relevant staff members to establish the procedure. ●

For more information:
Visit: refood.co.uk

Finsterwalder Umwelttechnik recently installed a depackaging plant at a waste management facility in Canada

Tackling food waste in Ontario

Depacking technology by German company Finsterwalder Umwelttechnik was recently installed at a waste management business in Ontario, Canada.

Davidson Environmental, a waste management company, collects food waste from restaurants and out-of-date packaged food from supermarkets in Ontario. The waste is collected in 600-litre boxes. At the facility, it is prepared for recycling in a biogas plant using a Finsterwalder compact depacking plant, which was pre-assembled in Germany and delivered in three parts in a shipping container.

The waste is dumped into a hopper, coarsely pre-shredded with a 4-shaft shredder, and distributed to the two BS20 separation presses. The filling of the presses is supported by two filling devices. By squeezing hard, components larger than 12 mm (mainly non-fermentable impurities) are separated from the organic substrate, which is then loaded into a truck by two piston pumps (KP10).

The impurities are pushed into a container and transported off-site. This process does not require any additional liquid and the energy content of the organics per m^3 is correspondingly high. The throughput of the plant is approximately 8-10 m^3 per hour.

"Fitec's Bio-Squeeze system has become a valuable tool in our efforts to recycle even more food waste," a spokesperson for Davidson Environmental commented. "The equipment handles any packaging, in any quantity, with no water added, as promised.

"The Fitec operating systems are easily customisable and user friendly. We are very satisfied and are looking forward to the future possible purchase of a biogas plant from Fitec."

Finsterwalder's team commented: "Together with our Canadian partner, Fitec Environmental Technologies, and Davidson Environmental, we were able to successfully implement an international project with the Finsterwalder compact processing plant.

"The system is used to process leftovers of restaurants and supermarkets for efficient energy production in biogas plants. The implementation shows that, in difficult times, even large projects can be realised professionally if you have the right partner at your side." ●

Bio-Squeeze depacking technology

For more information:
Visit: fitec.com and fitec.ca

Torsten Fischer of Krieg + Fischer Ingenieure discusses a legal investigation related to the deficiencies of a digestate dryer at a German biogas plant

First-person sleuthing: investigating a digestate dryer

Torsten Fischer, founder and managing director at Krieg + Fischer Ingenieure, has been an expert legal witness for more than 10 years covering 120 cases and wrote his first report about a biogas plant accident more than 15 years ago. In this personal account, Fischer discusses a legal dispute between a construction firm and the owner and operator of a farm-based biogas plant, exclusively for *Bioenergy Insight*.

Background information

The typical input substrates for a biogas plant are manure, energy crops, and organic waste, resulting in biogas and raw digestate. The digestate has to be stored for several months, depending on the country. In Europe, this differs between four and nine months. For large biogas plants, this may require huge storage capacities. Biogas plants with 10,000 or more cubic metres of raw digestate storage capacity are not uncommon. To reduce investment and trucking costs, a digestate dryer may provide a convenient solution for operators — especially if excess heat from the CHP can be used for the drying process. Such excess heat may originate from two sources: CHP exhaust gas and cooling water.

Figure 2. Typical raw digestate

In most dryers, common sludge-type (raw) digestate is dewatered and the solid digestate is dried. Some dryers use the raw digestate as it is, mixing it with dried digestate and drying the mix. Other systems take the liquid digestate behind the dewatering and evaporate as much water as possible while keeping the digestate in a pumpable condition. This report covers all such systems in general with the focus on drying the solid phase behind the dewatering. The result of all such processes is a big stream of strong-smelling air that needs to be treated in most locations before being emitted into the environment.

Setting

The court asked me to take evidence and write a report about the potential deficiencies of a digestate dryer at a biogas plant. The facility was a typical German standardised biogas plant system, with mostly corn silage and pig manure used as the input substrate.

My reaction

Dryers are always difficult; this is no easy job.

The job

Court reports must follow certain rules - the judge outlines the questions and the technical expert must answer them. The short version of the questions, in this case, was: “Does the dryer work or not?” and: “What are the reasons for the deficiencies?”

Site visit and report

The site visit revealed that the dryer system was a belt dryer based on a container-type machine with an upfront dewatering system for the digestate and a close connection to the neighbouring CHP that delivered hot water to the dryer (Figure 1).

On top of the container was a small buffer tank for raw digestate (Figure 2). From here, the screw press separator takes it. The liquid phase is pumped back into the biogas plant and

Figure 1. The containerised dryer. The front metal box contains the fore- and back-run pipes of the CHP. Behind the stack on top of the container: the buffer tank for raw digestate

Figure 3. Solid digestate from behind the dewatering with a screw press separator. This falls onto the conveyor belt of the disputable dryer

Figure 4. Dried solid digestate

the solid phase falls onto a conveyor belt. The conveyor belt is heated with hot water from the CHP at 90°C. Fresh air is heated in a heat exchanger and blown across the conveyor belt. In this case, saturated air is emitted directly via the stack into the environment.

My main investigation was into the efficiency of the dryer. Due to missing data on the diagram, Figure 5 can just be taken as an orientation; however, this orientation is strong enough to show that the disputable dryer worked on a very low level of efficiency.

Conclusion

The contact between the biogas plant operator and the dryer supplier came via an advertisement in a magazine. The operator called the supplier and from that moment on all written documents were produced by the supplier only. Later during the court case, this created a bad position for the operator. Besides the court file, I read through about 150 documents before writing my report, and nowhere was any specific technical requirement from the operator's point of view fixed. Everything depended on the texts from the supplier. Technical parameters such as dry matter content (input/output), the target dry matter content for the output, or any information about test runs were not fixed — it was all about 'wet' and 'dry' only. Calculations within the quotation were not related to the digestate specifically, but were in general about the amount of water evaporated from any digestate. If nothing was fixed — how could I establish whether the dryer was deficient?

A dryer is a machine, according to the machinery guideline. There are required standards for the documentation. In not one case for all the dryers I investigated had the suppliers fulfilled documentation requirements completely. In most cases, even the piping and instrumentation diagram is missing.

This scenario is also typical: the supplier delivers the dryer, assembles it on site, and is ready "Friday at noon". There is a cold start-up and about an hour of training before the (unprofessional) operator signs the final protocol for commissioning, the workers from the supplier quickly leave in order to be back home for the weekend, leaving the operator very much alone with fairly complicated machinery that he has no clue how to deal with and that has not shown any performance.

The fine print

There may be, roughly, 200 dryers of all kinds installed at biogas plants in Germany. Meanwhile, they have a certain reputation of having poor efficiency and catching fire easily. It is beyond my imagination why so many operators believe that they can buy such an expensive and complicated machine over the phone. According to the German Renewable Energy Law, an extra payment per thermal kWh is valid if the CHP heat is used in a dryer. This results in a situation where the less efficient the dryer is, the more money the operator receives. Finally, in 2011 the German Biogas Association published a target value for the efficiency of dryers. The dryer investigated here was not even close to that target value.

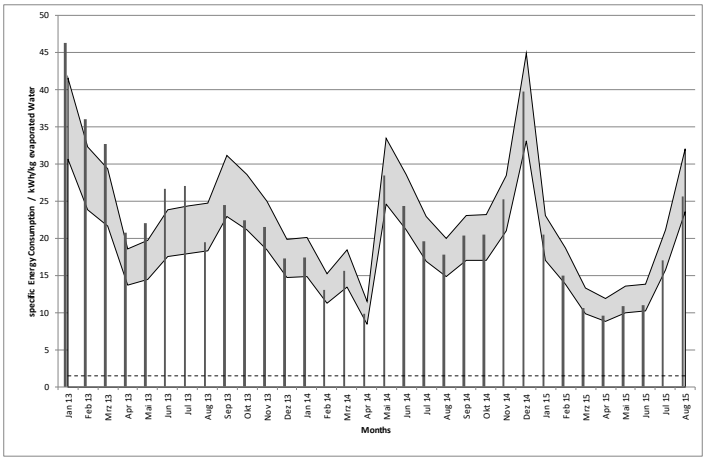


Figure 5. Diagram showing the specific energy consumption of the disputable dryer. The grey area shows the range of the potential energy consumption if the solid digestate is dried to 60-90% dry matter content. The beams are related to the measured energy consumption in real life. The dotted line shows, for comparison, the required target value from the German Biogas Association

Lessons learned

This example shows a poor but not exceptionally poor case. The operator lost the court case. After reading my report, he withdrew the lawsuit. All he could present was the advertisement in a magazine. The supplier had written his quotation in a — for the supplier — very favourable style. At the end of the day, it became clear that the operator got what he had ordered.

Note: not all details have been presented in full and some elements have been simplified.

For more information:
This article was written by Torsten Fischer, founder and managing director at Krieg + Fischer Ingenieure. Visit: kriegfischer.de/en/biogas-plants/services/expert-opinions-and-studies/. Fischer is happy to receive questions at fischer@kriegfischer.de.

How an intelligent retrofit by Explosion Power permanently reduced slag build-up in a biomass power plant's furnace

Retrofit success

Silbitz biomass power plant in Thuringia, Germany produces electricity (5.6 MW) and district heat (3 MW) from waste wood. To keep its production competitive, a high degree of availability at the plant is required. Until recently, this was not satisfactory in Silbitz.

The reason was the furnace — heavy slagging on the walls resulted in short boiler operation periods and frequent downtimes. Since 2011, four Shock Pulse Generators (SPGs) have been cleaning the plant during operation. This has enabled the amount of slagging to be minimised and boiler operation periods to be lengthened.

"Since we started cleaning the furnace and radiation pass as well as the convection passes regularly with four SPGs, we have kept the boiler efficiency at a constantly high level throughout the entire boiler operation period," said Andree Michaelis, operations manager at the biomass power plant in Silbitz.

Figure 2. Furnace in 2010 after a 10-week travelling period prior to the installation of the Shock Pulse Generators

Figure 3. Furnace after a 12-week traveling period with the Shock Pulse Generators installed in 2011

The plant went into operation in 2003. The vertical boiler consists of a furnace, a radiation pass, a convection pass and an economiser pass (see Figure 1). Engineering firm Standardkessel Baumgarte did not envisage installing a cleaning system in the furnace and radiation pass for the removal of deposits during operation. From the start, the superheater and economiser passes had been equipped with steam sootblowers (rotary and retractable sootblowers by Rosink).

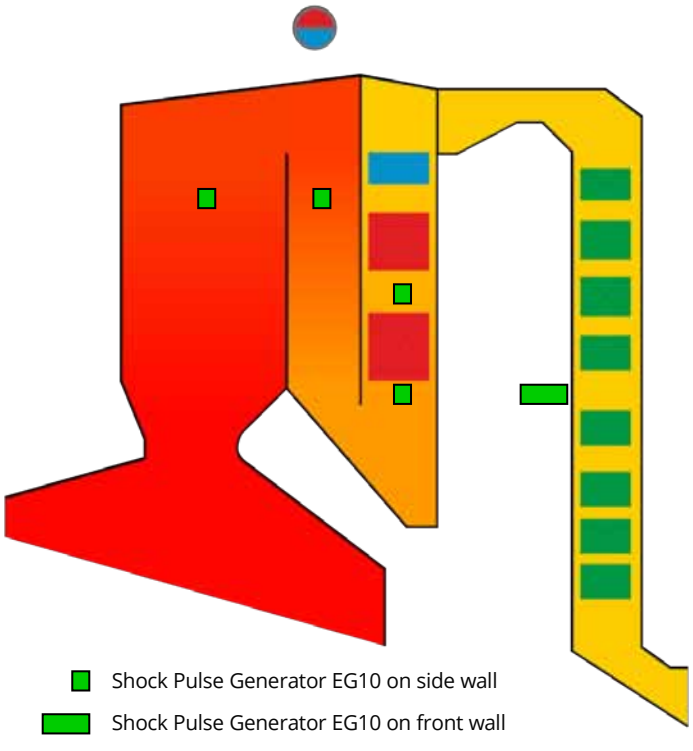


Figure 1. Boiler overview and installation positions of the Shock Pulse Generators at the Silbitz biomass power plant

Boiler fouling caused frequent downtimes

After just a short period of operation, the boiler showed signs of heavy fouling. In the furnace, slagging and fouling often reached such a high level (see Figure 2) and the sheer weight caused it to fall off from the side walls, dropping down and blocking the ash discharge, or damaging the grate. As a result, the boiler had to be shut down for cleaning and repair.

"The frequent downtimes massively reduced our boiler operating times," said Michaelis. "This was an untenable situation and we had to come up with some solutions."

The plant operator found the answer at Explosion Power. Since October 2011, four SPGs have been up and running at the plant.

Shock Pulse interval of 24 hours instead of eight sootblowers

The SPGs cater for improved cleaning within the entire boiler. The first SPG prevents slagging and fouling in the furnace (see Figure 2) with the second tasked with cleaning the radiation pass. The third supplements the sootblowers in the convection pass to clean superheater 1 better and to reduce the operation of the soot blowers, and the fourth makes the sootblowers in the economiser pass redundant.

By using SPGs in the furnace and radiation pass, the flue gas temperature can be kept at a constantly low level at the convection pass inlet. This reduces the level of corrosion in the superheater bundles and improves the 'cleanability' of the bundles.

In the convection pass, only the sootblower between the two superheaters and the one between the superheater and the evaporator are still in use. Thanks to the lower inlet

temperatures, the deposits left on the superheaters are less sticky. The tubes can be cleaned more easily and the sootblowers have to be used less frequently. During the first six weeks following a boiler overhaul, the sootblowers in the convection pass do not have to be used at all.

The plant could fully retire the eight sootblowers in the economiser as a single SPG with a Shock Pulse interval of 24 hours does the job of all the sootblowers now.

In October 2017, a fifth SPG was also installed in the third pass, between superheater 1 and superheater 2, to further optimise the cleaning of superheater 2.

Marked increase in availability

As the boiler is now automatically cleaned by the SPG system, availability has considerably increased, with downtimes reduced to a minimum.

"Between cleaning intervals, the plant now always runs in the nominal load range," commented Michaelis. "We've also been able to reduce the flue gas temperature at the furnace ceiling to a maximum of 850°C."

The SPGs also lengthen the service life of the boiler and simplify its maintenance.

"Unlike the sootblowers, the Shock Pulse Generators don't cause any abrasion on the pipe surfaces. This means that we could remove the protective shells on the economiser tubes."

As the sootblowers are used much less often, this has an effect on the overall energy balance of the biomass power plant. Thus, electricity production has risen by 2%. In addition, less demineralised water has to be prepared. The plant has been able to halve its water consumption.

Biomass power plant Silbitz, Germany, by courtesy of HHKW Silbitz, Andree Michaelis

Simple maintenance

Technicians at the biomass power plant in Silbitz have been trained in the maintenance of the SPGs. This means they are able to carry out servicing of the SPGs themselves. Maintenance is due after 3,000 Shock Pulses or every 12 months. Spare and wear parts are bought directly from Explosion Power. ●

For more information:
Visit: explosionpower.ch/en

As CEO of Nature Energy, Ole Hvelplund plays an important role in the global biogas sector

In conversation with Ole Hvelpund

Where were you educated, and what was your first job?
I hold a master's degree in economics from Aarhus University in Denmark. My first job was as a marketing coordinator for a Danish telephone company. Back then, the internet wasn't developed and digital transformation was on the rise. It was an interesting time working in the telephone business and to be a part of a sector that was about to enter the digital era. The lessons I learned back then about driving large transformations forward is something I still use today in Nature Energy and the biogas sector.

Ole Hvelplund

What interested you about becoming involved in the biogas industry?
Biogas is a true example of a circular product. Not only does it provide society with green energy, it is also a way to clean up biological waste in society and enable more sustainable food production when green fertiliser is returned to the fields. This circular, green value that biogas creates is one of the aspects that interested me the most when I joined the biogas industry — and it still is.

What do you enjoy most about your role as CEO of Nature Energy?
As an organisation, we are growing rapidly. Today, we have around 300 employees who are all dedicated to working with biogas. It motivates me to work in a dynamic organisation full of talented people who are committed to accelerating the green transition and increasing the use of climate-friendly biogas. The fact that we help to push society into a greener and more sustainable direction is something that drives me a lot.

What does a typical day look like for you?
I live in the Danish city of Aarhus which is a one-and-a-half-hour drive from Nature Energy's head office in Odense. Therefore, my mornings usually start in the car, where I often do my first meetings. I also enjoy listening to the latest news on the radio while driving to work. At our office in Odense, I often have a lot of meetings planned and, therefore, I prefer to have an open door to my office whenever possible so everyone can come in and talk to me when I'm not in meetings. When I'm home again in Aarhus, I enjoy spending the evenings with my wife and family.

Can you tell us about your proudest moment so far (in work or otherwise)?
Work-wise, I am proud of what we have achieved in Nature Energy over the last couple of years. I am proud of being the CEO of a company with this many competent employees and working with green technology, which has a huge impact on our ability to create an effective green transition. Above everything else, I am extremely proud to be the father of four children. They are all grown-up now, but they keep me and my wife young — and I am happy about that!

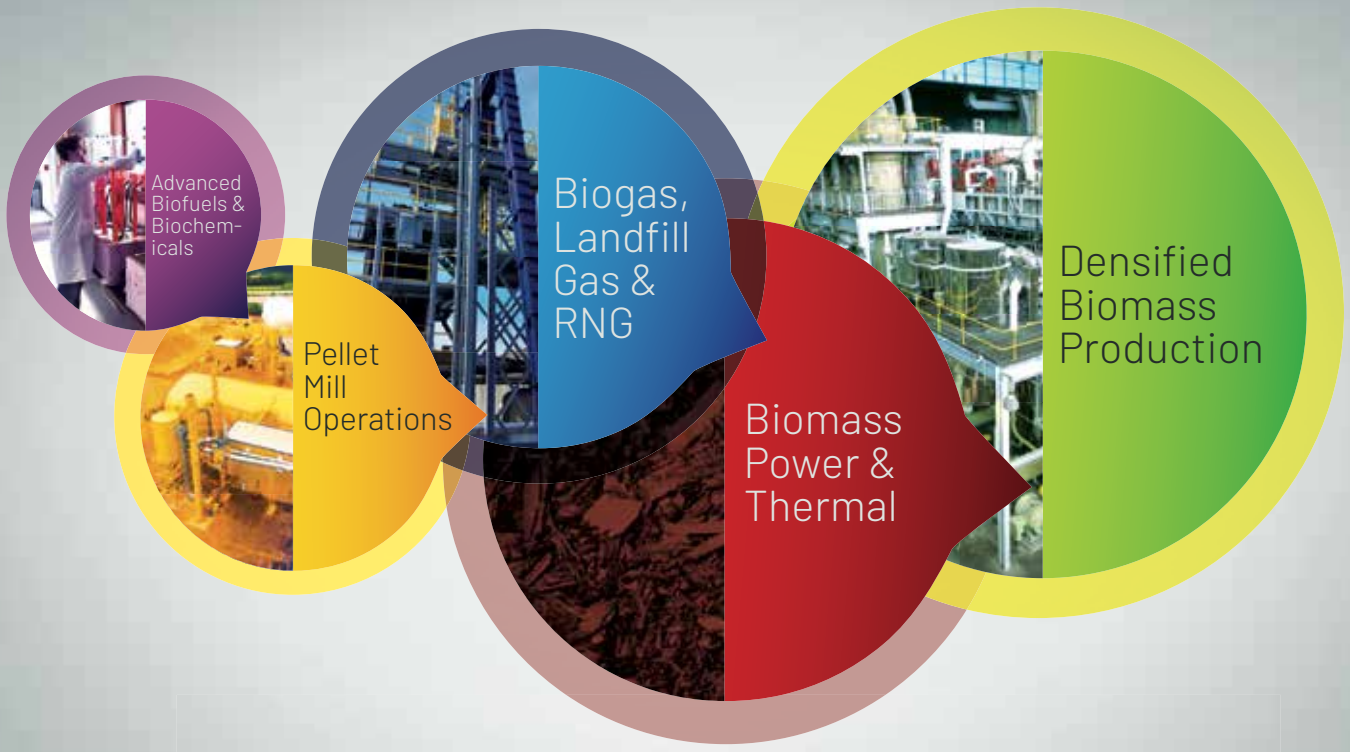
What is your favourite book and film?
I enjoy reading books with a focus on political and historical events. A good crime novel is also a hit with me. My favourite movie is Cinema Paradiso — an Italian movie I'd recommend.

How do you like to relax, and do you have any hobbies?
Like many others, I spend a lot of my time in front of a computer screen or at meetings. Therefore, I enjoy having an active lifestyle in my spare time. I have kayaked for many years. When possible, I do a rowing session on my rowing machine, or at my summer house where I have a kayak. One day a week, I take dance lessons with my wife, which is both fun and challenging.

What piece of advice would you give to someone thinking about joining the biogas industry?
When you join the biogas industry, you become a part of a sector that is expanding markedly, and together with solar and wind power, biogas plays a key role in the global, green transition. Therefore, my advice would be to join the biogas industry with an open mind and a high level of curiosity because, in many ways, this is a visionary sector moving at full speed.

What are you most looking forward to in 2022?
In Nature Energy, we are working intensively with expansions to new markets in Europe, Canada, and the US. Already this year, we will break ground on a new biogas plant in France and the US — that I look very much forward to. There is no doubt that we have a set assignment globally to reduce greenhouse gas emissions on a massive scale to fulfil the Paris Agreement. This sets a high demand for green technologies like biogas. ●

> "...this is a visionary sector moving at full speed"



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