Bioenergy Insight

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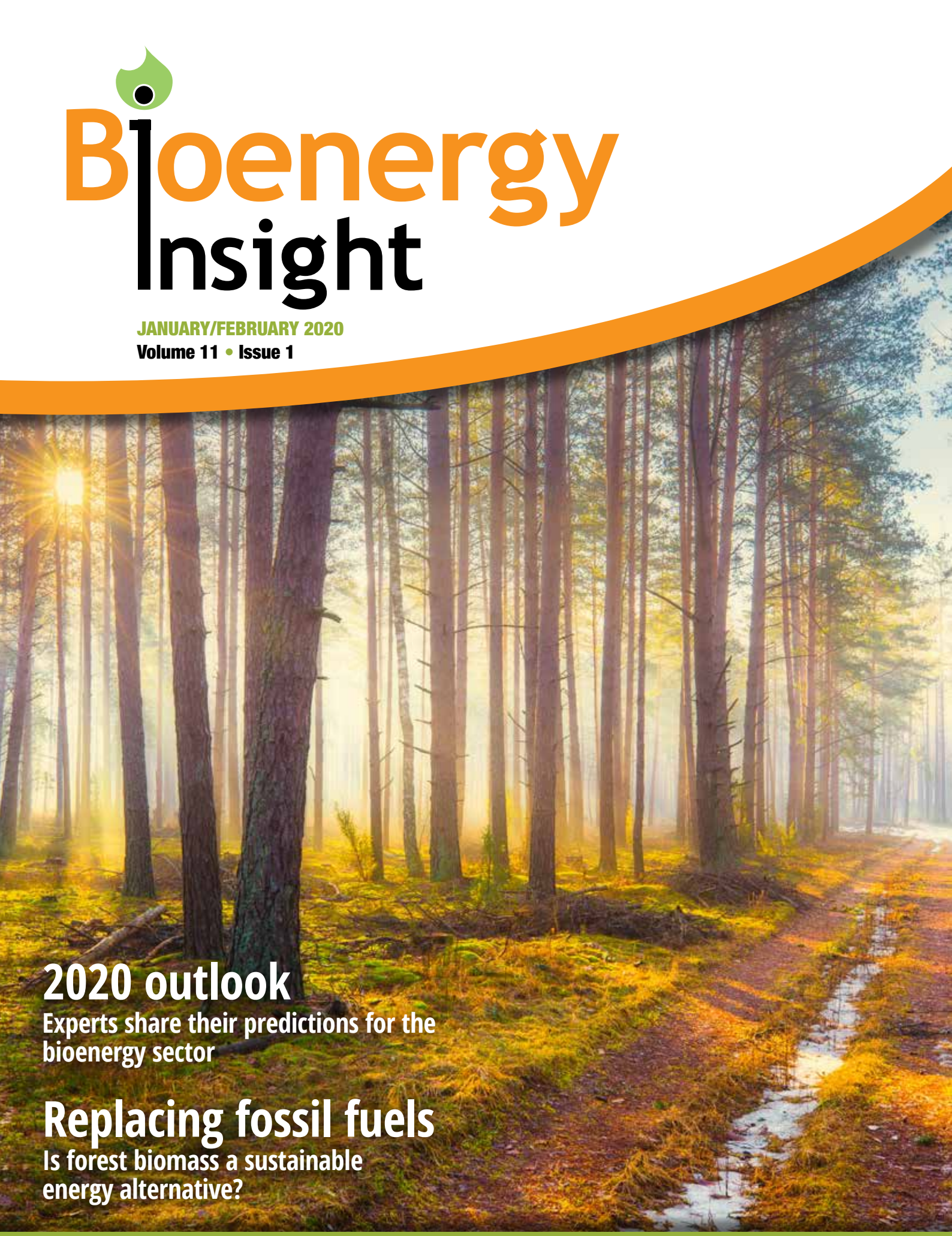

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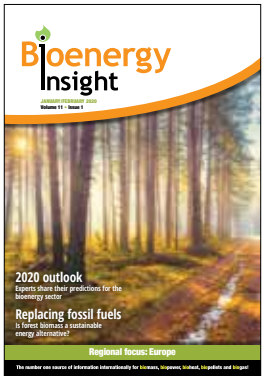

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It's time to save the planet

It has been impossible to avoid the crisis our planet is facing. Bushfires are raging in Australia; we are seeing droughts, flooding, heatwaves, and the devastating impacts of climate change are visible through eye-opening news reports, and for many, in daily life. So what can the bioenergy industry do to help?

In 2020, new policy support such as the European Green Deal should go some way towards encouraging the renewables sector, including bioenergy. Speaking with industry leaders over the past year, it has become clear that the potential of biomass and biogas must be acknowledged quickly to address the climate crisis. Other forms of renewable energy such as wind and solar have been consistently supported through funding and policy, but many experts believe that without the same support for bioenergy, countries will struggle to meet their net-zero targets.

Anaerobic digestion (AD) has been one of the most-talked about processes in renewables. Its potential is enormous. According to the World Biogas Association (WBA) currently just 2% of the potential waste and other feedstocks available for use in AD are harvested, meaning that 98% of organic waste is not being utilised. WBA president David Newman shares more statistics on biogas on P.22. To find out just how successful AD can be when using food waste, *Bioenergy Insight* visited a plant in Dagenham, UK (P.26).

On the other side of the fence, wood pellet producers are continually under fire from environmental campaigners for their perceived overuse of forest biomass. On P.34, Seth Ginther of the US Industrial Pellet Association and Sasha Stashwick of the Natural Resources Defense Council make the case for and against the use of forest biomass for bioenergy. Frank S. Lund of Danish company Aalborg Energie Technik also highlights the benefits of biomass on P.38.

We are looking forward to finding out what 2020 has in store for the bioenergy sector. We hope you are too!

Dawn Stephens-Borg
Editor

Helsinki horse riding event powered by horse manure

Helsinki International Horse Show in Finland powered its event entirely on horse manure. It is the fifth year in a row that all electricity used at the event, which hosted the Longines FEI World Cup Jumping qualifier, was generated from 100% horse manure.

Over 150 megawatt-hours of energy was created from the 100 tonnes of manure collected from competing horses during the four-day event. International energy company Fortum developed the manure-to-energy system, which provided power for lighting, scoreboards and mobile phone charging stations. The surplus energy generated went back into the national grid to heat homes in the Helsinki area.

"The manure-to-energy system holds immense potential for countries with large horse populations and has shown that out-of-the-box solutions are needed if we are to move away from fossil fuels," said Fortum HorsePower vice-president, Anssi Paalanen.

Helsinki International Horse Show event director Tom Gordin added: "As event organisers, it's our responsibility to create partnerships with local industry to make sustainable sporting events a real possibility and not just a nice-to-have."

Electricity from horse manure is just one of many initiatives under the 'Helsinki Jumps Green' environmental concept that aims to make the event 'the most ecological horse show in the world'. Other initiatives include recycling and paper reduction, using environmentally-friendly procurement practices and sustainable food consumption.

Fortum's system has also provided a way of dealing with waste at stables in a country with strict controls on the use of horse manure as a fertiliser, and the disposal of manure in landfill sites. The company provides stables with horse bedding made from sustainable wood shavings, sourced in Finland. The manure collected from the stables is then delivered to plants around the country to produce energy.

Approximately 70,000 tonnes of manure have been collected from horses in stables across Finland since the manure-to-energy system started in 2015. The power and heat plant in Jarvenpaa, just outside Helsinki, provides heat to around 1,250 customers in the area, as well as electricity for the national grid.

Ingmar De Vos, president of the International Federation for Equestrian Sports, said: "The manure-to-energy system has demonstrated that ideas for alternate energy solutions can come from the most unexpected places. The Helsinki initiatives make a tremendous contribution, not just in terms of the value they deliver to equestrian sport, but also for the wider implications they have for local and regional communities. It clearly shows that the equestrian community is serious about its responsibility to preserve the environment." ●

Enviva's Alabama pellet facility gets green light

Wood pellet producer Enviva has received a permit to build a new facility in Alabama, US. The firm released a statement thanking the Alabama Department of Environmental Management for its approval, which will pave the way for 85 full-time jobs alongside a further 180 jobs in logging, transportation and local services, and 300-400 jobs during the construction of the plant.

The new $175 million (€157.9 million) facility will be located at the Port of Epes Industrial Park in Sumter County. Enviva expects the new wood pellet production plant to be the next facility in its strategic asset cluster in the Gulf region, which is expected to include other plants in Mississippi and Alabama, as well as its deep-water marine terminal in the Port of Pascagoula.

The Sumter County plant is expected to produce around 1,150,000 metric tonnes of wood pellets annually. It will initially be constructed to produce 700,000 metric tonnes per year. The company hopes to be ready to build in early 2020, subject to final investment approval. The construction should take around 15-18 months. Once built, the pellets produced at the Epes plant are expected to be transported by barge along the Tennessee-Tombigbee River to Enviva's planned marine terminal in Mississippi, where they would be exported to Europe and Asia.

"The decision by the Alabama Department of Environmental Management is not just about a new wood pellet plant in Sumter County, because Enviva is more than that," said Enviva's chairman and CEO, John Keppler. "As I have said before, we are privileged to have been invited by the people of Alabama to invest in a remarkable community like Epes.

"We have received broad support – from Governor Kay Ivey, Commerce Secretary Greg Canfield, US Congresswoman Terri Sewell, local officials like Commission Chair Marcus Campbell, and most importantly the residents of Sumter County. But we recognise this support is not simply given; it is instead something we must continue to earn, each and every day for decades to come. That is our commitment to Sumter County. More than a wood pellet plant, we will be a good neighbour and community partner you can count on for a long time to come."

The new facility will use a mix of softwood and mill residuals sourced from areas within 75 miles of the plant in Sumter County. ●

Pinnacle to build new industrial wood pellet facility in US

Pinnacle Renewable Energy, one of the world's largest producers of wood pellets, has announced plans to construct a new industrial wood pellet facility in the US. The new production facility in the southeast US, close to Pinnacle's Aliceville, Alabama plant, will produce 360,000 metric tonnes per annum (MTPA) and is expected to cost around $99 million (€89 million) to build.

Wood pellets produced at the Demopolis facility, as it will be called due to its location adjacent to an existing large sawmill in Demopolis, Alabama, will be sold through Pinnacle's contracted backlog of long-term, take-or-pay offtake contracts. Commissioning of the Demopolis facility is expected in the second quarter of 2021.

The new facility will operate under a single partnership with Pinnacle, The Westervelt Company (TWC), a diversified land resources company, and Two Rivers Lumber Company (TRL), a McElroy Enterprises company, holding a 70%, 20% and 10% interest respectively. TWC will sell a 10% interest of its currently held 30% interest in the Aliceville facility to TRL.

Under the partnership, Pinnacle will operate the Demopolis facility and manage all aspects of customer relations, marketing, sales and logistics. The plant is currently in the final stages of design and construction planning and applications for permits have already been submitted. Long-term fibre supply agreements have been completed with the majority of suppliers, including TWC and TRL.

"Building on our early success at the Aliceville facility, which is currently producing wood pellets ahead of the commissioning curve, we are pleased to be expanding our presence in the US southeast and leveraging the existing relationships and infrastructure we have established in the area," said Pinnacle CEO Rob McCurdy.

"The US southeast expansion further aligns the company with our partners and fibre suppliers and allows for flexibility to optimise fibre flow between the facilities, while further diversifying our business in the region, which will see approximately 600,000 MTPA of pellet production once fully commissioned."

Brian Luoma, president and CEO of TWC, said: "Since we began working with Pinnacle last year at the Aliceville mill, we have built a strong partnership based on our shared commitment to safety, quality, environmental responsibility and our communities.

"This new venture with Pinnacle and Two Rivers Lumber allows Westervelt to participate in a growing market while capturing the advantages of the abundant resources in this area. Whether it's industry experience, supply chain advantages or land management expertise, this partnership will benefit from the strengths of each of the companies involved."

Jay McElroy, president of TRL, added: "We are excited to partner with Pinnacle and Westervelt in the expansion of their US southeast wood pellet production. Both organisations have great reputations and success stories. This partnership accomplishes our goal to further expand our investment into wood products and build upon our businesses in the region."

WRA warns over hazardous waste wood costs

A UK wood recycling trade body is making an urgent appeal to demolition companies to take part in a wood waste sampling programme.

The Wood Recyclers' Association (WRA) is seeking waste wood samples from the demolition of buildings built before 2007 in a bid to avert a 'potential crisis' that could cost the demolition sector more than £100 million (€117 million) per year.

The WRA is appealing to demolition firms to take part in the programme, which is supported by the National Federation of Demolition Contractors (NFDC) to identify which demolition waste wood items are hazardous. Without these tests, the WRA claims the Environment Agency will assume all demolition waste wood from this period is hazardous. As a result, demolition contractors will have to provide evidence that the wood waste is non-hazardous, or pay additional fees to send the material for energy recovery in specialist incinerators.

Julia Turner, executive director at the WRA, said: "They will be required by law to carry out the testing work before they can pass material onto a skip company or wood reprocessor. Furthermore, it can be a lengthy process to get the tests done — in some cases as long as 10 days — which could result in a backlog of waste wood material piling up on sites not suitable for storage.

"If the demolition contractors don't actively engage with us now and allow the testing of these specific waste wood items to take place, it will have a catastrophic effect on the whole industry and indeed environment by increasing hazardous disposal.

"We know there is actually less hazardous material in the demolition sector based on the chemical wood treatments applied at that time, than any of us originally believed. However, if we don't prove what is hazardous now, the demolition sector will be left footing the bill to prove it themselves on a job-by-job basis.

"By far the simplest and cheapest way forward for everyone concerned is to do the testing now as part of the bigger project."

As well as arranging and paying for the tests, demolition contractors would need two skips to differentiate between non-hazardous waste wood and suspected hazardous waste wood on their sites. According to the WRA, current disposal costs for this are in excess of £250 (€294) per tonne. The organisation estimates there is potentially 400,000 tonnes of material involved in the sector.

The WRA and NFDC are appealing for companies to get in touch and take part in the sampling process, and would like to speak to major construction and demolition firms that may have relevant historical data. ●

New German micro dryer to launch in UK

A new micro dryer from Germany-based Gerdes GreenSolutions will launch in the UK this year. The micro dryer was designed for waste heat and for installations at smaller sites, such as farms with biogas production waste heat, or wood treatment plants such as sawmills. In Germany, the first of Gerdes GreenSolutions' micro dryers was installed for coffee powder drying.

Winfrid Rauch of Gerdes GreenSolutions said: "The market for little dryers is characterised by container dryers or hall-ground dryers, but dynamic dryers giving a steady hourly output are often too expensive.

"Even for little heat inputs, for example 50kW, there is an economic drying solution by a double stage micro dryer giving an output 24/7, with a capital expenditure of €30,000 ex-works.

"Such a double deck (or double stage) dryer would have an input of approximately two tonnes per day and reduce wood chips P16 from 50% to 20% relative moisture degree, or sawdust from 30% to 10%."

Gerdes GreenSolutions has patented its technology to reduce the cost of micro dryers, in which the hot air enters from the back side of each stage. Rauch said: "Working with two or three stages, the product can fall from one stage onto the next stage. The functions of such a dryer can be simplified. All electrical interfaces only need 230V plugs. Instead of a complicated electrical cabinet, the speed variation comes from a standard time switch that you would normally use as a break-in prevention device.

"The hot air and the exhaust air fans are delivered with the machine. Once the machine has arrived on site, it's just a case of 'plug and play'." ●

First dairy manure-to-RNG facility in Oregon, US celebrates opening

Canadian biofuels firm Iogen Corporation has congratulated Threemile Canyon Farms and Equilibrium for the successful opening of the only dairy manure to renewable natural gas (RNG) facility in Oregon, US.

The facility, located near Boardman in Oregon, uses manure from 33,000 dairy cows to feed an anaerobic digestion (AD) system, followed by a biogas clean-up system that injects RNG into the grid.

The RNG produced at the facility is used as a transport fuel, helping to eliminate around 130,000 tonnes of carbon dioxide emissions annually – equivalent to removing 28,000 cars from the road. According to Iogen, the $55 million (€49.4 million) project started injecting RNG into the grid in July 2019 and is already being used as a transport fuel in California.

Iogen provided the project with a structured RNG offtake agreement that helped boost project returns with risk boundaries, according to the firm. "When our farm recently converted our methane digester to produce RNG, Iogen's industry experience and long-term business relationships were pivotal to the project's success," said Marty Myers, general manager for Threemile Canyon Farms.

"This project was significant because it further demonstrates our commitment to environmental stewardship and takes our regenerative farming philosophy to the next level. Iogen's technical knowledge and expertise added considerable value to the project."

Converting waste manure into RNG is beneficial to both farmers and the environment. Utilising AD not only reduces farms' methane emissions but also produces a natural fertiliser to enrich the soil for growing organic crops. Raimund Grube of Equilibrium added: "Equilibrium's water, waste and energy investment team is pleased to be working with Threemile Canyon Farms and Iogen on this project.

"This project is one of the largest of its kind in the United States, serving a dairy that is committed to sustainable and best-in-class operations. Both Iogen and Threemile Canyon Farms are leaders in their industry with the deep experience and proven capabilities that we seek in all of our partners."

BMW and dairy farm collaborate on biogas project

Future BMW electric cars will be powered by cow manure, following a partnership with a US creamery. Straus Family Creamery, a leader in organic farming and sustainable dairy innovation in California, has collaborated with BMW Group to create low-carbon charging for BMW's electric vehicle (EV) customers in the state.

The collaboration uses a new pathway that uses biogas to create electricity to charge EVs. According to Straus Organic Dairy Farm, it's the first of its kind in the automotive industry. Through the Low Carbon Fuel Standard (LCFS) programme, they are creating renewable energy with negative carbon intensity.

"With the current climate change crisis, the relationship that we're forging with BMW is essential," said Albert Straus, founder and CEO of Straus Family Creamery. "Not only will this help farmers in rural communities, but partnerships like these are critical to help the planet."

Bernhard Kuhnt, president and CEO of BMW North America, said: "This collaboration is the first of its kind in the auto industry. It is a perfect fit for the BMW Group, which has long valued creative technologies and partnerships that can contribute to reducing greenhouse gas (GHG) emissions."

The LCFS programme helps to meet the urgent need to decrease GHG emissions in the transport and farming industries, allowing dairy farmers to access a new revenue stream while reducing emissions. The programme forms part of California's Global Warming Solutions Act (AB32) and was created to reduce carbon intensity in the transport sector by 10% by 2020.

According to Straus Family Creamery, methane digesters can cost anywhere between $500,000 (€449,000) and $2 million (€1.79 million) — a huge investment for small organic farms. However, under the LCFS programme, a dairy farm can earn from five to 10 times more revenue for selling their renewable energy credits compared to a standard power purchase agreement with a utility buyer, making it much more likely that small-scale farmers will invest. The existing operating methane digester at the Straus Organic Dairy Farm reduces methane emissions by 1,600 metric tonnes of CO_2e annually.

Adam Langton, BMW energy manager, said: "When BMW set out to make electric vehicles, we intended to make sustainability a core design element that extended beyond the vehicle itself. Now, we're making the electricity that goes into our vehicles as clean as possible while helping to support the state's farming and food system."

Plans for £150m UK bio-resources-to-fuel facility approved

Plans to build the UK's first commercial-scale bio-substitute natural gas (BioSNG) plant have been approved.

Cheshire West & Chester Council's planning committee gave the green light to the £150 million (€174.2 million) project at Peel Environmental's Protos site in Ellesmere Port, which will generate renewable gas from up to 175,000 tonnes of bio-resources, such as unrecyclable wood and refuse-derived fuel.

The plant is being developed by independent UK clean energy company Progressive Energy and will generate enough fuel to power up to 1,000 low-carbon heavy goods vehicles and buses every year. It is hoped the project will create around 300 jobs at the Protos site during construction, with 35 full-time permanent, high-skilled jobs.

Protos sits within the Energy Innovation District (EID), which brings together energy users, network owners, innovators and partners working alongside Cheshire & Warrington LEP, Cheshire West and Chester Council and the University of Chester. The EID is developing a £300 million (€348.5 million) project to create a smart local energy system to boost energy cost savings and reduce greenhouse gas emissions.

As well as being used as a transport fuel, BioSNG can be used as a replacement gas that is currently supplied to homes and businesses. It can be injected into the existing gas network, providing the opportunity for the plant at Protos to export fuel to the wider UK.

"Decarbonising the transport sector is going to be critical if we've any chance of reaching net zero emissions by 2050," said Chris Manson-Whitton of Progressive Energy. "We're still hugely reliant on fossil fuels in the sector which, together with heat, accounts for around three-quarters of UK energy consumption.

"Today's decision is a huge step forward to providing a reliable and renewable gas for transport fleets across the North West and beyond. This is just the first of many BioSNG plants that could be built across the country, helping to transform our transport sector and make a huge contribution to tackling climate change."

Jayne Hennessy of Peel Environmental added: "This is another example of how Cheshire is leading the way on the clean growth agenda. Decarbonising the region, and safeguarding the industry and jobs is going to require many innovative solutions.

"Progressive Energy's ground-breaking project will be a great fit for Protos where we're clustering together low-carbon energy generation to drive down the cost of clean energy and attract new businesses, jobs and investment."

Scottish biogas project utilising waste salmon wins environmental award

A biogas project using waste salmon in the Outer Hebrides of Scotland has won a top environmental award. The Outer Hebrides Local Energy Hub, based on the Isle of Lewis, processes waste salmon into biogas using anaerobic digestion (AD) and won the coveted Scottish Environment business VIBES award for its innovative practices.

The project is a collaboration between the local council Comhairle nan Eilean Siar, the Scottish Salmon Company, Pure Energy Centre and Community Energy Scotland. Landia provided the pasteuriser that processes the waste salmon at the plant.

Donnie Macmillan, plant manager at Stornoway's Creed Integrated Waste Management Facility, said: "This award is a huge achievement for such a strong and determined partnership that underlines our belief in seeing this progressive plant continuously improve – minimising, maximising and optimising the methods of managing waste.

"We must acknowledge the very professional team at Landia, whose equipment now enables us to integrate a seven-cubic-tonne batch per shift of waste salmon with household food waste and garden waste for our AD process. This makes a very positive environmental and economic impact by not sending the waste salmon to landfill or having it transported off the island.

"We had very challenging space restrictions and regulations to adhere to, but from beginning to end, Landia was determined to make it work – and it certainly has."

The VIBES awards, now in their 20th year, recognise Scottish businesses that showcase best practice, taking major steps to improve or reduce their impact on the environment.

Greenlane Renewables wins biogas upgrading contract in California, US

Canadian biogas firm Greenlane Renewables has won an $8.3 million (€7.4 million) biogas upgrading contract for a landfill gas to renewable natural gas (RNG) project in California, US.

The company announced that its wholly-owned subsidiary, Greenlane Biogas North America, secured the contract with the customer whose name has not yet been revealed. Engineering work will begin immediately on the project upon completion of permitting and approval of submittals by the customer, expected by early-to-mid-2020.

The new facility is expected to process 1,600 standard cubic feet per minute of landfill gas to produce roughly 97% pure biomethane, or around 360,000 MMBTU annually of clean RNG, for direct injection into the local gas distribution network owned and operated by SoCalGas. Biogas upgrading is the process of identifying and removing trace impurities from the biogas stream and carbon dioxide is separated from methane to produce pipeline-specification biomethane. Residual off-gas, a by-product of the biogas upgrading process, will be blended with natural gas to generate power for on-site facilities and processes.

Brad Douville, president and CEO of Greenlane, said: “This project is a great opportunity to showcase Greenlane’s advanced and reliable technology. Our solution is targeting 100% methane capture from the landfill site. Recovered landfill methane will be upgraded and then piped directly into SoCalGas’ natural gas grid, meeting their stringent Rule 30 gas quality standards with the residual off-gas blended with natural gas for onsite power generation. This is a real win-win for the environment and generates attractive economics.”

60% of Finnish HGV fleet owners see biogas as viable fuel option, says survey

Heavy goods vehicle (HGV) fleet owners in Finland and Sweden see an environment-focused mindset as a permanent phenomenon, according to a recent survey commissioned by Gasum. The survey results revealed customers' environmental expectations have increased in both countries, and 82% of HGV fleet owners believe this is not a passing trend.

Gasum, a Nordic energy company, commissioned Value Clinic to conduct the survey on how Finnish and Swedish heavy-duty vehicle (HGV) fleet owners view environmental issues and their thoughts on alternative fuel solutions. The results showed 60% of fleet owners that have more than 16 HGVs view biogas as a viable fuel option in Finland in the near future, and 33% of Swedish fleet owners agree. Both countries agreed that biogas is a more viable option than hybrid of electricity solutions. Fleet owners also consider liquefied natural gas (LNG) and liquefied biogas' (LBG) strengths to be fuel cost savings.

According to Gasum, the use of LNG and LBG in road transport is based on proven and reliable technology and results in significant cuts in carbon dioxide, nitrogen oxide, particulate and noise emissions. Jukka Metsälä, vice-president of traffic at Gasum, said: "I'm very happy that already today the large-fleet owners of Finland and Sweden see the benefits of LNG and LBG in road transport.

"If a company with 16 HGVs switched from conventional fuels to gas, this would mean significant reductions in greenhouse gas emissions as the annual emissions of one HGV are equal to those of 40-50 passenger cars.

"I strongly recommend that also small-fleet owners consider making the switch. This would be a great solution for hauling companies to stand out in a highly competitive logistics market."

The survey showed that nearly 60% of Finnish and 82% of Swedish respondents believe that some of their HGVs will be using low-emission fuel within five years. "Our observations align with the fleet owners': there's increasing demand for environmentally-friendly solutions in heavy transportation," added Jani Arala, senior manager of sales in traffic at Gasum. "It's also clear from the results that this will not change soon, as only 18% believe that caring about the environment is a temporary phenomenon."

The European Union has set ambitious emission targets for HGVs, outlining that emissions of new HGVs must be reduced by 15% by 2025 and by 30% by 2030, compared to 2019. To support this goal, Gasum is expanding the gas filling station network in the Nordics. The survey asked fleet owners about the key factors that influence their choice of fuel partners. Both Finnish and Swedish respondents agreed the three most important factors are competitive pricing, ease of use and a comprehensive refuelling station network.

Gasum is aiming to build around 20 filling stations for HGVs in Sweden and Finland by the end of 2019 and to build 50 new filling stations in the Nordics by the early 2020s. The firm currently has a network of around 40 gas filling stations in the two countries, of which 11 LNG and LBG stations also serve the long-haul HGV sector. Other operators are also expanding in Europe. According to the Natural & Biogas Vehicle Association (NGVA Europe), there are now approximately 218 HGV filling stations in operation and around 6,000 LNG trucks across Europe.

Image credit: Gasum

Flat-pack AD kits to help tackle India's air pollution crisis

QUBE Renewables, a company that creates flat-pack anaerobic digestion (AD) kits, is using its technology to tackle India's air quality crisis.

The company is installing 50 QUBEs (AD kits) in the paddy fields of the Punjab region to help deal with the growing air pollution problem. Crop burning in the region is estimated to make a 40% contribution to Delhi's pollution levels, and an estimated 150 tonnes of rotting rice straw releases around 16 tonnes of methane. According to the firm, using its AD technology, farmers in the area will be able to turn their leftover crop stubble into electricity or fuel for cooking and transport. QUBE is working in partnership with Haryana Agricultural University on the project.

QUBE is a self-assembled kit that converts biodegradable waste into energy for heat, power and sanitation. Due to its flexible, fabric design, the QUBE can be used almost anywhere in a warm climate and with almost any type of biodegradable waste. According to the company, every year, India's rice farmers burn their crop stubble, contributing to seasonal smog that can drastically affect the health of civilians. Now, using QUBE Renewables' technology, farmers will be able to turn 150 tonnes of stubble into 50,000m^3 of biogas – equivalent to 584,000 hours of cooking on a 1.5kW biogas stove.

Joanna Clayton, co-founder of QUBE Renewables, said: "We're very proud to be involved in helping tackle literally one of the most burning issues in India. QUBE Renewables can play an important role in improving Delhi's air quality, whilst also helping to solve a related issue that gets talked about far less.

"Cooking with solid fuels is one of the five biggest killers in developing countries; by using the cooking fuel that QUBE can produce, we can help improve people in the region's health, productivity and quality of life."

A QUBE can be built and begin operations in less than two weeks. As well as fuel, QUBE also creates a fertiliser, enabling waste rice straw to be used to help grow the next crop. Professor K P Singh, vice-chancellor of Haryana Agricultural University, said: "Haryana Agricultural University is delighted to be working with QUBE Renewables on the installation of dry digesters for rice straw processing.

"Burning rice straw is a major environmental problem, and we look forward to rolling out this innovative, low-cost solution to help mitigate rice stubble burning in the future, and make useful biogas for cooking and power production in rural areas."

New biogas tax credits to boost industry growth, says ABC

Two new biogas tax credits are set to boost growth in the sector, according to the American Biogas Council (ABC). The credits can be used for projects that will be developed in 2020 or started operations during the last two years when these credits were expired. The ABC says the announcement marks a "major step forward" for the biogas industry, which has been at a "significant competitive disadvantage" due to inequities in the US tax code.

The tax extenders package signed into US law on 20 December 2019 included tax provisions extending the Section 45 Production Tax Credit for renewable electricity and the alternative fuel excise tax credit for biogas projects that provide vehicle fuel. The tax credits had been expired since 31 December 2017; the extension had been long sought after by the ABC. According to the organisation, the passage of this legislation puts biogas on par with several other renewable energy technologies that have benefited from longer-term tax credits in 2015 and 2018.

Patrick Serfass, executive director of the ABC, said: "Our members will tell you it's been a tough several years trying to finance many biogas projects while we compete with unfair advantages given to the fossil fuel industry as well as our sister renewable industries.

"For now, the biogas industry is on much more level footing. Our members are already developing the next biogas projects that will recycle organic material into renewable energy and soil products while creating new jobs and investment."

Biogas industry leaders form global partnership to boost production

Biogas industry leaders have formed a global partnership to provide "state-of-the-art, turnkey technology solutions" for turning organic waste into renewable energy and organic fertilisers.

The Integrated Biogas Alliance (IBA) will be one of the largest global partnerships of its kind. Its founding members include AB Energy (Italy), Greenlane Renewables (Canada), Eisenmann Corporation (US), Entsorga (Italy) and Tietjen (Germany). The companies have joined forces to provide the biogas industry with a 'fully-integrated' organic waste to energy platform solution.

According to a statement by the World Biogas Association, the platform solution will lower risks facing developers, investors and EPCs in developing biogas plants, lowering project execution risks and improving their 'bankability'. With its global footprint, reach and supply chain, the IBA has the potential to process almost any organic waste, including agricultural, food and green waste, to generate renewable energy and create organic fertiliser.

"The IBA partnership brings together industry leaders with proven technologies who recognise the need for an integrated platform solution approach to advancing the deployment of biogas plants around the world," said Christopher Maloney, the newly-elected president of the IBA.

"All our partners have long outstanding reputations for quality delivery, execution excellence and customer satisfaction and we are thrilled to be joining forces with such a world-class group of companies.

"The market is definitely pulling us towards providing customers with a total solution, where they can more easily optimise the full economic, agronomic and environmental value chain of products from the plant, driving stronger ROI, enabling more circular economy benefits while reducing project implementation and financing risk.

"We are also excited to bring our combined expertise to support the industry in lowering greenhouse gas emissions, something the IBA is passionate about."

Plant update – Europe

Biogen

Location:	Somerset, UK
Date:	November 2019
Development:	Acquisition
Alternative fuel:	Biogas
Feedstock:	Food waste
Details:	Biogen, a leading owner and operator of anaerobic digestion (AD) plants in the UK, has acquired an operational AD plant in Weston-super-Mare, UK, from Enovert. The 1.1MW facility will be integrated into Biogen - independent infrastructure investment firm Ancala's UK AD platform. The facility is an important component of a broader waste management and food recycling programme within the region of Somerset, UK, according to Biogen, with discarded food waste collected from the local area alongside waste from local businesses. Methane gas is then produced and converted through a combined heat and power engine that generates enough electricity to power around 2,000 homes.

E.ON

Location:	Germany
Date:	November 2019
Development:	Construction
Alternative fuel:	Biomass
Feedstock:	Residual wood
Details:	E.ON has unveiled plans to invest around €110 million to install a biomass power plant at a paper mill facility in Germany. The plant will have an electrical output of 20MW and a thermal firing capacity of 87MW, as well as supplying heat to UPM's Hürth paper mill and helping to reduce its carbon footprint. The facility will also feed renewable energy into the grid.

Gasum

Location:	Sweden
Date:	January 2020
Development:	Construction
Alternative fuel:	Biogas
Feedstock:	Manure
Details:	Finnish gas company Gasum has received investment grants for the construction of a new biogas plant and four gas refuelling stations for heavy-duty vehicles. The grant of SEK 158 million (€15 million) for the new biogas plant was provided by the Swedish Climate Leap initiative, Klimatklivet. The new biogas plant is currently under construction in Götene and will utilise manure as a feedstock to generate liquefied biogas. Biofertilisers generated at the plant will be certified as organic.

Foresight Group

Location:	Norfolk, UK
Date:	January 2020
Development:	Acquisition
Alternative fuel:	Biogas
Feedstock:	Agricultural
Details:	Foresight Group has acquired a 2.5MW anaerobic digestion (AD) plant in Norfolk, UK. The plant processes around 40,000 tonnes of agricultural feedstock annually to produce power for sale to the grid. The facility also benefits from the associated Feed-in Tariff income, as well as Renewable Heat Incentive revenue from on-site waste heat utilisation. Foresight has achieved a market-leading position in the AD sector, having established a portfolio of 40 greenfield and operational AD plants across the UK and Europe.

*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

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Bioenergy Insight asked industry experts for their thoughts on the progress of biomass and biogas, and their predictions for the sector in 2020

THE FUTURE OF BIOENERGY IN 2020

Cristina Calderon, Bioenergy Europe

Cristina Calderon
market intelligence director at Bioenergy Europe

"Climate change is a big challenge that we must face, and the energy system is key to mitigate the consequences. The transition to a low carbon economy and towards a clean energy system is a crucial task that can result in the creation of new green jobs and opportunities in Europe.

In a future net-zero carbon economy where the energy system would be reliant exclusively on renewable energy, Bioenergy Europe calculates that bioenergy could represent 50% of the final energy consumption in 2050 in Europe. This ambitious projection is derived from the result of a review of the most important studies on the biomass potential, which demonstrate that an average value around 406 million tonnes equivalent (Mtoe) of sustainable biomass could be available in Europe. This availability, together with the right policy measures towards reduction of the energy demand and increasing energy efficiency, could make biomass the most important energy source in Europe by 2050. This scenario will also allow almost one billion tonnes of carbon dioxide (CO_2) to be saved through the replacement of fossil fuels.

Even if those projections sound over-optimistic, looking at the past trajectory this is absolutely feasible. Bioenergy consumption has increased remarkably since 2000, growing from 55.6 Mtoe at the turn of the century to 119 Mtoe in 2017, thus being a major contributor to the delivery of 2020 renewable energy targets. Biomass is currently the most important renewable energy source and contributed 10% to the final energy consumption in Europe as of the end of 2017, providing more than half of all renewable energy consumption.

On this aspect, the role of European bioenergy industry may be fundamental to phase out fossil fuels, since the European Union (EU) is at the cutting edge of biomass technology and the leader on exports.

Bioenergy Europe estimates that about 50,000 businesses related to bioenergy are based in the EU, making bioenergy the most important indigenous source of energy, both in terms of energy supply (less than 5% of fuel imports) and industry coverage. Seven out of 10 companies involved in the global bioenergy supply (such as pelletisers, solid fuel preparation equipment, boilers/stoves producers, etc.) have their headquarters in Europe. Bioenergy technology and experience in Europe is the most advanced in the world and can play an important role in the energy transition by decarbonising the energy system of countries both in Europe and beyond. Besides, employment in the bioenergy sector exceeded that in other renewable energy technologies due to the additional element of local feedstock production, supply, handling and logistics. Bioenergy is the largest renewable energy source in terms of direct and indirect employment, accounting for 703,200 jobs in the solid biomass, biofuels, biogas and renewable municipal waste sectors. Its turnover represented €60.6 billion in the EU-28 in 2017. Those are additional benefits that are sometimes underestimated, but offer a valuable opportunity for European economic growth and job creation.

"Biomass is currently the most important renewable energy source and contributed 10% to the final energy consumption in Europe as of the end of 2017"

Angela Sainz, European Biogas Association

Angela Sainz
communications and community manager at the European Biogas Association

> Europe is determined to tackle the challenges of climate change.

Before the end of 2019, the European Commission revealed the details of the Green Deal that will make the European Union (EU) climate-neutral by 2050. This proposal is not just aimed at reducing greenhouse gas emissions; it will also set out measures to protect biodiversity, reduce air and soil pollution, reform the agricultural policy from an environmental perspective and advance the circular economy. Those measures shall be supported by a revitalised industry that can deliver new green jobs. The current context is a major opportunity for releasing the potential of renewable gases.

There is a promising future for the upgraded form of biogas, biomethane. The production of this renewable gas will reach around 100 billion cubic metres (bcm) in the EU by 2050, equivalent to 1,200 TWh)[1]. Realising this full potential will require a significant acceleration of renewable gas deployment at competitive cost. Energy prices should reflect all climate and environment externalities, including, amongst others, contributions to the reduction of CO_2 and air pollutants, protection of biodiversity and creation of green jobs. Renewable gases can, for instance, lead to a carbon-negative Europe and create 600,000-850,000 additional direct jobs and 1.1-1.5 million indirect jobs by 2050[2].

In this context, ensuring the development of renewable gases is underpinned by a consistent investment strategy becomes crucial. The European Investment Bank has initiated a transition to become a 'climate bank' and stop financial support for fossil fuels, including natural gas, from 2021. The upper limit for financing renewable energy projects was increased from 50% to 75%. In the course of this year, we will see how the new rules support renewable gases and what the transition arrangement is for the phase out of natural gas projects.

The next developments will also depend on the national context. There are different actions that can inspire the transition of the coming months and years. Countries like Germany with its 'Gas 2030 dialogue process' are already positioning themselves on the future of gas foreseeing a bigger role for hydrogen and biomethane. Some countries might follow the example of France and set a specific target for renewable gas. The number of biomethane plants in France has recently grown, and in early December, 115 biomethane units were in operation. Others might look to Italy or Denmark, which are making significant progress on biomethane deployment. In the transport sector, Nordic countries in particular are making considerable efforts to increase the use of biomethane. Finland has recently hit a milestone of 10,000 gas vehicles and has set a national target of 50,000 gas vehicles by 2030.

The decarbonisation of the transport sector will indeed be crucial for the renewable gas industry in 2020. The new European Commission will revise the Directive on Alternative Fuels Infrastructure, adding binding objectives to introduce a sufficient number of filling stations for alternative fuels like bio-CNG and bio-LNG. The facts about bio-CNG's low greenhouse gas emissions and positive climate effects are receiving increasing scientific support. A recent study compared the carbon footprint of the entire lifecycle of compressed natural gas and biomethane vehicles to that of diesel, gasoline and electric vehicles and concluded that biomethane is the best transportation option to preserve air quality[3].

Biogas will benefit from the development of circular economy strategies, which will remain a key priority for the EU Executive in 2020. The approval of the Fertilisers Regulation in 2019 was warmly welcomed by the industry, as it opened the door to the commercialisation of organic fertilisers. In the coming months, the European Commission is expected to present a new action plan for the circular economy that identifies targets, tools and indicators for the food sector, which should contribute to reducing greenhouse gas emissions, loss of biodiversity and land degradation.

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Philip Fjeld, CNG Fuels

Philip Fjeld
CEO of CNG Fuels

The UK has a thriving biomethane-to-grid sector, with more than 100 anaerobic digestion (AD) projects currently injecting biomethane into the UK pipeline grid. As the UK biomethane-to-grid industry continues to mature, the sector is starting to attract large institutional investors that are accelerating the consolidation rate in an industry that has so far been characterised by relatively small AD plants with fragmented ownership structures.

The Renewable Heat Incentive (RHI) subsidy has been instrumental in underpinning the growth of the UK biomethane-to-grid sector. With the RHI expiring in 2021, new biomethane-to-grid projects are looking for alternative markets to supply and the transport sector is now becoming an increasingly attractive market.

The Renewable Transport Fuel Obligation (RTFO) is the Department for Transport's main policy for decarbonising transport, incentivising and regulating the supply of biofuels to the UK transport sector. The RTFO is a market based regulation that has been in place since 2008 and was recently extended to 2032. The RTFO has been dominated by liquid biofuels such as biodiesel and bioethanol, with biomethane so far only making up a small part of the total RTFO volume. With rapidly growing biomethane demand from the heavy-goods vehicle (HGV) sector, there is an attractive opportunity for UK biomethane-to-grid projects to now supply the transport industry.

Specific RTFO criteria means that any biomethane supplied to the transport sector must be produced from a 100% waste feedstock. This is different to what is currently permitted under the RHI, where agricultural crops are also permitted as feedstocks.

> "As the largest buyer of RTFO- approved biomethane, CNG Fuels is seeing a noticeable change in feedstock sourcing strategy from new AD projects"

As the largest buyer of RTFO-approved biomethane, CNG Fuels is seeing a noticeable change in feedstock sourcing strategy from new AD projects, where the 100% waste feedstock criteria under the RTFO is resulting in new biomethane-to-grid projects developing feedstock sourcing strategies based solely around wastes such as food waste and manure.

Biomethane fuel produced from manure offers emissions savings of more than 100% compared to running on fossil diesel, meaning bio-CNG from manure is a 'carbon negative fuel' and thereby provides significantly greater CO_2 equivalent savings per mile for the HGV sector compared to what can be achieved by running on biodiesel.

In summary, 2020 is lining up to become a year of transformation for the UK biomethane-to-grid sector. The RHI is coming to an end in 2021, meaning new AD projects will be looking to supply the UK transport sector, where HGVs urgently need to be decarbonised and demand for biomethane fuel as a vehicle fuel is growing exponentially. The UK agricultural sector also needs to reduce greenhouse gas emissions. By producing biomethane fuel from a feedstock such as manure, two hard-to-decarbonise sectors of the UK economy can reduce emissions and support continued growth of the UK bioenergy industry.

Richard Coulson, Wood Recyclers' Association

Richard Coulson
deputy chair of the Wood Recyclers' Association

The growth of the waste wood biomass sector in the UK has been remarkable over the past decade, and the next looks set to be even more so.

Waste wood biomass is a relatively new fuel in the UK, with the first waste wood derived biomass boiler – Wilton 10 – being commissioned by Sembcorp Utilities near Middlesbrough in 2007. Since then, there has been unprecedented expansion. Biomass is now the biggest single user of waste wood in the UK, doubling its usage since 2016 to 2.1 million tonnes in 2018. This is a direct result of the number of new large-scale biomass plants that have come on stream.

There are around 30 large-scale plants in total planned for the UK. So what does this mean for our waste wood market? The Wood Recyclers Association' (WRA) believes 2020 will be the busiest year ever for the whole supply chain, from front-end producers to back-end users.

As I write this piece at the end of 2019, the UK waste wood supply chain is waiting for a further one million tonnes (approximately) of extra demand from new biomass plants to commission and realise normal operations. When all are operational, we believe it will make our market balanced, if not short of raw material. The supply of raw material may not be sufficient to meet total demand. Furthermore, given our industry is seasonal and winter sees increased demand and decreased supply, we are predicting the winter of 2020/21 will in reality be difficult.

Imports and exports

Over the past two years we have witnessed a dramatic drop in biomass exports from the UK to mainland Europe, with a decrease from 600,000 tonnes to just 300,000 tonnes last year. I would predict a further decrease will be seen this year when the WRA gathers its members' statistics in early 2020.

In contrast, the last quarter of 2019 has seen some end users begin trialling imports of waste wood biomass from mainland Europe in a bid to secure supply should the UK suffer a shortage. After all, although the supply chains for the new plants are all confirmed, we have to recognise that commissioning of these plants takes a long time, so when they do all commission, there will be pressure on the suppliers to move quickly to keep up with demand. So could it be that by 2021 the UK has become a net importer of waste wood? The WRA predicts that could be the case.

In addition, simple economics will no doubt mean production prices will increase for waste wood biomass fuel, and end users will be looking to get the best value for money while ensuring they have sufficient product guaranteed. In this instance, some plants currently under development could potentially switch to utilise alternative fuels instead or at least take a percentage of their fuel mix in alternative fuels. Many of the new biomass plants will have warranties in place to restrict types of fuel to be consumed in the early stages of running, but that doesn't stop them completing their research on alternative fuels now for consideration in the future, should it be required. This could help if there is a shortage of waste wood and take the pressure off the UK's waste wood market.

The one point that is worth applauding in all of this is the recognition that our market has developed sufficiently to ensure that we will hopefully realise our full potential of waste wood recovery in the UK and therefore landfill avoidance. That is fantastic news all round.

David Newman, World Biogas Association

David Newman

president of the World Biogas Association

The world is changing at an extraordinary pace in both a positive and negative way. Our ability to keep up with the news, new technologies and politics can leave us drained at times.

Al Gore, in his electrifying speech to the C40 World Mayors Summit in Copenhagen last October, drove home the message on the existential threat of climate change to our way of life. We have the money, the technologies, the urgent need to decarbonise, but not yet the political will. He asked: "Are we such moral cowards that we will leave our planet uninhabitable for our grandchildren? Are we willing to risk that?" The answer from COP25 in Madrid was equivocal — yes, some countries are willing to risk that. It was a disappointing outcome to say the least.

But the biogas industry, ahead of the COP25 meeting in Madrid, answered loud and clear — no! In a Biogas and Climate Change Declaration, the World Biogas Association (WBA) and major players committed to mobilising an enormous amount of finance — some $5 trillion (€4.47 trillion) — to build over one million new industrial biogas plants over the next decade. The objective is to develop the capability to reduce global greenhouse gas (GHG) emissions by at least 12% by 2030.

Our industry has grown by over 90% between 2010 and 2017, and the climate emergency is focussing minds to invest further into developing its infrastructure to decarbonise the economy across multiple sectors. The latest WBA report, the 'Global Potential of Biogas', estimates that currently just 2% of the potential waste and other feedstocks available to make renewable heat, electricity and fertilisers are harvested. This means that there is an untapped volume of 98% of organic wastes worldwide that could be turned into biogas in the future.

At a meeting in Morocco in November, the Minister of Energy Aziz Shabbah told us that 42% of the country is already on renewable electricity, thanks to solar and wind plants, but there are no plans yet for harvesting food, animal and human waste — all of which is dumped and produces uncontrolled methane emissions. This is just one example of how countries have so far ignored the potential of biogas. In 2020, with the help of WBA, they will start that planning to use that feedstock.

While the biogas sector is willing to invest in developing the infrastructure that countries such as Morocco require, it needs world governments to enable those investments — ensuring that feedstocks are collected rather than dumped; that open landfilling is gradually made more difficult; that access to the electricity and gas networks is allowed; that the subsidies used to lower the price of oil, coal and gas are gradually moved to promote renewable clean energy. Morocco, for example, subsidises the use of bottled liquefied petroleum gas to the tune of $500 million (€447 million) a year. By giving these suppliers a target to include renewable gas in their mix, a demand for biomethane could be created.

The deadline for world governments to submit their Nationally Determined Contributions towards achieving the Paris Agreement is less than a year away. WBA is working hard to ensure that the biogas industry is integrated into those submissions as a significant contributor to reducing GHG emissions and developing a sustainable, low-carbon circular economy. Biogas is a ready-to-use technology that cuts emissions in the hardest-to-decarbonise sectors, such as agriculture, heat and transport, and the next decade will be crucial for the sector's growth and for our responses to global warming.

The question of pricing is one that the entire renewables sector (both energies and materials) faces. The inherent policy contradiction of subsidising the production of fossil-based materials (for example, plastics) and fuels (coal, oil and eventually natural gas) with taxpayers' money at a time when climate change is worsening is no longer sustainable.

At COP25 in Madrid, 2020 has been described as the year when the talk must stop and real, urgent action needs to be taken. Biogas technologies have matured significantly over the last decade and unit costs are expected to go down by as much as 50% by 2030, as processes are industrialised, the biology is better understood, and the building of plants is systemised. As we compete with heavily subsidised industries, our message to the politicians is simple: if you want to combat climate change, stop financing industries that cause it and invest in alternatives such as biogas.

If not, how will you tell your children and grandchildren that indeed you were a moral coward?

Benedikt Von Butler, Enviva

Benedikt Von Butler
Germany general manager, Enviva

My sister manages a small forest in Northern Bavaria, Germany. Like hundreds of small forest owners in the region, she is also struggling to cope with the devastating impact the bark beetle had on forest operations this year[1]. She is lucky, she says, that she is just breaking even and not making a loss. Some forest owners even offer their affected wood for free — as long as the off-taker pays for removal and transport.

Given the circumstances, my sister is considering replacing her old oil heating with a wood chip fired boiler. This led to the following discussion: would the use of otherwise unutilised biomass for energy be good or bad for the environment, given that the burning of biomass also releases carbon dioxide (CO_2) and the forests take time to regrow?

First, we agreed that selling high-value tree stems is the main reason commercial forestry exists — as opposed to national parks or protected areas operating under an entirely different business model and for a different purpose. Trees need to be sold to provide income and jobs. Furthermore, every commercially valuable tree generates ancillary wood fibre of much lesser value: forests are thinned out regularly, there are unused branches and tree tops, and ultimately there is sawdust and bark, once the trees hit the saw mills.

In my sister's case, most thinnings, branches and low-value material remain in the forest where it will naturally decay and release CO_2. She admitted that she would of course prefer to sell it, but that there isn't a market for the small stuff. Larger commercial operations, however, use this inferior material for pulp or energy, thus increasing the economic efficiency of each tree[2]. Whichever way, it's probably fair to say that much of the low-value wood fibre resulting from traditional harvests would be burned, landfilled or left in the forest, thus eventually releasing the stored CO_2 in the short to mid-term.

If one cannot avoid the occurrence of low-value biomass, nor the release of CO_2 from it, wouldn't it make sense to at least use it as a substitute for fossil fuels, thus only emitting CO_2 once, instead of twice? Biomass is able to substitute some of the fossil fuel, whereby fossil fuels can't avoid emissions from biomass leftovers. This substitution effect would probably reduce CO_2 emissions at the landscape scale, regardless of the speed of reforestation. We also know, however, that at the landscape scale, harvest, growth and regeneration are constantly occurring, so that when one area is harvested, multiple others are providing new growth elsewhere on the landscape.

To what extent could the same principle be applied on a larger scale? How much otherwise unused annual wood residue would be available globally that could be used to displace fossil fuels? Of course, steps would need to be taken to prevent demand for bioenergy leading to net forest destruction, loss of biodiversity and other detrimental effects. However, if detrimental effects can credibly be prevented by using adequate certification and monitoring systems, wouldn't it make sense to use otherwise unused biomass to substitute fossil fuels?

My company, Enviva — a large US-based wood pellet producer — for example, goes to great lengths to make sure we only purchase low-value wood that would naturally be available as part of a harvest, and that Enviva's purchases don't create a perverse incentive to cut more trees[3].

It's important to point out that healthy markets for forest products lead to investments in forestry, resulting in landowners growing more trees instead of converting to another land use.

I am convinced that globally available, otherwise low-value wood material from sustainably managed forests can today contribute to the energy transition[4], especially when it comes to decarbonising heat and power. All else being equal and subject to adequate environmental certification, monitoring and sustainable procurement practices, it is important to replace coal with bioenergy now. As the saying goes: "Don't let perfect be the enemy of the good."

We must use all tools in the toolbox in order to have a chance of reaching our climate targets.

The bottom line is, forest operations inherently generate low-value biomass that has no alternative market — we should make use of it to displace fossil fuels. At least my sister's oil heating will soon be gone.

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Dr Rebecca Heaton, Drax Group

Dr Rebecca Heaton
head of climate change at Drax Group

2020 is going to be a busy year for us as we strive to achieve our ambition to become a carbon negative company within a decade — an ambition that has sustainable biomass at its core.

In December, we became the first company in the world to announce an ambition to be carbon negative by 2030. Our CEO Will Gardiner made the announcement at the UN climate conference in Madrid, Spain.

Being carbon negative means Drax will remove more carbon dioxide (CO_2) from the atmosphere than we produce, creating a negative carbon footprint for the company — and we will do that by applying carbon capture and storage technology to our biomass power generation. We believe this is achievable if we have an effective negative emissions policy and investment framework, which the UK Government is developing as part of its global leadership in addressing the climate crisis.

This ambition builds on the successes achieved in 2019. Our bioenergy with carbon capture and storage (BECCS) pilot project became the first in the world to capture CO_2 from a 100% biomass feedstock. We also announced our new biomass sustainability policy and launched an independent advisory board — these are solid foundations for our future plans.

The policy helps to further improve and strengthen our high sustainability standards and the independent board of scientists will keep us at the forefront of the latest scientific thinking on biomass sourcing.

There's widespread recognition that sustainable biomass can play an important role in meeting climate targets — both in producing renewable electricity and as a route to negative emissions. The IPCC and the Committee on Climate Change agree that BECCS is critical to achieving net zero by 2050.

As the largest user of sustainable biomass for energy, we believe it's important that we continue to lead by example by improving and strengthening biomass sustainability. We already abide by a robust regulatory framework in the UK and the European Union. But we wanted to go further than existing legislation and requirements — beyond the audits and paper trails — to ensure we're choosing the right feedstocks in the first place. This is especially important for us as we increase our biomass self-supply to 5 million tonnes a year from 1.5 million tonnes currently, while also reducing the cost of our biomass generation by about 30% to around £50 (€59) per megawatt-hour.

The biomass sustainability policy we published in October draws on recommendations made by Forest Research, the research agency of the Forestry Commission, in a report commissioned by the European Climate Foundation. Our policy has four parts to it. First, we commit to only using feedstocks that the science says delivers climate benefits. So that means we won't use biomass that drives harvesting decisions that would adversely affect the long-term potential of forests to store carbon. Second, we made it clear we will protect the natural environment — for example, by not causing deforestation. Third, we will support people and communities and lastly, we made a commitment to carry out research, outreach and intervention, which includes active engagement with the communities where we operate, as well as non-governmental organisations (NGOs).

The six-member advisory board we set up is chaired by the UK Government's former chief scientific adviser Sir John Beddington. It will help us to keep our sourcing guidelines under constant review so they can evolve as the science develops. We expect the board to challenge us every step of the way. We believe it is right that companies using biomass go beyond existing regulations to ensure that the biomass used makes a positive contribution to our climate and the environment. The board will produce a report for Drax of its conclusions and recommendations after each meeting. We will publish summaries of the board's findings and our response on our website.

A big part of our drive on biomass sustainability includes increasing transparency on our biomass sourcing and its impacts. We will provide that evidence by using big data and satellite images to evaluate the impact on forest cover, forest carbon and biodiversity in areas that supply Drax's pellet mills.

In December, we published the first in a series of reports evaluating the environmental and economic impacts on the areas Drax sources wood from. Hood Consulting's analysis highlighted the positive role the Amite Bioenergy pellet plant has had in Mississippi, US, supporting the health of the region's forests and its economy.

> "Bioenergy with carbon capture and storage is the big prize that will enable a zero-carbon, lower cost energy future"

Alongside increased transparency, we are also working with non-profit groups and NGOs, including Earthworm Foundation and biodiversity-focused group NatureServe, to understand the social and economic impacts and benefits where we source. In 2020, we will be broadening our work with Earthworm on our healthy forest landscapes programme. We will also expand the pilot that evaluates the impact on forest cover and biodiversity to more sites and publish findings from our initial work.

Ensuring the sustainability of the biomass we use is vital if we are to move to the next stage and deliver negative emissions using carbon capture and storage with bioenergy, while continuing to supply dispatchable, renewable power to the UK grid. Bioenergy with carbon capture and storage is the big prize that will enable a zero-carbon, lower cost energy future, helping to deliver for the environment and economies.

Shawn Kreloff, Bioenergy DevCo

Shawn Kreloff
founder and CEO of Bioenergy DevCo

Over the past year, the US has continued to face extraordinary challenges around municipal waste management. In turn, cities and towns across the country — from New York to San Francisco, Seattle to Miami — have announced ambitious new zero-waste goals, demonstrating the nation's growing appetite to reduce its mounting rubbish load. No longer able to rely on pollutant-heavy incinerators and overstuffed landfills, large-scale waste generators and collectors are finally turning towards environmentally-sound solutions like anaerobic digestion (AD) to meet long-term waste objectives.

Breaking down biodegradable material naturally using microorganisms in the absence of oxygen, AD technology simultaneously processes discarded organic material while generating truly renewable natural gas — a non-fossil fuel source of utility-grade energy that can be used to create industrial-scale heating solutions, fuel for vehicles, and electricity for homes and business. Despite their longstanding presence across the European Union, most AD facilities in the US are either agriculturally-centred or are still in the early stages of development. For example, Bioenergy DevCo's recently announced AD projects in Maryland and Delaware, once complete, will serve as two of the nation's first processing plants capable of yielding a consistent source of 'behind-the-meter' carbon-negative renewable energy from organic waste, as well as protect the local watershed and Chesapeake Bay from industry-related runoff.

With that said, overburdened waste producers are beginning to catch on. Just as our company has grown rapidly, so too has the challenge of organic waste disposal — a challenge that can only be resolved through land use best practices and effective reuse, recycling and repurposing of resources. Now, the latest advancements in agricultural technology can be brought to bear on an age-old process to not only protect the family farm, but manage wastewater to limit pollution, and provide the food processing industry with an alternative that is healthy for the planet.

In 2019, the US Environmental Protection Agency (EPA) estimated that anaerobic digesters operational in the US are capable of supplying enough energy to power nearly 80,000 homes for a full year. In addition, countless businesses across agriculture and food production — as well as convention centres, cruise lines, athletic stadiums, and more — have already begun exploring (and, in some cases, utilising) AD technology and its resulting fuel products. As such, interest in this technology will only continue to expand in the next year. The EPA recently noted that an additional 8,100 US dairy and swine farms, for instance, could support biogas recovery systems and deliver heat to an additional 2.7 million homes.

In 2020, AD is poised to become a double-barrelled solution for cities and corporations seeking to tackle the climate crisis and achieve zero-waste targets. Reprocessing discarded organic materials alongside composters and other waste diversion programmes, Bioenergy DevCo's facilities transform these unusable scraps (e.g. foods, fats, grease and litter) into digestate — an odourless topsoil amendment that can (1) help naturally replenish nutrients for growing crops by creating healthy soils, and (2) prevent storm water erosion on highways, landscapes, schools, and much more. In tandem, AD serves as a meaningful alternative to solar and wind generation, resulting in a renewable fuel product that can be injected directly into existing gas pipelines that serve the electrical grid. Together, wind, solar and renewable natural gas from AD represent the triumvirate of natural solutions capable of combating climate change and driving the economy forward.

And don't forget, AD strongly supports private sector development. At scale, the creation of renewable natural gas through repurposed waste is incredibly valuable to how businesses and communities operate, allowing everyone to steadily transition away from fossil fuels through energy self-reliance. The technology's digestate bi-product even sequesters carbon into soil, rendering the entire process carbon negative. Beyond Bioenergy DevCo's work to advance AD throughout the US, truly renewable natural gas will inevitably have a strong impact on the nation's energy future in the coming years, paving the way for resilient, zero-waste businesses, campuses and communities to accomplish shared goals around environmental protection.

Bioenergy Insight visited a food waste recycling facility in London, UK, to find out what can be achieved using anaerobic digestion

Visiting a food waste recycling plant

by Dawn Stephens-Borg

Built in 2017, ReFood's plant in Dagenham, London is the newest and largest of its UK facilities. The company, which specialises in food waste recycling, has two other facilities in Doncaster and Widnes. *Bioenergy Insight* was invited to see the new facility and learn more about the many ways our food waste can be utilised as part of a circular economy.

On arrival, the most noticeable thing is surprisingly not the smell (you wouldn't know it was an anaerobic digestion (AD) facility from the perimeter) but the cleanliness. The site is neat and orderly, with no sign of ugly residues. I was greeted by Philip Simpson, commercial director at ReFood. He tells me that the facility was built in the Sustainable Industrial Park on a regeneration site, at a cost of £32 million (€37.3 million). The Dagenham facility converts commercial food waste into natural gas, which is injected into the grid. The remaining digestate is turned into a biofertiliser called ReGrow, which helps to fertilise crops at local farms. The crop is harvested, used by local food producers and the resulting produce is supplied to a school. The resulting food waste is then returned to ReFood and the process starts all over again. All food waste is collected within a 50-mile radius and the resulting gas and digestate is supplied to farmers within the same radius. It doesn't get more circular than that — or so I thought. Simpson told me that there are plans for a biofuels venture in the pipeline, which would be used as fuel for the ReFood food collection truck fleet.

Katie Woodward, managing editor at Woodcote Media and Philip Simpson, commercial director at ReFood

The ins and outs

ReFood's process is fairly straightforward; the firm collects 25,000 bins of commercial food waste per month using its fleet of 40 vehicles (though Simpson estimates the plant is accepting on average 500-600 bins extra per month). Once the waste arrives at the facility, it is separated. Meat and bone is sorted to ensure no contaminates such as microplastics remain in the mix, and the resulting product is used in pet food. The other food waste is processed to ensure no contaminates remain, before being transported to the on-site AD tanks.

ReFood trucks on-site

Each tank at the site has the capacity to hold 3,600 tonnes of food waste. It's in those tanks that, as Simpson puts it, "the party happens". Bacteria are exposed to warmth where they are allowed to breed and grow. The whole process takes around one month; the mixture is then pumped into storage where the gas is pumped out. The resulting gas from the process comes out as 60% methane and the remaining 40% carbon dioxide (CO_2). In the next stage, all volatile organic compounds and CO_2 is stripped from the gas in liquid form.

The Dagenham facility recently suffered a tank defect, which was only discovered 18 months into the cycle. At the time of our meeting in August, repair work had already taken seven months. We are told correcting the issue means almost an entire rebuild of the tank, but Simpson is adamant that operations haven't been affected, adding: "You learn from it. It's all part of the fun!"

Why ReFood?

AD and food waste processing facilities are cropping up all over the world, but there are

a few things that make ReFood special. Firstly, businesses do not have to wait to have their food waste collected; collections take place daily and in some cases twice a day, meaning the waste doesn't sit festering outside the restaurant, shop or school. As well as taking waste away, ReFood's designated team provides freshly sanitised bins. Its fleet of 40 vehicles are all cycle-friendly, glass-sided cabs, with multiple mirrors and cameras to ensure maximum visibility; this is hugely beneficial in a city like London, where the relationship between cyclists and motorists is fraught, at best.

The role of policy

Around 30,000 cubic metres of gas is pumped from ReFood's Dagenham site into the National Grid. Simpson describes the facility as the "show piece" for the company – it is where government officials are shown around to learn just how beneficial AD could be, with greater support.

According to Simpson, the technology is in place, but the UK Government needs to provide more funding and incentives for facilities like ReFood to reach their full potential. "There is demand for green, renewable energy, but there needs to be support at government level to advance policy, support the demand and boost supply," said Simpson. He added that the Landfill Tax also has a huge role to play. The tax was introduced to penalise companies for sending waste to landfill. Currently, the UK Government makes a considerable profit from the tax. According to Simpson, if a landfill ban was introduced, the government would need to recoup the money elsewhere. "England is still permitting food waste to go to landfill," he said. "It's crazy."

The relationship between facilities like ReFood and local councils also plays a large role in how successful AD is in the UK. Simpson recounted a troubling story of ReFood bidding for a contract in Westminster to handle food waste. He said that when the details of the tender were released, ReFood and other AD plants in London were excluded due to the 20-mile radius, by just one mile. He argued that Westminster was aware that this could exclude these facilities: "Why can't London process London's waste? If the food waste is processed elsewhere, such as Herefordshire, the energy isn't coming to London either. It's breaking the cycle."

Simpson's frustration is clear, particularly when it comes to the consumer. "The frustrating thing is the user is doing the right thing. They are trying to do their bit for the environment by recycling food waste and plastics, but they are wasting their time if the infrastructure isn't in place to process food waste properly."

In cases like ReFood, what would otherwise be wasted is being put to excellent use. However, there are examples of crops being grown specifically to be used in AD plants, an issue that Simpson has raised with the National Farmers Union in the UK. "Crops should only be used once we have run out of food waste to process," said Simpson. "Let's deal with the food waste first and then, as a last resort, we could use crops."

The solution

"The solution needs to start with the rule-makers," said Simpson. Without real policy change, AD can only go so far. "Scotland is doing something about it, why can't England? Scotland has proved that if you focus on the issue then you can deliver a solution.

"There is a network of 400-500 AD plants in Britain. The infrastructure is there, but the government fears time and cost implications."

Simpson also agreed that there is room for improvement regarding the public sector. ReFood already converts waste from the retail and hospitality sectors, but there are other opportunities. While ReFood is currently at capacity, the issue with AD facilities comes down to a "chicken and egg" situation, according to Simpson: "There's an appetite for renewable energy, the expertise is available, but the feedstock isn't. The lack of joined-up approach is what frustrates operators like us. We have a tried and tested model that works. The icing on the cake will be the landfill ban." ●

For more information:
Visit: www.refood.co.uk

Stephen McCulloch of DMT Environmental Technology explains how the company's new service can support businesses with biogas upgrading projects

A helping hand with biogas upgrading

Stephen McCulloch of DMT Environmental Technology

Could you tell our readers about yourself and your role at DMT?

With more than a decade's experience in the biogas industry, I have a solid track record in delivering pioneering gas-to-grid projects. Areas of particular expertise include technology identification, the biomethane fuel supply chain and understanding the financial viability of major projects. This, alongside my continued work with industry influencers and the government, has helped to create a successful infrastructure for the biomethane to grid market. I was appointed UK business director for DMT Environmental Technology in 2017 and currently, I'm working on our Total Solutions Provider concept, alongside a project for delivery in Scotland in 2020. In the future, I'm looking forward to expanding our portfolio with projects across the globe.

Could you explain the process of biogas upgrading?

Biogas is produced by degrading waste biomass such as manure, expired food products, agricultural waste and sludge, via anaerobic digestion (AD). However, during the digestion process, harmful chemical components are produced (carbon dioxide [CO_2], hydrogen sulphide, siloxanes and volatile organic compounds [VOCs], among others). Using membrane gas separation technology, these unwanted compounds can be removed and the gas effectively upgraded to create pure biomethane.

There are several options when upgrading biogas. For almost all situations, the DMT Carborex® MS offers the best economics and several technological advantages. Based on an ingenious, multi-stage, highly-selective membrane, the technology removes CO_2 by preventing its flow through the dense, polymeric membrane.

The Carborex® MS is a compact, modular and containerised unit, which uses highly-selective membrane technology to upgrade biogas. The resulting biomethane has a methane concentration of >99% methane, which greatly reduces the consumption and cost for propanisation. The biomethane can be injected directly into the local gas grid, or further compressed for use as vehicle fuel. The CO_2 is recovered as >99.5% pure, while up to 70% of oxygen is also removed. While systems like the Carborex® MS require power to function, they are not reliant on chemicals or water to upgrade biogas.

What are the greatest challenges faced by customers during biogas upgrading projects, and how does DMT help with these?

Biogas facilities can be a highly lucrative investment opportunity, capable of achieving a return on investment in less than seven years. Sites require minimal maintenance, can operate relatively self-sufficiently, can begin generating revenue instantly and, thanks to fixed government subsidies, will guarantee income for years to come. However, building a new biogas facility is highly complex. Therefore, the go-to approach has been to employ a selection of specialist sub-contractors, each given a specific task, role or area in parallel. While many hands make light work, it can also often make the build process somewhat disjointed.

Take the six stages after gas leaves the digester, for example (pre-treatment, compression, membrane separation, propane injection, quality control and connection to the gas grid). Despite only taking up a relatively small space footprint on site, responsibility is typically shared between several companies. A small contract issue, inexperienced workers, incorrect paperwork or delays to just one of these teams can prove detrimental to the efficiency of the entire build. Misjudging remit or poor fitment results in unexpected additional costs and unnecessary project delays.

A delayed completion not only affects the payback period, but in the worst-case scenario it can be the difference between achieving or falling short of a subsidy deadline. For investors, simple mistakes can therefore cost hundreds of thousands of pounds. Minimising the risk of delays is therefore important in securing project financing. Rather than multiple contractors and more risk of possible delays, the market is pushing for a new approach — a solution that provides a single point of contact, while maximising cost efficiencies.

You recently launched TSP to support customers with their biogas projects. Could you tell us more about the TSP service and how it benefits customers?

Total Solutions Provider (TSP) is our end-to-end project partnership that supports the customer from the moment biogas leaves the digester to when it's injected directly into the grid. From planning support and finance provision, to equipment supply, installation and commissioning,

TSP guarantees a seamless, integrated and high-performing solution to meet exacting site requirements.

While most equipment suppliers will only provide the upgrading unit, TSP also covers the specification and installation of pre-treatment technology, grid entry/natural gas kiosks, interconnecting pipework, electrics and export to grid connection. A key part within the TSP service is dealing with the gas networks and following their strict documentation protocols – a vital area if projects are to achieve their deadlines; not only for installation of equipment but also making sure all the correct documentation is correctly submitted and signed off.

TSP takes away the concern of having to deal with different contractors and the risk of overlooking something, resulting in possible delays. We want our customers to feel at ease throughout the project. A smoothly running biogas upgrading plant is a benefit for all parties involved and decreases the return on investment time, making it more attractive for investors. An investment in a biogas upgrading plant that runs smoothly, has low maintenance, performs from the beginning and generates income from the very start is highly attractive.

Do you think TSP will prove successful?

We believe that TSP will prove hugely popular with the biogas industry. Removing the pressure of deadlines, strict requirements and paperwork means our customers can focus on their business. Instead of a complicated, disorganised process, TSP offers the comfort of a single, efficient point of contact.

How is the TSP approach different to the approaches of your competitors?

When it comes to supplying biogas upgrading equipment, most companies will only provide the separation unit. This fails to address pre-treatment, compression, propane injection, quality control and connection to the gas grid, which are left to other (often less experienced) contractors to deliver. TSP offers a start-to-finish approach that optimises site performance and guarantees a solution you can count on. Our ability to consult with clients to deliver the perfect upgrading solution, while providing unmatched support and expert consultancy throughout the whole process, sets us firmly apart from the market.

What can you tell us about your first TSP project in the UK? Have you rolled-out TSP internationally?

We have just completed our first TSP project in the UK and, already, it has proven a huge success. We were responsible for delivering and integrating the six stages after gas leaves the digester, which has resulted in a high-performing, highly-efficient biogas plant. We recently received another TSP order and we are looking forward to expanding our portfolio with similar projects and new customers.

Internationally, we've applied the TSP approach to multiple facilities in the US. By taking away the unnecessary complexities of building a biogas plant, we have reduced customer risk and helped our customers to meet strict deadlines.

In your opinion, to what extent can biogas support Europe's net-zero targets and help to achieve a circular economy?

Biogas is capable of contributing significantly to a circular economy, while consequently tackling air pollution and alleviating our reliance on fossil fuels. Its clean credentials, efficient properties and low emissions when used as vehicle fuel are hugely beneficial.

Biogas plants have the ability to convert unwanted waste into renewable, decentralised, low-carbon fuel, while producing fertiliser that can be used to improve crop growth as a sustainable by-product – an excellent example of a circular economy.

What's in store for DMT in 2020?

We have a number of exciting plans for 2020, but our key priority is to roll out the TSP service across multiple markets. We've recently received another TSP order and we are looking forward to expanding our portfolio with similar projects and new customers. We have noticed a dramatic change in requirements from the biogas industry and believe that TSP offers an approach that customers are looking for.

For more information:
Visit: www.dmt-et.com

Pump and mixer manufacturer Landia assisted UK-based Cannington Bio Energy in solving grit issues at its anaerobic digestion plant

Landia pumps help alleviate grit issue at Cannington Bio Energy

A decade since it began operations, Cannington Bio Energy's track record is impressive — with volumes of waste arriving, waste being treated and green energy being produced. If only it was as simple as all that.

In the demanding waste-to-energy industry, the Cannington site in Somerset, UK is a place where improvements through careful fine-tuning never stop — the company is always learning and never afraid to meet the challenges of producing biogas head-on. The contents of thousands upon thousands of food waste caddy bags are not a pretty sight, and they certainly don't smell of roses, but this is a centre of excellence with a refreshing and very down-to-earth balance of science and common sense that the anaerobic digestion (AD) industry can learn a great deal from. From the unfortunate avalanche of unwanted post-Christmas food, discarded Mother's Day flowers, to some of the wild variances in food waste — it pays to keep everything as balanced as possible to accentuate the gas yield.

Paul Barrass from Cannington Bio Energy (right) with Paul Davies from Landia

As a site that, before AD, stored upwards of 10,000 tonnes of fruit juice and food ingredients at -14˚C to ambient temperatures, there was a significant challenge and opportunity to fight back against an ever-increasing electricity bill that had risen to £250,000 (€291,644) per annum. Since investing in an AD operation — and with an enthusiastic and determined eye for continuous improvement — there's been no turning back.

Like almost every AD operator, Cannington is no stranger to the world of grit that prevents digesters from producing as much gas as they should. During its recent clean-out revolution — given the massive volume (60,000+ tonnes per annum) of waste material that is handled at the plant near Bridgwater — it wasn't a big surprise that in the worst case, one of its 3,000-tonne tanks was holding a whopping 750 tonnes of grit (mainly plastics and metals). No self-respecting AD plant should tolerate this, yet in truth, many operators simply do not seem to know how much grit is clogging up their digesters and pumps, suppressing their performance and creating so much maintenance work downtime.

'Using valuable energy to mix grit is not acceptable'

"As part of our site progression and expansion, we knew it was time to give our digesters an overhaul," says Paul Barrass, Cannington's engineering manager. "Using valuable energy to mix grit is not acceptable — as well as the wear and tear on pumps and ancillary equipment. You could feel the cold and hot spots on our digesters, which tell you immediately that the dead spots represent a loss of earnings.

"A build-up of grit very much comes with the territory, but you can't just leave it indefinitely — so in addition to looking at the types of waste we use and how best to combine them, we've introduced a powerful new

The Metamo degritter works with the Landia chopper pump to remove grit from the substrate before it goes to the digester

Landia now has 21 pumps and mixers at Cannington Bio Energy

degritter and upgraded the pump that accompanies it to optimise our results."

The new degritter comes in the shape of a simple hydrocyclone from Metamo Process Technology. Capable of treating 60m³ per hour, it can remove up to 240-300 litres of grit from the substrate before it goes into the digesters at Cannington. Importantly, compared to other degritters, it had the small footprint required for the Somerset site.

Barrass adds: "With no moving parts to wear out we can see already that it will reduce our maintenance costs — and working in sync with a very good pump from Landia, it deals with all the grit, bones, eggshells and such like that arrive in the food waste. We get plenty of cutlery too, which I'm sure people don't mean to throw out, but that would be asking a bit much! With crops such as maize and sugar beet from our own land that make up around half of our feedstock, we already end up with a good quality digestate, but the Metamo degritter will make it even cleaner and better."

The degritter needed a pump that that could provide sufficient pressure, as well as prove resilient to the tough application, which is where Landia — already with a long-standing track record at Cannington- came in. Armed with acid-proof coatings for food waste and designed for hard-to-handle mediums, the Landia chopper pump and the Metamo degritter work together seamlessly, despite the dry solids content of 18%.

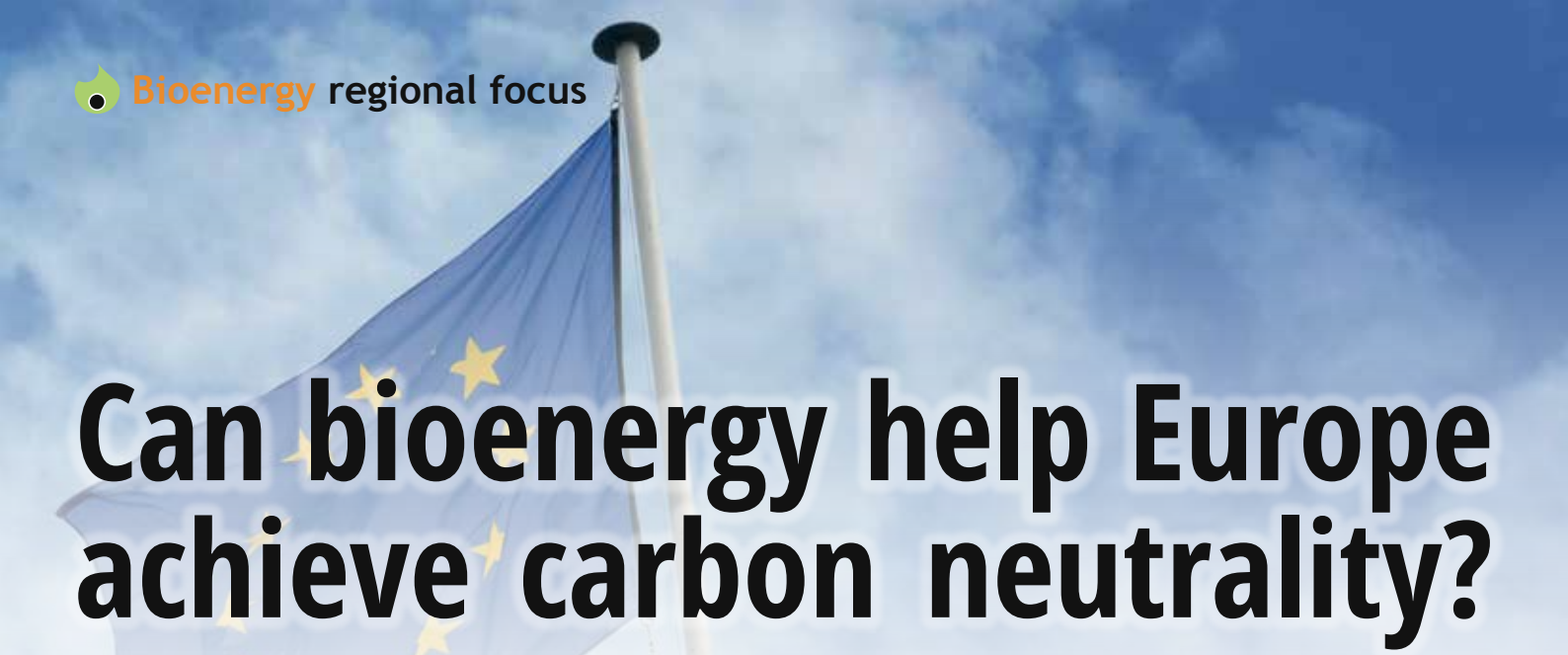
Boosting income

Mike and Tim Roe (the pioneering father and son team who own Cannington) very wisely had the foresight to design their process for flexibility in feedstocks — and true to this day, always look for enhancement. Almost 10 years ago when the AD operation began, they installed a Landia POP-I mixer at the front end to keep solids in suspension for the main reception tank. Then, for a separate feedstock holding tank, they soon introduced a submersible Landia chopper pump to replace a unit from a different manufacturer that was proving ineffective in handling one of the chosen feedstocks of corn. The Landia chopper pump immediately accelerated batch times.

From potato and arable crop farmers who then diversified into cold storage, bioenergy and recycling, Cannington now has its combined heat and power (CHP) facilities producing a plant output of 2MW — as well as an additional 1000m³-plus of refined gas.

Income from waste and the AD-generated electricity that is sold into the UK's National Grid accounts for about half of Cannington's income. Approximately 1,000kW is utilised to power the site with around 1,000kW exported to the grid. The site at Bridgwater has now grown to an impressive three digesters, a pasteurizer, a pre-heat tank, plus another five holding tanks — one for slurry at the back end — also discharging to lagoons. Here again, a Landia pump was called in to replace an existing unit that despite managing the 35m head required to make the final discharge to the digestate lagoons, would take it 24 hours and suffer from significant wear and tear. However, the Landia MPTK chopper pump, which also has to pump 250m horizontally as well as 35m vertically, proved far more resilient — and does the same job — in just two and a half hours. This has created major benefits back down the production line. ●

For more information:
Visit: www.landiaworld.com and www.canningtonbioenergy.co.uk



Can bioenergy help Europe achieve carbon neutrality?

Bushfires and Brexit raise Europe's bioenergy temperature for the new decade

The opening of a new decade sees European bioenergy producers poised to play a major role in support of the region's 30-year drive towards carbon neutrality.

The need for change has arguably never been more graphically illustrated than by the raging bushfires in Australia and the devastation they have caused in recent weeks to people, their homes and their livelihoods. Constant images of burnt-out buildings, scorched pastures and dead animals have heightened the climate change debate in that country and around the world, coming on the back of deforestation issues in the Amazon and the massive media attention surrounding Swedish climate campaigner, Greta Thunberg.

While the darkened skies over Australia have served as a sharp reminder of the challenge we face, the task of actually reducing greenhouse gas (GHG) emissions remains as elusive as ever, despite the high profile unveiling of the European Green Deal (EGD) at the end of 2019.

Although the EGD is undeniably high in aspiration, the key question for the architects of the new deal centres on whether or not the policy's aims and objectives will enable Europe's politicians and producers to come together in delivering the solutions being sought, a point put by *Bioenergy Insight* to Giulia Cancian, policy director of Bioenergy Europe.

"The EGD is an overall well-balanced growth plan that will steer the European Union's (EU) energy transition towards becoming carbon neutral by 2050," she said. "It's necessary now, more than ever, that existing policy tools come together as pieces of the same puzzle: carbon price, energy taxation, renewables target, state aid policy, sustainability requirements, green financing and industrial policy strategy.

"The focus on carbon neutrality is a timely one and although the EGD communication doesn't go into the details of the measures needed to achieve this goal, the European Commission is already at work on the Climate Law. We believe, in fact, that having a more ambitious GHG saving mid-term target is necessary to send the right message to the market and achieve climate neutrality by 2050."

Bioenergy Europe's view is that achieving a 55% reduction in GHG emissions by 2030 will adjust the trajectory for the EU to become carbon neutral by 2050, a position backed by the European Parliament in its first major debate on the new deal.

"This is an arduous task, however," said Cancian, "and if Europe is to achieve its targets, then the 2030 climate and energy framework must be adjusted to allow for a more rapid upscaling of renewable technologies such as bioenergy, alongside a clear plan for industry decarbonisation as well as an accelerated and robust fossil fuel phase-out plan."

Given the right climate action decisions, delivered steadily as the new decade unfolds, Bioenergy Europe is confident its producers can contribute strongly as a sector in the coming years.

"Sustainable bioenergy is ready to deliver what the EU needs in order to achieve climate neutrality; namely clean, carbon neutral, reliable and innovative forms of energy," said Cancian.

"What is missing from the long list of initiatives stemming from the EGD, however, is a clear path to transition from a fossil fuel-dominated heating sector to a sustainable and renewable-based one. The heating and cooling sector represents no less than half of the EU's energy consumption and its decarbonisation should be urgently addressed."

Brexit and EU bioenergy

Reducing the EU family this year from 28 to 27 members, due to Britain's imminent departure from the 550-million-people community, has inevitable energy implications, of course, a point that is fully appreciated by Bioenergy Europe.

"Working alongside other countries, such as Denmark and the Netherlands, the UK has been at the forefront of setting strong sustainability standards for bioenergy," said Cancian, adding that Britain's bioenergy know-how and leadership will definitely be missed.

"Moreover, innovation is a very important aspect of the UK's bioenergy industry, with one of the world's few bioenergy carbon capture and storage pilots currently under development in the UK. This is the kind of solution the EU will need to address to achieve its climate neutrality target on time.

"We hope therefore that future cooperation between the EU and UK will remain strong and that the climate and energy legislation on both sides of the new relationship will remain convergent, giving confidence to the total marketplace."

World of opportunity

Posing a similar question to Jonathan Scurlock, chief adviser of renewable energy and climate change with the UK's National Farmers' Union, produced a response that highlighted the extreme highs and lows faced in recent months by all European business leaders who are seeking to develop their bioenergy plans for the next three decades.

"There is a world of opportunity looming for bioenergy in Europe, 20 or 30 years hence," he said. "As of today, however, it's quite a challenge figuring out how businesses and producers should be investing in the here and now, given the remaining uncertainties attached to the reaching of a new UK trading relationship with 500 million other Europeans.

"There are also questions surrounding whether or not future British standards of production will be aligned with those of Europe or end up being compromised in some sort of substandard trade deal, especially with many in the UK expressing concerns about potential trade deals with the US, which is clearly dancing to a different (climate) tune at present.

"Will the UK, for example, be able to unilaterally implement anything like a carbon border tax once the country reaches its new ex-EU status? Such a tax is currently not compliant with World Trade Organisation (WTO) rules and WTO rules tend to be gridlocked, taking forever to be changed.

"Many people, however, think that the early movers towards net zero emissions are going to have to implement some sort of carbon border controls and ways of assessing the GHG footprint of imported products of poorly known provenance. Otherwise, all you will do is damage low carbon growth opportunities at home while effectively exporting industry opportunities to producers in other countries, who are free to produce to lower standards."

Having already locked itself into an end-of-2020 timetable for securing a trade deal with the EU, the UK Government is seen by some as being severely at risk of rushing the year's trade negotiation process. This could easily include the government's approach to energy issues, many argue, potentially ending up with a structure that won't help the UK's bioenergy industry to achieve the 'looming world of opportunity' that is out there.

Leading the EU to carbon neutrality

The task of driving Europe's energy agenda forward as we embark on a new decade is now in fresh hands, of course, following the appointment late last year of Kadri Simson as the European commissioner for energy. Coming from a background of being minister for economic affairs and infrastructure, with responsibilities for energy policy, in her native Estonia, the new commissioner has already pledged to lead the EU's transition towards a climate neutral economy and society.

Describing this challenge as representing an extraordinary opportunity for Europe, she has further promised to deliver 'concrete actions' to the benefit of all European citizens.

Questioned by the European Parliament as part of her pre-appointment vetting process, Simson also said she would address key market concerns for those businesses and producers, which operate at the sharp end of the industry and who need to make decisions daily, not in 30 years' time.

"Open and competitive markets in Europe are the most effective way to secure low carbon energy at affordable prices," she said. "Well-functioning electricity and gas markets, based on fair competition between energy suppliers across borders, empowering consumers and ensuring the integration of renewable energy, will help us to deliver a decarbonised, competitive and innovative energy sector.

"In order to deliver greater benefits to consumers, we need to address the missing links in the energy system and the new trends in our markets. Stopping unnecessary subsidies to the most carbon-intensive fossil fuels plants under capacity mechanisms is another key provision of the new electricity regulation that will favour the transition and requires close monitoring. In the context of security of supply legislation, I will also monitor the full implementation of cross-border solidarity provisions."

Newly appointed politicians love to talk about their first 100 days, of course, and how they plan to shake things up during their so-called 'honeymoon period'.

For Simson, her first 100 days pledge includes a vision for rising amounts of investment in the sector, aligned with the need to review current legislation, especially in light of the increased ambitions laid out within the EGD.

She's already spoken of needing €260 billion a year of additional funding to deliver these ambitions, shared between improving Europe's use of current energy resources alongside investing in many new forms of clear power. Hopefully, her new money pot will include a generous injection of finance in support of bioenergy projects and innovations, helping to ensure that the sector's 'world of opportunity' is properly realised, and that all this happens 'sooner rather than later' as our new decade unfolds. ●

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

The US Industrial Pellet Association and Natural Resources Defense Council answer the biomass sector's most burning question.

To what extent can forest biomass replace fossil fuels as a sustainable energy alternative?

Seth Ginther, executive director of the US Industrial Pellet Association

Seth Ginther
executive director of the US Industrial Pellet Association

According to the world's foremost climate experts, biomass is a necessary part of any modern-day climate strategy, both for renewable energy production and for its contribution to healthy, growing forests.

Chief among these scientific bodies is the United Nations' Intergovernmental Panel on Climate Change (IPCC), which strongly supports this conclusion. In the organisation's special report, released in August 2019, the IPCC indicated that biomass and sustainable forestry are critical components in keeping the Earth's warming below 1.5˚C. Specifically, the IPCC stated that sustainable forest management "aimed at storing carbon while yielding timber, fibre, and bioenergy" will produce the best results for the climate. The IPCC also indicated that all scenarios to limit global warming include combinations of bioenergy, afforestation and reforestation, and carbon capture — all three of which are supported by the biomass industry.

Other international experts agree, including the International Renewable Energy Agency[1], the European Forest Institute[2], and the US National Association of University Forest Resource Programs[3], among others.

> "Historically, strong demand for forest products has resulted in private landowners continually planting trees instead of converting their property for other, more lucrative uses that would permanently destroy their forest"

With strong backing from the scientific community, it is no surprise that biomass is supported by governments around the world as a tool to meet ambitious net-zero emissions goals. But there is more work to be done, and the US stands poised to meet this challenge.

The US is a global leader in the production of sustainable biomass, exporting more than 7 million metric tonnes of wood pellets in 2019. However, a recent report[4] projects that this is actually well below the US' sustainable capacity. In fact, the research shows the sustainable export potential from the southeast US is more than double its current production levels. The reason for this is straightforward: forests and carbon stocks in the southeast US are growing consistently year-over-year and a stronger demand for wood biomass increases incentives for landowners continue replanting and expanding their forests.

The southeast US is among the world's most sustainably-managed 'wood baskets'. This region encompasses about 1.2 million square kilometres of forests, which is larger than the entire land area of France, Germany and the UK combined. What's more impressive than the scale of this natural resource is how well it's managed. According to data from the US Department of Agriculture, today, 1.8 trees are planted for every tree that is harvested in the region. That is why forest inventory and forested area has steadily increased since the mid-1950s, while carbon stocks have more than doubled during this time span, despite the pressures of record population growth and urban development.

One of the most critical yet overlooked aspects of this success story is the power of market incentives. More than 87% of the forest land in the southeast US is owned by private citizens. Historically, strong demand for forest products has resulted in private landowners continually planting trees instead of converting their property for other, more lucrative uses that would permanently destroy their forestlands. It is well-established that urban development is by far the number one threat to forests in this region, not demand for wood.

Wood bioenergy accounts for just 3% of all wood fibre[5] harvested in the southeast US each year. While this is a small fraction relative to the overall forest products sector, wood bioenergy still provides a critical market for low-value wood to private landowners. In fact, a recent report from the University of Georgia and the US Forest Service[6] projects that the absence of a market for wood bioenergy would actually result in the loss of up to 15,000 square kilometres of US forestland, roughly the size of the Netherlands, over a 10-year period. So not only is demand for biomass good for US forests, but loss of this demand could result in less forestland overall.

The southeast US already has a proven track record of helping countries around the world displace millions of tonnes of fossil fuels and achieve record emissions milestones with sustainably-produced biomass, but there is

more work to be done for the industry's potential to be fully realised. From replacing fossil fuels, to supporting deployment of wind and solar energy, to bioenergy with carbon capture and storage, the future for US-produced biomass as a climate mitigation tool is bright.

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Sasha Stashwick, senior advocate at the Natural Resources Defense Council

Sasha Stashwick
senior advocate at the Natural Resources Defense Council

It can't. Biomass energy has proven itself to be unsustainable in every way. Scientists have made clear that we now have a little over a decade to cut greenhouse gas (GHG) emissions by half, and 20 years after that to cut them to net zero, to stabilise the rise in global temperatures and avoid the worst impacts of climate change. There is no time — or money — to waste on false solutions.

> "...cutting down older trees and replacing them with saplings reduces the amount of carbon stored in that forest, even under a best-case scenario in which harvested trees are immediately replanted"

Any energy source that increases concentrations of heat-trapping carbon dioxide (CO_2) in our atmosphere over the next decades must be phased out immediately, alongside the use of fossil fuels like oil, coal and natural gas. At the same time, any incentives used to support such dirty energy sources must be immediately redirected to genuinely zero-emitting and renewable energy technologies like solar, wind and battery storage. Given this reality, forest biomass burned for electricity has no role to play in replacing fossil fuels as a sustainable energy alternative. Here's why:

Per unit of energy, biomass power plants emit more CO_2 from their smokestacks than coal plants. And, in each specific wooded area, cutting down older trees and replacing them with saplings reduces the amount of carbon stored in that forest, even under a best-case scenario in which harvested trees are immediately replanted. Taken together, this means that for decades — or even more than a century — biomass energy exacerbates climate change.

Even when biomass energy is generated by burning genuine forest residues — the leftovers from logging operations, like tree tops and limbs — the result is increased CO_2 in the atmosphere over several decades. This is not compatible with the speed at which countries must cut emissions to meet their climate targets under the Paris Agreement or limit global warming to 1.5˚C or 2˚C.

Nevertheless, the European Union (EU) erroneously decided to categorise biomass energy as a form of renewable energy and treats biomass as 'carbon neutral', effectively placing it on par with solar or wind. On top of that, EU member states are providing huge financial subsidies to incentivise this practice. In some member states, biomass energy subsidies now make up a large share of all subsidies available to renewable energy sources. While biomass is burned for multiple energy uses, most subsidies are directed toward burning biomass in power plants for electricity and for combined heat and power (CHP) generation. This usage is particularly destructive for our environment and climate because it generally relies on biomass taken directly from forests, and, in the case of the UK, often whole trees sourced from clear-cuts of mature forests.

A November report[1] published by my organisation, the Natural Resources Defense Council, based on research from the consulting firm Trinomics, found that 15 EU member states spent more than €6.5 billion in 2017 subsidising bioenergy. More than half these subsidies were paid out in just two countries: Germany (€1.7 billion) and the UK (€1.6 billion).

According to the report, the UK is not only a top subsidiser of bioenergy but relies most heavily on the most damaging type: burning forest biomass for electricity generation. Unlike other EU member states, more than half of total biomass use in the UK was to generate electricity in the least efficient type of power plant — one that produces only power and has no ability to capture and utilise the heat from burning biomass. The UK was also amongst the EU member states that spent the greatest share of its overall renewable energy subsidies on bioenergy.

In 2018, the UK Government granted a record-setting £1.3 billion (€1.55 billion) in biomass subsidies to power stations alone, with almost all of it going to a single company: Drax. Meant to promote clean, renewable energy, these subsidies were essentially wasted.

These subsidies must end now. Countries considering new policies and incentives to replace ageing fossil fuel-based energy infrastructure, both inside and outside the EU, must rule out incentives for burning forest biomass instead of or alongside coal. And in EU countries where massive biomass industry subsidies have become entrenched, such as the UK, policymakers must immediately redirect this financial support toward real clean energy.

UK policymakers themselves appear to be recognising that burning biomass in power plants is not a climate solution. In 2018, the nation set a new, lower GHG emissions threshold for biomass power plants supported by its current renewable energy subsidy scheme, known as Contracts for Difference. Then, in 2019, it said no other plants like Drax's coal-to-biomass conversions will qualify for subsidies. But the government also created a giant loophole for existing biomass plants, most notably for Drax, and maintains it will continue paying out existing subsidies, in some cases for as long as another 18 years. These half measures are not enough. With the UK set to host the next global climate summit at the end of 2020, the new UK Government must go further and immediately sunset existing biomass subsidies, and redirect funds to cheap, clean and reliable energy sources like solar and wind.

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For more information:
Visit: www.nrdc.org

Christoffer Boman of Bio4Energy shares details on recent projects seeking sustainable bioenergy solutions in Africa

Exploring sustainable bioenergy solutions

Researchers at Bio4Energy, a research environment based in northern Sweden, have been exploring sustainable bioenergy solutions in sub-Saharan Africa. Christoffer Boman spoke to Bioenergy Insight about his research on the development of clean-burning biomass gasification technology for household cooking and medium-scale electricity production on the continent.

Robert Lindgren fuelling the reactor with coffee-husk pellets

Can you tell our readers a bit about yourself and Bio4Energy?

I am a researcher at Umeå University, Sweden, focusing on the combustion and gasification of biomass and particularly trying to understand the underlying thermochemical reasons for, and find solutions to, both technical process-related problems and air pollution issues. I have been working in this field for about 20 years now, mainly in the Nordic and European context. However, for a few years now I have been leading some projects on bioenergy in developing countries, which has brought new perspectives and challenges, and at the same time also enriched both our research group, as well my skills as a researcher, immensely.

Within Bio4Energy, I work within one of seven research and development platforms, called Bio4Energy Environment and Nutrient Recycling, where our research is focused on different environmental and sustainability aspects of forest and organic waste-based biorefinery processes. For example, we are studying the emissions of air pollutants from different biomass combustion systems, with particular emphasis on the formation of very small particles and their health and climate-related properties.

Over the last four years, researchers within Bio4Energy have been working on a project to develop clean-burning technology for household cooking and medium-scale electricity production in Africa.

What can you tell us about this project?

The long-term vision for this project is to develop effective and sustainable use of local biomass resources from agroforestry, improved farming and industrial residues in countries like Kenya and Rwanda, to promote the implementation of clean cooking solutions, biochar use and renewable electricity production. Through our cross-disciplinary approach, we link technical research on biomass combustion and gasification with research on sustainable forestry and agriculture, as well as health and climate effects of air pollution, to support the development of new bioenergy solutions in these countries. This is a broad and fruitful collaboration between our team at Umeå University, other universities in Sweden, as well as African partners, both in Kenya and Rwanda.

We hope to identify the most beneficial and sustainable bioenergy cooking systems and practices, using efficient combinations of different stove technologies and different locally available biomass fuels. We believe that the results of this project can be used to support science-based technological developments, policymaking and the implementation of new sustainable bioenergy transitions in sub-Saharan Africa.

Our African bioenergy projects comprise broad national and international collaborations supported by different funding bodies, not directly related to the mission and activities of Bio4Energy. Still, the competencies and multidisciplinary collaborations established within Bio4Energy have been vital for our team working in the African context. The research questions that we are working on are related to several of the focus areas and platforms of Bio4Energy, for example, thermochemical energy processes, biomass resources and upgrading, as well as bioenergy and biorefinery-related environmental and system perspectives.

The project involves developing medium-sized electricity facilities using biomass gasification. What can you tell us about the technology/processes being used?

The production of electricity locally is a key condition for sustainability in many remote areas. In this project, the most important outcome of such local power supply enabled by a gasification technology is the possibility to upgrade biomass, for instance by milling or making pellets from biomass, to be used in cleaner cooking solutions. Excess electricity can be used for a range of industrial or domestic purposes, and the by-product biochar (carbonised biomass) can be used in agricultural or technical applications.

The existing use of internal combustion engines for

small-scale power generation in developing countries, in particular in rural areas, makes biomass gasification a directly applicable alternative to diesel-based systems. This is well known and different technology solutions are available today. Overall, the most suitable small-scale fixed-bed gasification technology is the downdraft design. It produces a relatively clean and tar-free production gas, with costs for manufacture and operation remaining relatively low. One requirement for this kind of gasifier is, however, the use of upgraded (e.g. pelletised) fuels, which is a preferable fuel type for modern advanced cookstoves. Still, one major drawback of the fixed-bed biomass gasification technology is related to its operation with ash-rich fuels, which is often the case when forest, industrial and agricultural residues are used.

In our research, we evaluate the operation of fixed-bed downdraft gasification technology in detail for challenging ash-rich biomass fuels. The laboratory-scale pilot reactor is a small-scale (up to 10kg of fuel per hour) gasification unit with flexible air supply and reactor design, optical sensors, features to control the bed temperatures, and extensive monitoring and sampling possibilities. We will specifically explore the influences of fuel properties and process conditions of the producer gas quality, ash behaviour and biochar properties.

Why did the researchers at Bio4Energy decide to launch this project?

It all started in 2012, when a very dedicated and enthusiastic student approached me, wanting to do a Masters' thesis project on bioenergy in Malawi. He had lived in African countries and wanted to apply his new knowledge in the area of energy technology. For me, this was a great opportunity to change focus from the Nordic and European research and development context. I have always been interested in global perspectives and there are so many combined challenges and opportunities with bioenergy transitions in developing countries, where I hope that Bio4Energy and I can contribute. So, together with the Masters student, I decided to go for a larger initiative, which was granted funding in 2015 by Formas, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning. It allowed us to start a PhD project on bioenergy in developing countries. I am very happy that my former student, Robert Lindgren of Bio4Energy, pushed me and our research team in this direction. In the last few years, we have broadened our networks and established very fruitful contacts with researchers and organisations in both Kenya and Rwanda.

What's next for the biomass gasification venture in Africa?

Researchers are presently evaluating the gasification and biochar properties of different relevant biomass fuels in a laboratory set-up at Umeå University, with the aim of future field testing. These activities will then be linked to a newly initiated research and capacity building programme in Rwanda, funded by the Swedish International Development Cooperation Agency, on sustainable bioenergy, waste management and air pollution control. We are planning to establish a test site in Rwanda the coming years, in collaboration with the University of Rwanda, including a pilot plant for fixed-bed gasification. We expect it to be in operation within 2-3 years. We also hope that we can help other researchers within the team to demonstrate the whole new bioenergy value chain, from production of upgraded solid biofuels, clean and efficient cooking and electricity, to the use of biochar in both agricultural and industrial applications. ●

About Bio4Energy

Bio4Energy is a research environment based in northern Sweden, developing tools and methods for conducting efficient and sustainable biorefinery, with end products such as advanced biofuels, 'green' chemicals and smart bio-based materials. While the core of Bio4Energy is a research programme of 220 scientists, the research environment also includes an industrial network, and advisory board and research infrastructure. Three universities and several entities from the Swedish research institute RISE are part of the constellation. Umeå University, the Luleå University of Technology and the Swedish University of Agricultural Sciences at Umeå are the academic partners. In Bio4Energy, RISE Innventia and RISE Energy Technology Center represent a division of RISE called RISE Bioeconomy. Bio4Energy is funded by the Swedish Government, as one of its 20 national Strategic Research Environments.

For more information:
Visit: www.bio4energy.se

Frank S. Lund of Aalborg Energie Technik in Denmark makes the case for biomass as part of a sustainable future

Making the case for biomass

As an industry, the bioenergy sector has many new influential trends; global warming, competing technologies, lowering prices, questioning whether bioenergy is green. Thinking about our industry's image and how we minimise the effects of climate change is more crucial than ever.

The bioenergy sector creates green energy from the combustion of residues from forests, agricultural biomass, waste from industries, as well as from cities. We produce energy 24/7, regardless of whether the sun is shining or the wind is blowing. With biomass, we have a very efficient and natural battery to store energy; a battery that stores energy for six months to 50 years and that other technologies are desperately looking to develop.

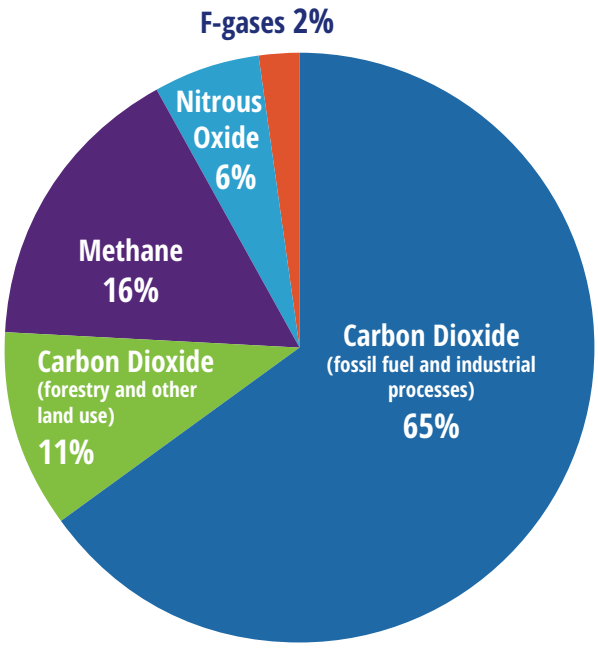
The local circular economy is supported when implementing a biomass-fired plant; the fuel is locally sourced, the resulting heat and power is used locally, and the digestate is re-used as fertiliser by nearby farmers and forest industries.

It is estimated that the bioenergy sector has nearly 700,000 employees in Europe – more than twice the number of employees in the wind energy sector and more than five times the number in the photovoltaic and solar thermal sector.

Ideally, biomass-fired plants have high fuel flexibility, utilising low value wood (treetops, branches, bark, stumps), agricultural residues (straw, prunings), agri-industrial by-products (olive stones, sunflower, nut shells, meat and bone meal, chicken litter), miscanthus, short rotation crops (SRC), city-related residues and industrial by-products. Treetops, branches, bark and stumps are not used for paper, furniture or construction, and this low value wood is likely 50-70% of a tree. We can utilise this low value wood left in the forest that would otherwise release methane into the atmosphere.

While carbon dioxide (CO_2) is typically painted as the 'bad boy' of greenhouse gases (GHGs), the environmental impact of methane is more than 25 times that of CO_2. Therefore it is recommended that we (the bioenergy industry) pick up the residues in the forest and burn them to keep emissions down, rather than leaving it to rot. Globally, it is estimated that methane forms 16% of GHG emissions, which means that it is much more important to reduce methane than CO_2. The release of methane also comes from the production and transport of fossil fuels, digestive processes in the agricultural sector and waste going to landfill.

Biomass left in agricultural fields is hardly used today, and therefore has great potential. There is also still a lot of biomass and waste, such as demolition wood, currently going to landfill, waiting to be utilised. The situation is the same with a lot of agri-industrial by-products, such as chicken litter. Poultry farms raise chickens for 30-50 days and the waste from breeding is left on the floor in the farmhouses. The bedding is typically a mixture of straw, sawdust and paper, and this is mixed with the poultry manure. Typically, this waste has been burnt close to the farm, resulting in severe



Global greenhouse gas emissions by gas. Source: EPA

Boehringer Ingelheim, Germany

"Despite the use of wood for construction, paper, combustion etc. the European forest area is increasing by a football field each minute."

Randers, Denmark

smoke and odour from the fire. Instead, building a combustion plant that utilises the energy makes more sense and at the same time the ashes can be re-used in the fields. The environment will benefit, if the dumped biomass is combusted in a boiler instead and at the same time creates useful energy; power, steam, and/or heat. A quadruple win: fewer GHGs into the atmosphere, fewer landfills, less use of fossil fuels and the re-use of ash as a fertiliser.

Biomass-fired plants have low emissions and do not create further emissions (air, water, ash). Bioenergy is carbon neutral, as the carbon that plants photosynthesize is released with combustion, when energy is needed. The combustion of fossil fuels, on the other hand, releases carbon that has been stored for millions of years.

A new European Union emission legislation is being implemented with more stringent emissions criteria all over Europe, particularly the nitrogen oxide (NO_2) level being lowered for existing and new plants. It is also important that biomass-fired boilers do not emit other harmful emissions like nitrous oxide (N_2O), which is very harmful to the ozone layer. One tonne of N_2O is equivalent to 300 tonnes of CO_2 — N_2O is critical if you have a circulating fluidbed boiler.

Biomass plants have high availability in order to ensure a stable energy supply (power, steam or hot water) to the industry, 24/7. Industries such as chemical producers, chipboard manufacturers and paper mills need energy round-the-clock. This means that the biomass-fired plants need to operate more than 8,400 hours per year.

Noblesse oblige: We as the bioenergy sector have made significant progress during the last decades and still have many more opportunities to improve in the future. The increased use of leftover residues, better use of biomass, lower emissions and more will give us a healthier planet and greener world. ●

For more information:
Frank S. Lund is the head of strategy and marketing at Aalborg Energie Technik. Visit: www.aet-biomass.com

Bioenergy incident report

A summary of the recent major explosions, fires and leaks in the bioenergy industry

Date	Location	Company	Incident information
25/12/2019	Yorkshire, UK	N/A	More than 60 firefighters were called out to a blaze at a biogas plant in East Yorkshire. The fire was caused by 600 tonnes of vegetable oil. A total of 12 fire engines attended the scene near the town of Market Weighton at 6.30pm. According to a report by *York Press*, residents were advised to keep their windows and doors closed, although the smoke was not considered to be hazardous.
31/12/2019	Maine, US	Northeast Pellets	A fire broke out at a wood pellet manufacturing facility in Ashland, Maine on 31 December, which is believed to have been caused by a piece of conveying equipment. Firefighters were called to the site at around 6am and found smoke and sparks coming from several conveyors used to move sawdust. According to a report by *Powder Bulk Solids*, workers were starting up the equipment when the fire began. Staff and firefighters managed to put out the fire by around 6.30am. No injuries or damages were logged.
07/01/2020	British Columbia, Canada	N/A	A freight train carrying wood pellets derailed in northwest British Columbia, Canada. According to a report by *Prince George Matters*, Canadian National Railway Company said the freight train, which derailed near the village of Kitwanga at around 6am, was formed of 34 cars carrying wood pellets. No fires or injuries were reported and none of the pellets went into the Skeena River, which runs close to the tracks.

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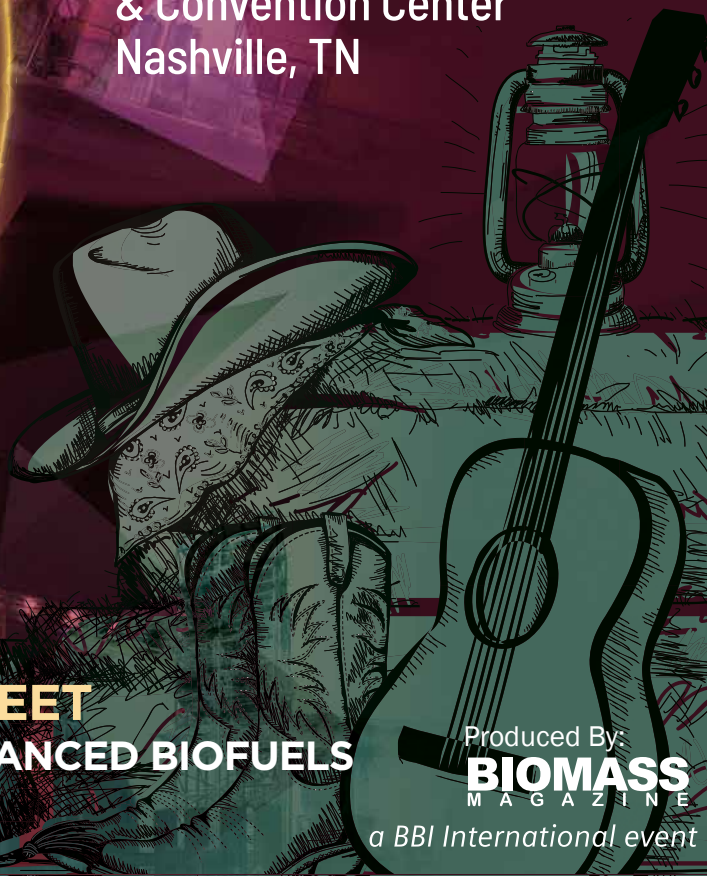

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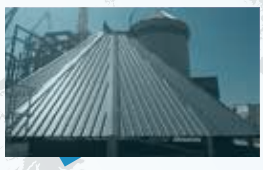

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